QU Saudi Arabia

Qassim University جامعة القصيم

# Qassim University Bulletin
## 2012

## (Science Colleges)

**Prepared by:**
**Prof. Sulaiman A. Al-Yahya**
**Eng. Asif Mahmood, Eng. Upendra Lele**

**Produced by:**
**Dr. Hassan Khalafy**

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بسم الله الرحمن الرحيم

Custodian of the two Holy Mosques

**King Abdullah bin Abdulaziz Al Saud**

May Allah Protect him

His Royal Highness Prince

**Salman bin Abdulaziz Al Saud**

May Allah Protect him

His Excellency Minister of Higher Education

**Dr. Khalid ibn Mohammad Al Anqari**

His Excellency Deputy Minister of Higher Education

**Dr. Ahmed ibn Mohammad Al Saif**

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## Preface by the University President

Qassim University is proud to present the Bulletin of 2012. This Bulletin has been published by the University Vice Presidency of Planning, Development and Quality for the guidance of students and faculty. Information about all the colleges and institutes is given in detail including programs offered, courses and faculty members. The Study Plans and Course Description have been given comprehensively to facilitate the students in the choice of courses.

We hope this bulletin with the Blessing of Allah is of great benefit and interest for the acknowledgement of effectiveness and efficiency in education to achieve our higher goals.

I ask Allah's facilitation and help for all.

**Prof. Khalid bin Abdul Rahman Al-Hamoudi**

**The President**

## Introduction

I am very glad that we are presenting this Bulletin of 2012 for the guidance and reference of students and faculty members. In this Bulletin, information about all the colleges is given in detail including programs offered, courses and faculty members. The Study Plans and Course Description have been given comprehensively to facilitate the students in the choice of courses.

In this Bulletin the information of these colleges have been included: College of Agriculture and Veterinary Medicine, College of Applied Health Sciences in Rass, College of Applied Medical Sciences, College of Arabic Language and Social Studies, College of Architecture and Planning, College of Business and Economics, College of Computer Science, College of Dentistry, College of Design and Home Economics in Buraidah, College of Education, College of Engineering, College of Medical and Applied Health Sciences in Unaizah, College of Medical Rehabilitation in Buraidah, College of Medicine, College of Nursing, College of Pharmacy, College of Public Health and Health Informatics in Bukeriyah, College of Science, College of Sciences and Arts in Bukeriyah, College of Sciences and Arts in Buraidah, College of Sciences and Arts in Muthnib, College of Sciences and Arts in Rass, College of Sciences and Arts in Oqlatu's Soqoor, College of Sciences and Arts in Unaizah, College of Sharia and Theology, Community College of Buraidah, Community College of Unaizah.

The suggestions to improve the Bulletin will be highly appreciated and in the light of the suggestion we will improve the publication to make it more beneficial and effective in the next years. We are thankful to God Almighty who has given us an opportunity to complete this project.

**Prof. Sulaiman A. Al-Yahya**

**Vice President for Planning, Development, and Quality**

# Kingdom of Saudi Arabia

Kingdom of Saudi Arabia is an Arab Muslim State with a complete sovereignty. Its religion is Islam, its constitution is derived from the Holy Qur'an and the Prophet's (peace be upon him) Sunnah (traditions), it has Arabic as the official language and its capital is Riyadh. The system of Ruling in Saudi Arabia has been a Royal System where sons and grandsons of the Kingdom's Founder King Abdulaziz bin Abdurrahman al Faisal al Saud have been to hold reins of power of the Kingdom in terms of allegiance and eligibility where Ruling has been completely based on the Holy Qur'an and Prophet's (peace be upon him) Sunnah. The power of Ruling in the Kingdom has been derived from the holy Qur'an and prophet's (peace be upon him) Sunnah that are the two regulators all over the Ruling system and all its related systems where Ruling is based upon justice, Shura and equality in terms of Islamic Shari'a.

Custodian of the Two Holy Mosques king Abdullah Bin Abdulaziz Al-Saud (1343H/1924G) is the King of Kingdom of Saudi Arabia. He was born in Riyadh and brought up directly by his Father King Abdulaziz Bin Abdurrahman the Founder of the Third Saudi State. Being much affected by his father and utilizing his experience and statecraft, King Abdullah has been loving his homeland feeling much responsibility towards the Kingdom and its citizens. In 1384H, King Faisal selected him to head over the National Guard and in 1395 King Khalid chose him to a Deputy Premiere in addition to his position as the Chairman of the National Guard. Afterwards, he was chosen by King Fahd bin Abdulaziz to be the First Deputy Premiere and Chairman of the National Guard in addition to being the Crown Prince. In Monday 26th of Jumadah the Second, all Saudi people pledged allegiance to Custodian of the Two Holy Mosques king Abdullah Bin Abdulaziz to be the King of the Kingdom of Saudi Arabia and Prince Sultan bin Abdulaziz as his the Crown Prince.

Custodian of Two Holy Mosques King Abdullah Bin Abdulaziz has achieved a set of milestones in both National And International Politics. Additionally, he has a wide range of excellent relationships with most Arab States Leaders. He has contributed in a lot of humanitarian efforts and good deeds as well.

Saudi Arabia is located in the southwest corner of Asia, the Kingdom is at the crossroads of Europe, Asia and Africa. It is surrounded by the Red Sea on the West, by Yemen and Oman on the South, the Arabian Gulf and the United Arab Emirates and Qatar on the East, and Jordan, Iraq and Kuwait on the North. Saudi Arabia's Red Sea coastline stretches about 1,760 kilometers (1,100 miles) while its Arabian Gulf coastline roughly 560 kilometers (350 miles). Estimated area of the Kingdom is 2.149790 million square kilometers.

The Kingdom of Saudi Arabia total population is 27,136,977 people, 18,707,576 of them Saudis, according to 2010 statistics, and the growth rate of the total population between 2004 and 2010 is 3.2%, while the population density is 14 people / sq km. The 2010 GDP reached with constant prices to 3.76%, the private sector contributed at a rate of 47.8%, while the GDP per capita at the current prices reached 60.066 SAR. Moreover, the gross enrollment rate in primary education in 2009 reached 99%, and the infant mortality rate for the same year reached 17.3 per thousand live births.

Development in Kingdom has generally been regarded as a discerning process dedicated to formulating a well-cultured and comprehensive social structure where community has stressed its identity and creativity. In this respect, Development has mainly been founded on affirmative collective partnership starting from planning and decision making, in addition executing and holding responsibilities reaching to utilization of fruits of development projects and programs. All such related programs have focused on Saudi people to be considered means of Development and its objective as well. The Saudi Government has consequently attached much interest to Cooperative Societies where charity works have been supported and urged by the Government. Collaboration between both Government and Private sectors has helped much in pushing Government Programs relating to Development plans. Additionally, the Government has focused on Care Program dedicated to the old-aged. It has also sought to eliminate illiteracy through opening a lot of schools for men and women over cities and villages so that such people can join the schools. The Kingdom has also paid keen attention to the orphans where related services have been implemented over the last 20 years to cherish those orphans with an attempt to eliminate the problem of mendicancy.

**Capital and Major Cities:**

**Riyadh**

Located in the central province, is the capital city of Saudi Arabia. . It is also the high-tech center of modern Saudi Arabia and houses the headquarters of the Gulf Cooperation Council (GCC).

**Makkah**

Is the birthplace of the Prophet Muhammad and the focal point of Hajj, the Islamic pilgrimage in which almost two million Muslims from all parts of the world participate every year.

**Madinah**

Is the city where Prophet Muhammad emigrated and lived.

**Jeddah**

Located along the eastern coast of the Red Sea, is the commercial capital of Saudi Arabia, and serves as an entrance to the rest of the peninsula.

**Dammam**

Is the capital of the Eastern Province. It houses the Emirate of the Eastern Province and also branches of many ministries, governmental agencies and departments. King Fahd International Airport is located northwest of the city. Dammam Port is the largest on the Arab Gulf.

**Currency**

Saudi Riyal (SR) pegged to U.S. dollar ($1=SR3.745); bank notes, in Arabic and English, in denominations of 1, 5, 10, 50, 100 and 500 riyals; coins in denominations of 5, 10, 25, 50 and 100 halalahs, with 100 halalahs equal to one riyal; metric system in use.

**Climate**

Almost the entire Kingdom is arid, although there is rainfall in the north and along the mountain range to the west, especially in the far southwest, which receives the monsoon rains in summer. Sporadic rain can also occur elsewhere, sometimes very heavily, causing serious flooding, including in Riyadh, where the air and prevailing winds tend usually to be very dry.

## Introduction of Qassim Region

Al Qassim Province is one of the thirteen administrative provinces of Saudi Arabia. It is located in the center of Saudi Arabia approximately 400 km northwest of Riyadh the capital. Qassim is the heart of the country, its population is more than a million and its area is about 65,000 km². It has more than 400 cities, towns, villages, and Bedouin settlements, ten of which are recognized as governorates. Its capital city is Buraydah, which is inhabited by approximately 49% of the region's total population. Buraydah has a typical desert climate, with hot summers, cold winters and low humidity. It is the seventh populated province in the country after the province of JizanIt is known to be the "alimental basket" of the country, for its agricultural asset.

Qassim can be reached by driving or by air. The principal means of road transport is private cars. However, some taxis are also available in all major towns in addition to Rent-a-car. Saudi Arabian Public Transport Company (SAPTCO) plies some buses between major towns. Additionally, some private operators arrange coach tours for Haj and Umra. Qassim can also be reached by air from all major airports of Saudi Arabia, like Riyadh and Jeddah. Qassim airport is about 25 Kms from the Capital city Buraydah and 40 kms from the city of Unaizah.

## Introduction- Qassim University

Qassim University was established in 2004 by merging two Qassim branches of Imam Mohammad Ibn Saud Islamic University and King Saud University. Since the establishment of the university, it has experienced a remarkable growth in enrollment and a significant expansion of faculty and its administrative staff.

The number of male and female students registered at university during 2010-11 approached 50,000 and number of faculty members and staff reached well over 4,000. At present the university encompasses 28 colleges both for male and female students.

### Location

Qassim University is located in the center of the Qassim region, 4 km north of Qassim regional airport, and covers an area approximately 7.8 million square meters in total. It is 28 Km from the main city Buraydah.

## QUALITY FOCUS

### ABET

Qassim Engineering College has been awarded the prestigious accreditation by *Accreditation Board for Engineering and Technology (ABET).*

### QS Stars

The university has applied for QS stars rating which is an extensive quality audit of the services and facilities provided by the university.

### QS Benchmarking

Qassim University is currently being benchmarked by QS against its national and international peers. The benchmarking provides a detailed map of the university's strengths and weaknesses in various academic markers.

### NCAAA

Qassim University is currently undergoing the accreditation process by National Commission for Academic Accreditation and Assessment (NCAAA).

### COE

Community College in Buraidah obtained the accreditation from The Council on Occupational Education (COE) in July 2012.

### ASIIN e.V.

Qassim University is also undergoing the certification of quality management systems **in** systems accreditation.

## INTERNATIONAL COLLABORATIONS

Qassim University currently has collaborations with the following international universities:

Leland Stanford Junior University, USA

University of Southern California, USA

Durham University, UK

Xinjiang Medical University, China

University of International Business and Economics, China

Huazhong Agricultural University, China

Peking University, Health Sciences Center, China

The University of Adelaide, School of Dentistry, Australia

The University of Maastricht, Holland

University of Istanbul, Turkey

University of Ankara, Turkey

University of Marmara, Turkey

## Scientific and Research Centers

The following scientific and research centers are present to undertake research for the Kingdom's growing scientific and industrial needs. Research Center of the College of Sharia and Theology, Research Center of College of Arabic Language and Social Studies, Research and Human Resource Development Center at the College of Business and Economics, Research Center of the College of Pharmacy, Research Center of the College of Medicine, Scientific Research Center of the College of Applied Medical Sciences and the Engineering Research and Consultation Center, Research Center of the College of Computer Science, Research Center of the College of Science and Research Center of the College of Agriculture and Veterinary Medicine.

# INTERNATIONAL RANKING

## QS World University Ranking®

Qassim University (QU) appeared in the QS Work Ranking for the first time in 2011. According to the QS report, it has shown excellent potential for strengthening its position by harnessing its core strengths in teaching and Research. QU has published Research papers with institutions ranked in top 100 of the 2011 rankings. QU has also shown initiative in arranging International Seminars in order to develop relations with global academic peers.

# QASSIM UNIVERSITY VISION

A nationally distinguished institution of higher education, supporting sustainable development in the Qassim Region, and helping to advance a knowledge-based society

# QASSIM UNIVERSITY MISSION

Provision of a high quality, accredited education producing competent graduates who meet the needs of the labor market, conducting applied research and offering quality community services to develop the Qassim Region and to contribute to the building of a knowledge-based economy, achieving all goals by using the most advanced techniques in management, technology, and information processing, by fostering national and international partnerships, and by boosting the University's resources.

# QASSIM UNIVERSITY OBJECTIVES

1. Improving the Quality of education in all disciplines and achieving excellence in some programs and obtaining national and international academic accreditation.
2. Raising the competence and competitiveness of the students
3. Improve the effectiveness of community services and applied research to meet the requirements of development
4. Raising the administrative, technical, institutional and informational performance
5. Strengthening the cooperation and partnership with local, national and international institutions
6. Establishing and developing the University's endowment, diversifying the sources of funding, and rationalizing the spending
7. Completing, developing and maintaining the infrastructure of the University
8. Raising the rates if efficiency and satisfaction, and retention of human resources

## UNIVERSITY ADMINISTRATION

| University Council | | | | | | | |
|---|---|---|---|---|---|---|---|
| University President | | | | | | | |
| **Vice-President** | **Vice-President for Graduate Studies and Academic Research** | **Directorate of Strategic Planning** | **Follow-up Unit** | **Internal Audit Unit** | **Vice-president for Teaching and Learning** | **Vice-president for Planning, Development, and Quality** |
| Deanship for Academic Faculty and Personnel | Deanship of Postgraduate Studies | Financial observer | College of Business | | Deanship of Educational Services | Deanship of Academic Development |
| Council Secretariat | Deanship of Academic Research | Media Centre | College of Education | | Deanship of Students Affairs | Deanship of Quality Assurance and Accreditation |
| Financial Administration | Deanship of Library Affairs | Legal Department | College of Science | | Deanship of Admission and Registration | Deanship of Information Technology |
| Public Service Administration | Academic Council | Centre of Sustainable Development | College of Applied Medical Sciences | | Deanship of Community Services | Directorate for Planning and the Budget |
| Department of Stores | Directorate of Publication and Translation | College of Sharia and Islamic Studies | College of Medicine | | Centre of Academic Studies for Girls | |
| Traffic Management | Directorate of International cooperation and Scientific Associations | College of Arabic and Social Studies | College of Dentistry | | Directorate of Public Affairs and the Media | |
| Department of Administrative Communication | Institute of Studies and Consultation Services | College of Economics and Administration | College of Pharmacy | | University Gazette | College of Science and Arts in Buraida City |
| Department of Projects and Maintenance | University Scientific Journal | College of Agriculture and Veterinary Medicine | College of Nursing | | Community College in Buraida | College of Science and Arts in Onaiza Governate |
| Department of Procurement and Tenders | | College of Engineering | College of Design and Home Economics | | Community College in Onaiza | College of Science and Arts in Al-Rass Governate |
| Department of Security and Safety | | College of Architecture and Planning | | | | College of Science and Arts in Al-Miznib Governate |
| | | College of Computing and Informatics | | | | College of Science and Arts in Al-Bukairia Governate |

| | | | | | |
|---|---|---|---|---|---|
| College of Medical Rehabilitation in Buraida | College of Medicine and Medical Sciences in Onaiza | College of Engineering in Onaiza Governate | College of Pharmacy in Onaiza | College of Science and Arts in Al-Asiyah Governate | College of Science and Arts in Al-Badaiea Governate |
| College of Public Health and Information Technology in Al-Bukairia | College of Applied Medical Sciences in Al-Rass | College of Dentistry on Al-Rass Goverate | College of Business Administration in Al-Rass Governate | College of Science and Arts in Dhariyyah Governate | College of Science and Arts in Uklat Al-Sukoor Governate |

**Council of Higher Education**:

The Higher Education Council is the supreme legislative body for all universities and institutions of post-secondary education in the Kingdom of Saudi Arabia, headed by the Custodian of the Two Holy Mosques and the minister of higher education as the vice president; it includes some of the ministers in charge of planning, finance, education, civil service, the presidents of the universities, in addition other senior government officials involved in the post secondary education.

Higher Education Council is in charge of approving the establishment of new institutions for higher education, new educational units and programs; it coordinates the activities of institutions of higher education and approves to regulations and by-laws for the activities of the universities, and appoints the vice presidents of the universities.

**Minister of Higher Education**

The Minister of Higher Education is the direct supervisor of all presidents of Saudi universities; he appoints the deans and ensures that all operations carried out by universities are in accordance with the Charter of the Council of Higher Education and Universities and its by-laws. He is also head of the all Saudi universities' councils.

**University Council**

Each university has a Council, headed by the Minister of Higher Education and the president of the university as a vice president. Council members include the Secretary General of the Higher Education Council, the vice presidents of the university, the deans, and three external members appointed by the Minister of Higher Education. The Council shall be responsible for all operations of the university, such as granting the academic degrees to the students and the ratification of the study plans and curricula of the existing departments, and make recommendations to the Council for Higher Education in other matters.

**President of the University and the Vice-Presidents**

The president is in charge of academic and executive affairs of the University. He is in charge of the administration of its affairs in accordance with the Council of Higher Education and Universities and its regulations, by-laws, decrees, and the decisions of the Council of Higher Education and the University Council. He also represents the university in the contacts with national and international organizations. Four vice-presidents helps the university president: (the Vice President, the Vice President for Post Graduate Studies and Research, the Vice President for Teaching and Learning, Vice President for Planning, Development, and Quality), a number of deans, the university boards, and the standing committees. The four vice-presidents are assisted by the deans of colleges and support Deanships and the directors of administrative and financial units.

**ADMINISTRATIVE SUPPORT UNITS**

| | |
|---|---|
| Scientific Council | Directorate of Scientific Publishing and Translation |
| Unit of International Cooperation and Scientific Societies | Department of Planning and Budget |
| Directorate of Procurement and University Stores | Directorate of Administrative Communication |
| Directorate of Project management, maintenance and integrity | Directorate of Financial Administration |
| Directorate Security and Safety Services | Directorate of Public Services |
| Department of Transport | Department of Public Relations |
| Legal Department | Center for Information and Decision Support |
| Follow-up Unit | Internal Audit Unit |
| Unit of University Central Switchboard | Directorate of Strategic Planning |
| University Media Center | |

## Members of the senior management of the University

### The President of Qassim University

Prof. Khalid bin Abdulrahman Al-Hamoudi
Tel: 3801094 Fax: 3800656
PO Box: 6666 Buraidah: 51452
E-mail: khamoudi@qu.edu.sa

### Vice President

Prof. Abdul Moneim Bin Ibrahim Al-Moneim
Tel: 3800313 Fax: 3800267
PO Box: 6666 Buraidah: 51452
E-mail: vpqu@qu.edu.sa

### Vice President for Scientific Research and Postgraduate Studies

Dr. Abdulrahman Bin Saleh Al-wasel
Tel: 3801709 Fax: 3801705
PO Box: 6666 Buraidah: 51452
E-mail: vpgsr@qu.edu.sa

### Vice President for Academic Affairs

Prof. Dr. Ahmed Saleh Al Tama
Tel: 3801735 Fax: 3800108
PO Box: 6666 Buraidah: 51452
E-mail: vpea@qu.edu.sa

### Vice President for Planning and Development and Quality

Prof. Dr. Suleiman Bin Abdul Aziz Al-Yahya
Tel: 3802331 Fax: 3802338
PO Box: 6666 Buraidah: 51452
E-mail: vppdq@qu.edu.sa

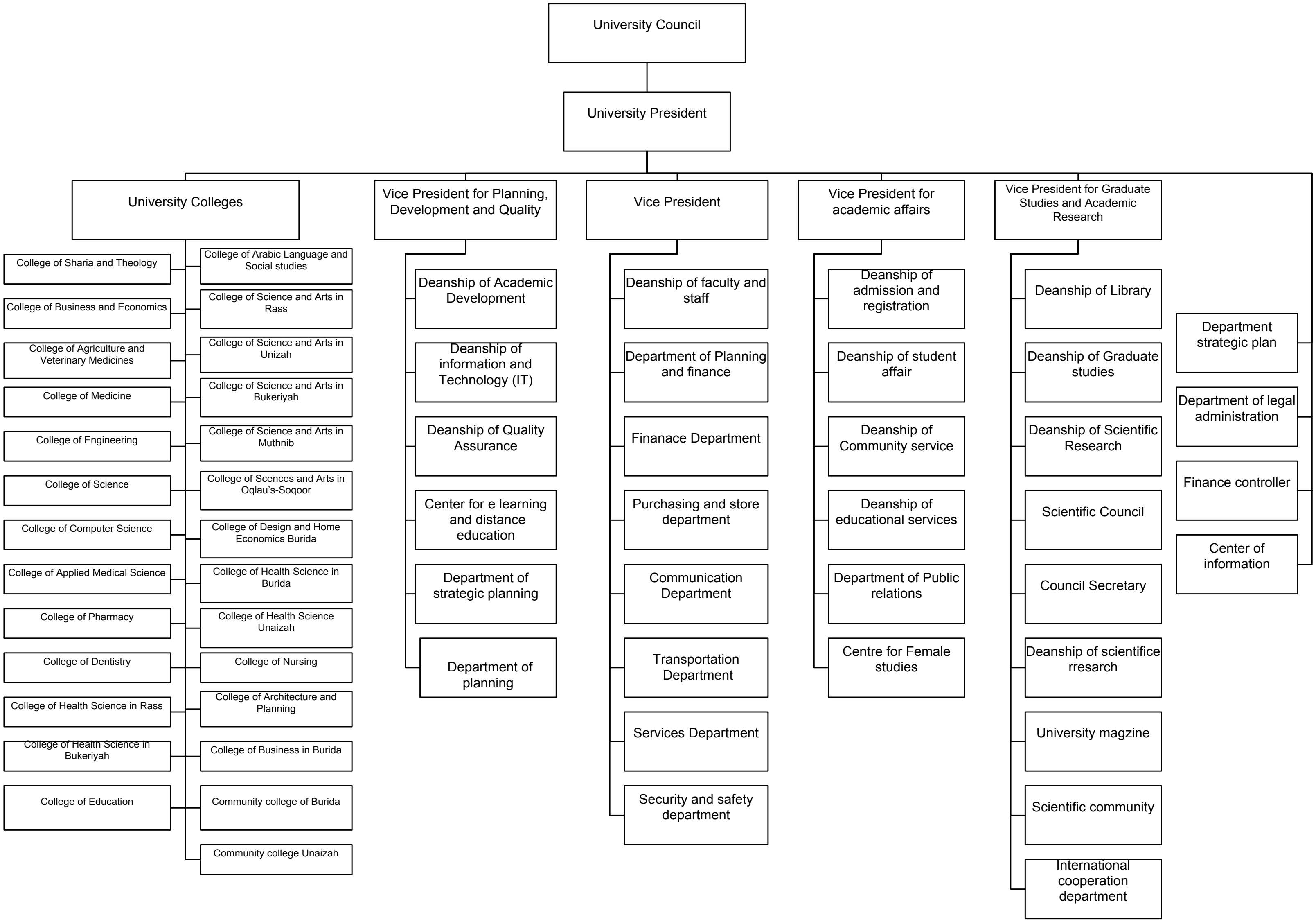
## FACULTY MEMBERS

University Faculty members are:

- Professors
- Associate Professors
- Assistant Professors
- Lecturers
- Instructors

The Council of the University appoints faculty members after taking the opinion of the college or institute or department concerned. Non-Saudis may be appointed where appropriate.

# Organization Chart of Qassim University



## Admission and Academic Regulations

Qassim University aims to prepare and qualify students academically to the maximum level attainable according to modern scientific criteria. To achieve these objectives, the University applies strict regulations on study and examinations.

### The Responsibility of the Student

Students are responsible for acquainting themselves with the academic system of the University and the rules regulating it, including graduation requirements. Directions and help provided by academic counselors do not absolve students of this responsibility. It is the student's responsibility to become acquainted with the requirements stipulated for awarding of academic degrees. The students must also keep themselves abreast of any new developments in this regard. This can be done thorough consultation with the head of their departments or their academic counselors. The following is a list of some of the more commonly used terminology in academic systems:

### Definitions

| | |
|---|---|
| Academic Year | Two main semesters and a summer semester if applicable. |
| Study Semester | A period no less than 15 weeks in which courses are taught. It does not include the registration period or final examinations. |
| Summer Semester | A period no more than eight weeks, not including a registration period or final examinations, during which the time allocated for any course is doubled. |
| Study Level | The stage of study. The number of levels required for graduation is eight or more, depending on the accredited study plans. |
| Study Course | A study subject belonging to some specific level as a part of an accredited plan in every specialization (program). Each course has a number, a code, a name and a detailed description of its items that delineate it in terms of content and level from other courses. The course also has a special file kept by the appropriate department for the purposes of follow-up, evaluation and development. Some courses may have one or more prerequisites. |
| Study Unit | The weekly theoretical lecture whose length is no less than 50 minutes, or the clinical lesson whose length is no less than 50 minutes, or the practical or field lesson whose length is no less than 100 minutes. |
| Academic Warning | A notification directed to students whose GPA falls below the minimum level stipulated in the study regulation. |
| Course Work Grade | The grade given for course-related work indicating the student's attainment in a study semester as represented by examinations, research |

| | |
|---|---|
| | and other relevant educational activities. |
| Final Examination | An examination in the course held only once at the end of the semester. |
| Final Exam Grade | The grade the student receives on the final examination. |
| Final Grade | A grade awarded by adding the total course work grade and the final exam grade in any course. The grade is calculated out of one hundred. |
| Overall Grade | The percentage or alphabetical code for the final grade that the student receives in any course (see Appendix A). |
| Incomplete Overall Grade | An overall grade recorded temporarily for students who did not complete their course work in the stipulated time. It is coded in the academic record as (IC). |
| Continued Overall Grade | An overall grade recorded temporarily for any course requiring more than one semester to complete. It is coded in the academic record as (IP). |
| Semester GPA | This GPA is obtained by dividing the total number of points achieved by the total number of units designated for all the courses studied in any semester. Points are calculated by multiplying the designated units by the weight of the overall grade received in any course (see Appendix B). |
| Cumulative GPA | This GPA is obtained by dividing the total number of points achieved in all courses studied at the University by the total number of units designated for those courses (see Appendix B). |
| General Overall Grade | A description of the student's academic attainment during the period of study at the University. |
| Minimum Study Load | The least number of study units that can be registered for, in view of the cumulative GPA, as decided by the University Council. This is temporarily recorded for any course whose study requires more than one semester to complete. It is coded in the academic record as (IP). |

## Admission

Since the start of the academic year 2010 the admission of the students was performed electronically. Electronic admission starts by applying via the internet and ends by sending the acceptance letter and files of those who accepted through express mail freely. Using this system students do not need to come personally to the college unless personal interview is a requirement……

## First: Conditions for Admission

The following requirements have been stipulated for the admission of the new student:-

1. Must obtain a secondary school certificate or equivalent from inside or outside of the Kingdom of Saudi Arabia.
2. Must be Saudi or son of a Saudi mother
3. The secondary school certificate should not be more than five years old and the Rector of the University may give exemption from this term if there are good reasons.
4. Should be with good conduct and behavior.
5. Should successfully pass the interview conducted by the Senate.
6. Should be medically fit.
7. Should obtain approval from his employer allowing him to study if he is working in private or public sector.
8. Should fulfill any other terms fixed by the Senate.
9. Must not be dismissed from another university for disciplinary or educational reasons.

## Second: The procedure for governing the electronic application

The procedures governing the application are as follows:

1. Entering tests conducted by the National Center for measurement and evaluation in higher education.
2. Read the conditions for admission through the portal (electronic gate) or the site of the Deanship of Admission and Registration on the internet.
3. Filling the application through portal to accept in the specified period for that.
4. After expiry of the period set for the electronic application, admission will depend on the comparison between the applicants, who meet all the conditions and automatically according to the rates, as required by different colleges.
5. The requirement to pass the personal interview for admission to some colleges.
6. Trade-off between the applicants and the applicants in the light of competitive achievement and their indicators, which includes the cumulative percentage of public and the degree of achievement test and the degree of testing capabilities.
7. Finally results will be announced and candidates could enter through the portal to know the outcome of the nomination and help will be provided by e-mail and text message (SMS) via mobile phone.

## Third: Registration

Registration of the students in each class is done automatically according to specific rules, the applicant can access to the gate of academic system on the internet using the user name and password to perform the deletion, addition, or modifications and make sure that the recording and printing of his time-table. The student should confirm his registration during the first week of the semester. The minimum course registration to the course applicant (12), a unit of study and a maximum of (20) unit of study commensurate with the student's cumulative average. For student suspended academically, they must provide a request to the college where he is studying. The student who does not wish to study in the first semester or any other semester should apply for postponing, as the lack of such application will result in considering him failed in the semester. In the case of possible problems in the student's registration, he is advised to consult with his academic advisoror Student Affairs in his college.

## 1. Study System

- Studying at the University proceeds on a "level"-based system. The system consists of at least eight levels. The duration of a study level is usually one semester.
- The success of students in their course work and their ascendance between study levels is decided by the rules and requisites for transferring from one level to another.
- It is possible for the study system at some colleges to proceed on a full academic year basis according to the rules and procedures in its regulation. Here, the expression "study year" replaces the expression "study semester." When this occurs, it must not contradict other admission rules.
- Courses are offered in the year-long system for a study period, which is no less than 30 weeks in length. This does not include registration periods or final examinations.
- A final examination must be held for each course during or at the end of the study year. For practical or clinical courses of a training nature, their final examinations may be held at the end of the training period.
- For students who have failed a course, a supplementary examination will be held at least two weeks before the start of the academic year. An overall grade of "acceptable" (D) will be awarded to students who pass the supplementary examination instead of a grade of (F).
- Students who fail the supplementary exams will remain at the same year level and repeat any failed courses. The same applies to courses that do not have supplementary exams. The college council or other authorized party may make exceptions to this rule.
- A student shall not transfer from one year to the next until the transfer requirements are completed.
- Students may not register in courses exceeding two consecutive year levels.

## 2. Level System

In the level system, the study year is divided into two main semesters, in addition to the possibility of a summer semester. If a summer semester is added, the duration will be half the length of the main semester. The requirements for earning a scientific degree are distributed among levels according to a study plan approved by the University Council.

- Students will be transferred from one level to the next if they pass all the courses at that level.
- The minimum study load is 12 study units, and the maximum for

specializations is 20 study units. This load can increase to 23 study units for prospective graduates. With the consent of the Permanent Committee for Study Systems and Plans, students may specify different unit requirements for specializations that necessitate such a procedure.

- At a certain level, students will be obligated to repeat all failed courses whose total number of study units is equal to or greater than the minimum study load.
- If the student fails courses whose total number of study units is less than the minimum study load, he or she will be obligated to study those courses along with additional courses from the levels that follow thereafter and according to other system rules.
  - Registration in the courses must be in line with the regulations of the study plan and schedules.
  - The study load must pertain to the students' cumulative GPA so that it does not fall below minimum requirements.
  - Students must avoid contradictions in their schedules.

If the student is not able to register for some or all of the courses at the continuing level (because of contradictions, non-completion of prerequisites or the completion of all courses at that level), he or she can complete the study load from the allowable courses if the following requirements are met:

- The number of levels from which course registration is available is limited to two consecutive levels.
- Registration is completed automatically (with no need for application on the part of the student unless there are negative remarks about him or her), and the study schedules are made ready before the commencement of the study year.

## 3. The Visiting Student

A "visiting student" is a student who is studying courses in another university or in one of the branches of the University to which he or she is not enrolled. For these students, the subjects studied will be equalized.

(1) Qassim University students who wish to be a visiting student at another university or college must fulfill the following requirements:

- Students must have an academic record (with a cumulative GPA) for at least one semester at the University to which they are enrolled before applying for visiting student status.
- Students must obtain prior approval of their college to be a visiting student and specify the courses they wish to study. The college may stipulate the realization of a certain grade to equalize the course. Students are directed to study by an official letter from the Deanship of Admissions and Registration.
- The study must be at a recognized college or university.
- The courses studied outside the University must be equivalent to and have a number of units no less than

one of the courses required for graduation.

- The maximum total number of units counted from outside the University is 20% of the total number of graduation units from Qassim University.
- The GPA of equalized courses is not counted in the cumulative GPA. However, these courses are included in students' academic record.
- Students must submit their results to the Deanship of Admissions and Registration within one week after the beginning of classes in the first semester following the period of study at the host University. If students fail to do so, they will be considered absent for those semesters (except for summer semesters).
- The monthly stipend will be disbursed to students after approval by the Deanship of Admissions and Registration.
- Study at the host university should not exceed two semesters.

(2) Students from another university who wish to study as a visiting student at Qassim University must fulfill the following requirements:

- Students must have an academic record (with a cumulative GPA) for at least one semester from their university of record.
- Students must obtain prior written consent from their university to enroll as a visiting student at Qassim University. The letter of consent must specify the courses at Qassim University to be studied.
- Students must obtain the consent of the college in which they wish to study.
- Students may study a maximum of two semesters at Qassim University.
- Students may not apply for residence at Qassim University and will not receive payments from the University.
- Courses shall be registered for the students by the relevant administrative units, taking into consideration all the regulations pertaining to course registration.
- Students will be given a letter at the end of their study indicating their results in the courses studied.

## Affiliation

After evaluating proposals made by the relevant colleges, the University Council may advocate study by affiliation in some colleges and specializations. This will be granted in accordance with the following conditions:

1. The number of units required for graduation of the affiliated student must be no less than those required for graduation of the regular student in the specializations available for affiliation.

2.The affiliated student will be treated in the same manner as the regular student in terms of admission, recording of overall grades, transfer, dismissal and readmission. The only exceptions are in the case of attending lectures. The University Council is authorized on recommendations of college councils to set the rules necessary to evaluate the performance of affiliated students. An indication must be made in the academic record and graduation certificate or diploma that the student studied by affiliation.

## Academic Policy

### Attendance, Withdrawals and Transfers

- Regular students must attend at least 75% of all lectures and tutorials or risk being barred from entering the final exam. Any student barred from entering a final exam for failure to meet the attendance policy will automatically fail the course. Class work grades will be recorded, and the student will receive an overall grade of barred (DN).
- The council of the college offering the course will confirm the lists of barred students.
- If the absence ratio in a course exceeds 50%, excuses will not be considered, as stipulated in Article 10.
- The lists of debarred students are to be announced before the beginning of final examinations.
- The council of the college (which offers the course), or whoever it authorizes, can, with exception, lift the disbarment and allow a student to sit for the final examination. This may be done in cases in which the student provides an adequate reason for absence and that reason is accepted by the appropriate authority. Exceptions will be made only if the student attended at least 50% of classes.
- Students whose debarment is lifted can sit for the final exam in the same semester in which they were debarred. Exceptions are at the discretion of the college council.

Students who are not present for the final examination will receive a score of zero on the examination, and their overall grade in that course will be determined on the basis of their class work grade. The following are acceptable criteria for reasonable absences:

- The reason for absence must be given within one week of its occurrence.
- Only involuntary absences, such as health-related issues, will be considered by the college council.
- In cases in which the council determines the reason for absence to be acceptable, a substitute examination will be given no later than two weeks after the following semester begins. The result will be recorded the week the substitute examination is administered.
- In the semester system, students must provide a written justification for withdrawal at least five weeks before the beginning of final examinations to receive a (W) on their reports. In the yearly system, students must provide written justification at least eight weeks before the final examination. Exceptions to these time limits can be made only by the appropriate authority. It should also be noted that the semester in question will be counted toward the overall time limit set for

completing graduation requirements.

- The semesters for which students request withdrawals should not exceed two consecutive semesters or three non-consecutive semesters throughout the entire period of study; otherwise, the student's record will be terminated. Students participating in the yearly system of study are limited to two withdrawals in non-consecutive years. It is left to the Permanent Committee for Students' Academic Problems to make exceptions to this policy, and exceptions will only be considered subsequent to a written recommendation from a dean.
- Written requests for withdrawals will only be considered after approval from the respective college dean and an official notification from the Deanship of Admissions and Registration.
- For the written request of withdrawal to be accepted, the student will be subjected to the issues of attendance as stipulated in article 15.
- The withdrawing student will be automatically registered for the following semester after withdrawal has been confirmed.
- In addition to the aforementioned conditions, female students will need written consent from their parents or guardians for absences.

**Postponement and Non-Attendance**

- Students in semester-based programs may apply for a postponement of study before, but no later than, the first week after the commencement of classes. The application must be provided in written form and approved by a college dean. The postponement period is for a maximum duration of two consecutive semesters or three non-consecutive semesters. In the case of the yearly system, the maximum period is for one year or two non-consecutive years. The University Council may make exceptions to these rules on the recommendations of the relevant college council and the approval of the Permanent Committee for Students' Academic Problems. The postponement duration will not be counted in the time limit set for the completion of graduation requirements.
- Postponement will go into effect only after the approval of the appropriate college dean and an official notification from the Deanship of Admissions and Registration.

- Students will be automatically registered the semester following the postponement.
- The record of regular students will be terminated if they do not attend classes for the first seven weeks of the semester.
- The list of terminated student records will be provided by the colleges to the Deanship of Admissions and Registration eight weeks after the semester begins.
- Students visiting other universities for a semester will not be counted as "non-attending."

**Reinstating a Student's Record**

Students whose records have been terminated may apply for reinstatement (including their old student number) according to the following criteria:

- The application for reinstating the record must be submitted within four semesters (or two academic years for colleges that apply the year system) after termination of the record.
- The college council in question must agree to reinstate the student's record in accordance with set regulations.
- If four or more years elapse after the termination of a student's record (or two or more academic years for colleges that apply the year system), students must submit a new application to the University, without reference to their previous studies, and satisfy all current requirements of application. The Permanent Committee for Students' Academic Problems can make exceptions to this rule according to certain criteria set by the committee.
- A student's record can be reinstated only once. However, the University Rector can make exceptions based on the recommendations of the Permanent Committee for Students' Academic Problems.
- The record of a student who has been dismissed from the University on academic grounds will not be reinstated.
- The record will not be reinstated for students who have been dismissed from the University on an educational or disciplinary basis or for students who have been dismissed from another university for disciplinary reasons. If it becomes known that the student had been dismissed for such reasons, the record after reinstatement will be considered null and void as of the date of reinstatement.

**Transfer within Colleges**

- The student can, with the consent of the college dean, transfer from one specialization to another within the college according to preconditions set by the college council.
- The remaining period of stay for the student at the University must be sufficient to complete graduation requirements.
- The procedures of transfer must be finished within the first week following the beginning of the semester or academic year for colleges using the year system.
- Students must study for at least one semester before requesting a transfer.
- Students can transfer only once throughout their period of university

study. The college council will make an exception to this rule only once. The Deanship of Admissions and Registration must be notified of the transferred students during the second week following the beginning of the semester.

- Cases to which these rules do not apply will be directed to the college council to consider and make appropriate decisions.
- The academic record of the student transferring from one specialization to another should include all the subjects studied, overall grades and semester and cumulative GPAs throughout the student's study at the University.
-

**Transfer from One College to Another**

With the recommendations of the deans of the relevant two colleges and the approval of the Permanent Committee for Students' Academic Problems, students may transfer from one college to another in accordance with the conditions set by the council of the college to which the student wishes to transfer. The following conditions apply to such transfers:

- The remaining period of stay for the student at the university must be sufficient to complete graduation requirements.
- Transfer procedures must be completed within the first week of the semester or academic year for colleges using the year system.
- Students can transfer only after completing at least one semester of study at the college from which they are transferring.
- Students are allowed to transfer only once throughout the entire period of their university study.
- For students to whom the aforementioned transfer rules are not applicable, it is the responsibility of the president of the University to make exceptions when necessary. These exceptions will be based on recommendations of the Permanent Committee for Students' Academic Problems.
- The academic record of the student transferring from one college to another will include all subjects studied in addition to overall grades and cumulative and semester GPAs.

**Transfer from Outside the University**

The transfer of a student from outside the University may be accepted in accordance with the following rules:

- The deans of the colleges in the university being transferred from and the university being transferred to (Qassim University) must consent.
- The student must have studied at least one semester at a recognized college or university.
- The student should not have been dismissed for disciplinary reasons by the university from which they are transferring.
- Students must satisfy the transfer conditions set by the college council to which they are transferring.
- The number of units, which the transferring student would be required to study at Qassim University, may not be less than 60% of the total number of units required to receive a bachelor's degree from the University.
- Transfer is permissible only once throughout the student's entire period of study at any university in the Kingdom of Saudi Arabia.

- The duration of time that the student spent at the university being transferred from and the time remaining to be spent at Qassim University must not exceed the average of the minimum and maximum period of stay at the college.
- Transfer procedures must be completed two weeks before the start of the semester or academic year for colleges using the year system.
- For students to whom the aforementioned transfer rules are not applicable, the University Rector can exceptionally preclude them if necessary on the recommendation of the Permanent Committee for Students' Academic Problems.
- The college council will equalize the courses that the student had studied outside the University on the recommendations of the departments that offer the courses in question. The equalized courses will be included in the student's academic record, but they do not count in calculating the cumulative GPA.
- If at any time the student had been dismissed for disciplinary reasons, the transfer will be considered null and void by the University.
- If it becomes known that the transferred student had given incorrect information, the student will be referred to the Permanent Disciplinary Committee of the University.
- The student can transfer in any semester from one university to another in accordance with the timing and procedures announced by the university being transferred to and in conformity with the general rules of transfer.

**Dismissal from the University**

Students may be dismissed from the University in the following cases:

**First**

A student receives three consecutive warnings that his or her cumulative GPA has fallen below the stipulated minimum (2.00 out of 5.00). In such a situation, the student may be afforded a fourth opportunity in the following cases:

- The student raises his or her cumulative GPA to two (2.00), assuming that he or she had achieved forty-eight (48) points from studying twelve (12) study units and provided that these are calculated and executed automatically. It is at the college council's discretion to provide other opportunities if the student cannot raise the cumulative GPA to two (2.00) given the former assumption.
- The college council, at its discretion, decides to grant students who have been dismissed because of warnings an opportunity that does not exceed two semesters at most and in accordance with the following:
    - There must be an improvement in the student's performance in the last two semesters. This would be the case if dividing the total number of points for the two semesters into the number of registered units yields a figure no less than two (2.00). This may not include the summer semester.
    - The student must have the capacity to raise his or her cumulative GPA to two (2.00) when and if he or she receives the

opportunity and registers in the available courses.

  - In case the two previous conditions are not applicable, the college council will make recommendations to the Permanent Committee of Students' Academic Problems to make a decision to that effect.

- The University Council reserves the right to evaluate exceptional cases in which students have exhausted the opportunities provided them from the two previous sections and to offer them further opportunities. This is not to exceed two semesters at most on the recommendation of the Permanent Committee for Students' Academic Problems, which in turn is based on the recommendation of the college council. On submitting such a case to the University Council, the student must ensure that his or her performance has improved in the last two semesters. This would be the case if dividing the total number of points for the two semesters into the number of registered units yields a figure no less than two (2.00). This may not include the summer semester.
- For colleges that apply the year system, the student will be dismissed from the university if his or her cumulative GPA falls below two (2.00) for two consecutive years. The student may be offered a single opportunity to raise his or her GPA to two (2.00) (on the assumption that he or she had earned 96 points from 24 study units) provided that this is executed automatically. If the student cannot raise the cumulative GPA to two (2.00), given the previous assumption the college council may offer another opportunity at its sole discretion.

**Second**

Students will be dismissed if they cannot complete graduation requirements in time. However, the college council can make an exception to students to complete graduation requirements within a period not exceeding twice the length of time specified for graduation and in accordance with the following terms:

- The reasons must be acceptable to the college council.
- There must be an improvement in the student's performance in the last two semesters. This would be the case if dividing the total number of points for the two semesters into the number of registered units yields a figure no less than two (2.00 out of 5.00). This may not include the summer semester. If these terms are inapplicable to the student, the case will be referred to the Permanent Committee to make a decision.
- The University Council holds the right to make exceptions to these guidelines for dismissed students who have surpassed the double time limit. This will be done on the recommendation of the Permanent Committee for Students' Academic Problems, which in turn will be based on recommendations of the college council. In such cases, the exception should not exceed two semesters. The following should be observed when referring the case to the University Council:

  - The remaining courses for the student's graduation must be completed in a period not exceeding two semesters.

- There must be an improvement in the student's performance in the last two semesters. This is the case when dividing the total number of points for the two semesters into the number of registered units yields a figure no less than two (2.00 out of 5.00). This does not include the summer semester.

**Third**

Colleges must consider all the cases they receive, refer them to their councils and thereafter notify the Deanship of Admissions and Registration about the decisions made by the second week after the start of classes.

## Examinations

**1. -Final Examinations**

The college council offering the course determines the weight of the semester course work. The weight should be between 30% and 50% of the total grade for the course based on a recommendation of the department council.

The grade for the semester course work is based on one of the following:

- Oral or practical examinations or research and other types of class activities or all or part of these and at least one written examination.
- At least two written examinations.

The college council that offers the course can, on the recommendation of the department council, include oral and/or practical examinations in the final examination of any course and allocate to them some portion of the final exam grade that it deems appropriate.

The department council offering a course can, at its own discretion and on the recommendation of the instructor of the course, allow a student to complete any course's requirements in the following semester and register an overall grade of incomplete (IC) in his or her record. In such a case, the grade to be counted in the student's semester or cumulative GPA will not be less than the grade after completing the course's requirements. If a full semester elapses and the (IC) grade is not changed, the grade will be replaced by an (F) and included in the student's semester and cumulative GPA.

Research and symposia courses or courses of a practical or field nature can be excluded from the provisos of articles (22, 23, 24) depending on the decision the college council makes based on the recommendation of the council of the department from which the course is offered. The college council decides the form of measurement for a student's attainment in these courses.

If the research courses require more than one study semester, an overall grade of (continued) will be registered for the student, and after finishing the course, the student will be awarded the overall grade. If the student does not complete the course in the allotted time, the council of the department offering will register an overall grade of (IC) in the student's record.

The general overall grade for the cumulative GPA upon the student's graduation, on the assumption that the weight of the overall grade is out of five (5.00), shall be as follows:

- (Excellent): If the cumulative GPA is no less than 4.50.
- (V. Good): If the cumulative GPA is from 3.75 to less than 4.50.

- (Good): If the cumulative GPA is from 2.75 to less than 3.75.
- (Satisfactory): If the cumulative GPA is from 2.00 to less than 2.75.

The first class honors degree will be awarded to those students who achieve a cumulative GPA between (4.75) and (5.00). The second class honors degree will be awarded to those students who achieve a cumulative GPA greater than (4.25) but less than (4.75).

To receive the first or second class honors degree, the student must satisfy the following conditions:

- The student must not have failed any of the courses at the University or other universities.
- The student must have completed all graduation requirements within a period not exceeding the average of the maximum and minimum periods of stay allowed at the awarding college.
- The student must have studied no less than 60% of graduation requirements at Qassim University.

**2. Procedures for Final Examinations**

- The college council forms a committee to organize the progress of the examinations and submits the results to the Deanship of Admissions and Registration within a period no more than three days after the date of any course's examination.
- The college council may decide to impose confidentiality on the procedures of the final examinations.
- The instructor of the course prepares the questions of the examination, or questions may be prepared, if necessary, by someone the college council chooses on the recommendation of the head of the department.
- The instructor of the course grades the final examination scripts, and the head of the department may, if necessary, add one or more specialist to participate in grading. The college council may nominate, if necessary, whoever it deems fit to undertake the grading.
- The grader of the final examination must record the grades scored by the students on the record lists prepared for that purpose, sign them up, and have them sanctioned by the head of the department.
- The student may not sit for more than two examinations in one day; the University Council holds the right to make exceptions.
- The student may not enter the final examination half an hour after it begins, nor may the student exit the exam hall until half an hour after the exam begins.
- Cheating on the examination, attempting to do so or going against the directions and rules for examinations are violations, and students will be disciplined in accordance with the student discipline regulation issued by the University Council.

The college council that offers the course can approve the re-grading of examination scripts, when necessary, for that course within a period not surpassing the beginning of the final exams for the following semester.

### 3. Rules for Re-Grading Exams

- The college council that offers the course can approve re-grading of a script, when necessary, on the request of the student concerned. This should be done within the first week of the following semester.
- The student must not have made a previous request for re-grading an examination that was found unjustified.
- The student may not apply for the re-grading of more than one examination script in a single semester.
- The college must prepare a form that includes the aforementioned information in addition to other information, including student name, university number, the course's number, code and title, section number, semester number, absence rate, cumulative GPA, warnings, course instructor's name, examination date, reasons for applying for re-grading and a pledge by the student that the information presented is correct.
- In case the re-grading is approved, the college council will form a committee for re-grading the scripts. The committee will submit a report regarding the case to the college council to make a decision. The council's decision is final.
- The committee can recommend that the student be referred to the University's Permanent Disciplinary Committee if deemed necessary.
- The college council can, on the recommendation of the relevant department council, set the time limit for the written final examination provided that it is no less than an hour or more than three hours.
- Without violating the provisions of articles (31–40), the University Council will set the regulations pertaining to the procedures of final exams.

### 4. The Academic Record

The academic record shows the student's educational progress. It includes all the courses the student studied in each semester, including the course codes, numbers, study units, overall grades scored and their code values. The academic record also shows the semester and cumulative GPA and the general overall grade, in addition to the courses from which the transfer student has been exempted.

# GRADUATE STUDIES

**Objectives of Graduate Studies**
**Article 1**
The Graduate Studies program aims to:

1. Promote the research and publication of Islamic and Arabic studies;
2. Contribute to the enrichment of human knowledge in all fields through specialized studies and research in order to make new scientific and applied contributions and create innovative discoveries
3. Provide opportunities for undergraduate students to pursue their graduate studies locally;
4. Develop qualified scientific and professional human resources in different fields of knowledge.
5. Encourage qualified scientists to keep pace with the rapid developments in science and technology to direct their research towards the solution of problems in Saudi society; and
6. Continue with the improvement of undergraduate programs in order to interface efficiently with graduate studies/programs.

**The Scientific Degrees**
**Article2**
The University Council awards the following scientific degrees according
to the College and Department Councils and approval of the
Council of Deanship of Graduate Studies:
1- Diploma.
2- Master degree.
3- Doctoral degree.

**Article3**
Studying requirements for the scientific degrees are determined according
to these regulating rules, except the following.
1- Medical diplomas.
2- Medical fellowships which are controlled by the regulating rules issued by the University Council

**Organization of Graduate Studies**
**Article 4**
A Deanship of Graduate Studies will be established in every University. The Dean will report to the Vice-Rector for Graduate Studies and Scientific Research. The Deanship will supervise all programs of graduate studies in the University; coordinate them; recommend their approval where appropriate; and, subject them to periodic reviews.

**Article 5**
The Council of the Deanship of Graduate Studies will consider issues relating to graduate studies in the University in general and make the necessary decisions within its authority as per this unified regulating rules; specifically, the Council will:

1. Propose/revise the general policy for graduate studies and its coordination with all University Colleges and institutes and follow-up its implementation after initial approval;
2. Propose, in coordination with academic departments, the internal regulating rules concerning the organization of graduate studies;
3. Propose criteria for admission to graduate studies and supervise their implementation;
4. Recommend the approval of new programs of graduate studies and their coordination with existing programs;
5. Recommend the approval of graduate courses as well as revise or change their contents;
6. Recommend in Arabic and English, the names for the graduate degrees as per the recommendations of the college councils;
7. Recommend the granting of degrees.
8. Make final decisions in matters relating to graduate students a airs in the University;
9. Approve the formulation of thesis and dissertation committees, and report the relevant a committee's decision.
10. Formulate the general guidelines for research plans; set up rules and regulations for writing theses/dissertations; print, submit and develop forms for their defense and evaluation;

11. Evaluate periodically the graduate studies programs at the University through committees from within the University or from outside;
12. Study the periodic reports submitted by academic departments in the University and;
13. Study the items referred to it by the University Council, or its Board Chairman, or the Rector.

**Article 6**

The Council of Deanship of Graduate Studies consists of the following:

1. Dean of Graduate Studies, acting as the Chairman of the Council;
2. Dean of Scientific Research, member;
3. Deputy Dean of Graduate Studies, secretary general of the council
4. A faculty member, of associate professor rank (at least), from each

College offering graduate programs, appointed by the University Council as per the recommendations of the College Council and the approval of the Rector, for a 2- years renewable term.

The Council shall meet at least once a month. A minimum of two thirds of its members is required to be a formal meeting. Its decisions are taken by simple majority, and in the case of equal vote with or against a suggestion, the one supported by the head of the council is adopted. The decision of the council should be considered final if there is no objection from the Rector within 15 days from the date received in the rector's office. The council can from standing or temporary committees from its members or others and charge them with various tasks.

**New Programs**

**Article 7**

The University Council will set detailed standards to approve the graduate programs based on the recommend.ations of the Council of the Deanship of Graduate Studies after consideration of the following:

1. There should be sufficient faculty members of the rank of professor and associate professor specialized in the program. In addition, sufficient research facilities including laboratories, computer resources, etc., should be available to ensure the success of the program together with the assurances regarding the quality of teaching, research, and supervision of research.

2. The Department should have acquired sufficient experience in managing undergraduate program if the new program is for a master's degree if it is for a doctorate degree, experience in managing master,s program is required .

3. The number of students expected to enroll in the program should be sufficient to guarantee the continuation of the program.

**Article 8**

With consideration of the requirements in Article 7, the Department submits to the College Council a detailed proposal of the program explaining the following:

1. The program objectives and the need of the Saudi society for it;

2. The nature of the program from its academic and professional focus

3. The importance of the program and its justification after reviewing what other departments are offering in the same area of specialization in the University and other universities in the Kingdom;

4. The facilities available or what will be procured by the Department to assure the promotion of high academic and professional quality for the program, especially, in the major research areas identified by the Department

5. Faculty stability and turnover during the previous five years;

6. The CV's of all faculty members in the department and other faculty members in the University who are involved in the program in question.

**Article 9**

The Council of the Deanship of Graduate Studies will review the program proposal and coordinate its requirements and other existing program requirements, if any, to avoid duplication of effort. If the council is satisfied, it may recommend that the program be approved by the University Council.

**Article 10**

Any adjustments in the curriculum, program requirements, or admission requirements should be approved by the University Council as per recommendations of the Council of the

Deanship of the Graduate Studies in coordination with the department concerned.

**Article 11**

Combined graduate programs can be established between two or more Departments or between two or more Colleges according to guidelines approved by the University Council based on the recommendations of the Council of the Deanship of Graduate Studies in coordination with the Departments concerned.
CONDITIONS FOR ACCEPTANCE

**Article 12**

The University Council determines the number of students to be admitted each year for the graduate studies as per the recommendations of the Council of the Deanship of Graduate Studies and suggestions by Department and College Councils.

**Article 13**

For Admission to the Graduate Studies, the following general requirements should be satisfied:
1. The applicant must be a Saudi national or must have official scholarship to the Graduate Studies (for non-Saudis);
2. The applicant must have a university degree from a Saudi university or from another recognized university;
3. He/she must have a record of good behavior and be medically fit.
4. Recommendation letters should be submitted from two of his/her former professors.
5. An approval letter from his/her employer is required, if the applicant is employed;
6. The basis in Ph.D. programs is that the student should be a full-time student. However, the University Council can decide exception from this requirement whenever it is inevitable.
The Council of each university can add any other general requirements as necessary.

**Article 14**

Admission to a postgraduate diploma requires an undergraduate performance of not less than “ good ” ( c grade )

**Article 15**

Admission to master’s degree program requires a minimum over all undergraduate performance of ‘ very good ’ ( B ) However the council for the deanship of graduate studies can waive this condition for upper good ( C+ ) on condition that his/her grade is “very good” in the specialized Courses . Board, given that The Council of the Deanship of Graduate Studies can add other requirements as per the recommendations of the Department Council and the support of the College Council.

**Article 16**

Admission to a Doctoral degree program requires a minimum overall master degree performence of “very good” if it is from a university with a letter-grading system. The Council of the Deanship of Graduate Studies may add other necessary admission requirements as per the recommendation of the Department Council and the support of the College Council.

**Article 17**

A graduate student may be admitted to master’s or doctoral program other than his/her original field of study as per the recommendations of the Councils of Department and the College concerned, together with the approval of the Council of the Deanship of Graduate Studies.

**Article 18**

The concerned department may require student in a master or doctoral program to take a number of deficiency courses for a maximum period of three semesters with the following considerations:
1. The deficiency courses must be completed at the first attempt with a grade not less than ‘ good ’ ( C ) .
2.the cumulative GPA in all deficiency courses must not be less than ‘very good’ (B);
3. Registration for the intended graduate studies program will not commence until the deficiency courses are passed. The Department concerned may allow the student to enroll in such graduate courses if only one or two deficiency courses remain;
4. The time period required for completing the deficiency courses is not considered a part of the maximum residency period for the degree in question;
5. Deficiency courses are not included in the GPA calculated on for graduate studies

**Procedure for acceptance**

**Article 19**

Admission and registration of graduate students should be conducted through the Deanship of Graduate Studies in coordination with the Deanship of Admission and Registration, and to accept students in accordance with the following:

1. Apply for admission and have the required documents presented to the Deanship of Graduate studies from the beginning of the second week until the end of the fifth week of the semester preceding the start of the study.
2. The Deanship of Graduate studies transfer the documents of those who wish acceptance to the relevant departments within a period not exceeding the end of the sixth week of the previous semester to begin the study.
3. Recommends that the relevant parts of the council to accept students for a period not exceeding the tenth week of the semester prior to the commencement of the study, and return the documents to the Deanship of Graduate studies within two weeks from the date of the recommendation.
4. The Council of Deanship of Graduate studies issues the decision regarding the acceptance.
5. After the issuance of decisions to accept students, Deanship of Graduate studies send the entire original documents to the Deanship of Admission and Registration, and provide the relevant parts of the list of admitted students before the start of registration period in course in at least two weeks.

**Article 20**

A student cannot enroll in two graduate programs at the same time.

**Deferment and Dropping**

**Article 21**

The student may postpone his admission for not more than two semesters based on the approval of the relevant Department Council, the Dean of the College concerned, and the Dean of Graduate Studies. This period of postponement will not be included as part of the maximum residency period allowed for completing the degree.

**Article 22**

Studies may only be postponed following the approval of the relevant Department Council, and Dean of the College concerned, and the Dean of Graduate Studies according to the following:

1. The student must have finished at least one semester or more, or completed a good part of his thesis;
2. Postponement must not exceed four semesters (2 academic years);
3. The student must submit a postponement request two weeks before the beginning of the semester;
4.The postponement period is not included in the maximum residency period required for the degree.

**Article 23**

The student can request to drop all courses of the semester subject to the following conditions:

1. He/she must submit the form for dropping before the final examination;
2. Approval of the Department Council together with the approvals of the Dean of the College concerned and the Dean of Graduate Studies, are required;
3. This semester must not be considered from the additional attempts given to the student.
4. This semester will be considered as part of the postponement period that mentioned to it in Article22.

**Withdrawal**

**Article 24**

If a student has withdrawn voluntarily from graduate studies, and then decided to return, all the current admission requirements must be met.

1. If the student has withdrawn voluntarily and then decided to return, the department can count for him all or some of deficiency courses that student has already studied before withdrawal.
2. The main or major courses been studied by the student before withdrawal should not be counted for him.

**Article 25**
A student would be considered to have voluntarily discontinued his/her program and would be dismissed in the following cases:
1. If he is accepted in the program and doesn't register during the registration period;
2. If he/she registers in a semester but does not a end classes in that
semester.

**Dismissal and Readmission**
**Article 26**
The Council of the Deanship of Graduate Studies may decide to dismiss a student if:
1. The student gains admission to graduate studies but does not register during the registration period;
2. He/she registers in a semseter but does not end classes in that semester.
3. He/she withdraws or discontinues the program for one semester without an acceptable excuse;
4. He/she does not show his seriousness in studying or does not fulfill his academic duties according to Article 52 of these regulating rules
5.His/her GPA is below " B " for two consecutive semester,
6. He/she exceeds the postponement periods mentioned in Article 22 of these regulating rules
7. If he/she violated the scientific honesty during the period of studying courses or during his/her thesis work, or if the rules and regulations of the university are violated;
8. He/she does not pass the comprehensive examination (if required) at the second attempt;
9. The thesis committee disqualifies the thesis for defense or does not accept it following the defense; and
10. His/her program remains incomplete following the expiry of the maximum residency period according to Article 36.
11. His/her program remains incomplete following the expiry of the maximum residency period according to Article 36.

**Article 27**
In extremely limited cases, a student's _le can be reinstated if the Department and College Councils support his/her readmission request, with justification. The readmission is to be approved by University Council based on the recommendations of the Council of the Deanship of Graduate Studies with the following considerations:
1. If the period between dismissal and the application for readmission exceeds six semesters, the student will be treated as a new applicant regardless of the number of credit hours he earned before.
2. If the period between dismissal and the application for readmission is 6 semesters or less, the student may be asked to repeat some courses. These courses will be identified by the Department and College Councils and approved by the Council of the Deanship of Graduate Studies. The credit hours earned from the time of readmission will be counted in his GPA calculation. The previous period attended in the program by the student will be counted as part of his/her maximum residency period for the degree in question.

**Additional Attempts**
**Article 28**
Item (5) of Article 26 may be exempted to give a student an additional attempt at graduating for one or two semesters (maximum) as per the recommendations of both the Department and College Councils and the approval of the Council of the Deanship of Graduate Studies.

**Article 29**
Item (10) of Article 26 may be exempted to give a student an additional attempt at graduating not exceeding two semesters following the recommendations of the supervisor and the Department, College, and Deanship of Graduate Studies Councils.

**Transfer**
**Article 30**
A student can transfer from one recognized university to the University as per the recommendation of both the Department and College Councils and the approval of the Council of the Deanship of Graduate Studies after consideration of the following:
1. The student must satisfy the admission requirements and other departmental requirements as necessary.
2. The student must not be dismissed, for any reason, from the university from which he is transferring.
3. The number of credit hours earned will be calculated according to the following:

(a) Courses under consideration should not have been taken more than six semesters preceding the application.
(b) The topics of the credit hours to be transferred must meet the current program requirements.
(c) The percentage of the credit hours to be transferred must not be more than 30% of the new program requirements.
(d) The grade of the transferred courses should not be less than Very Good (B).
(e) The transferred credit hours will not be included in the GPA calculation.
(f ) The Department Council will recommend the transfer of credits, to be approved by the Councils of the College and the Deanship of Graduate Studies.

**Article 31**
The student's major can be changed at the university according to the recommendations of the Department and College Councils and the approval of the Council of the Deanship of Graduate Studies taking the following into consideration:
1. The student satis_es the admission and any other requirements deemed necessary by the Department.
2. Educational Units earned at the University may be counted, if the new Department approves its compatibility with the new program to be transferred to. These credits will be included in the GPA calculation.
3. The student should not have been previously dismissed for any of the reasons indicated in Article 26.
4. The period spent in the previous major will be considered part of the maximum residency period for the degree in question.
5. Only one change of major is allowed during the maximum residency period for the degree in question.

**System of Study**
**Article 32**
Studying for a postgraduate diploma includes courses, field work, applied courses and experimental activities that satisfy the following:
1. The residency period should not be less than of two semesters and not more than four semesters; and
2. The number of credit hours should not be less than 24 and not more than 36.

The University Council determines the required courses for the diploma degree as well as the name of the diploma degree as per proposal of both the Department and College Councils concerned and the recommendations of the Council of the Deanship of Graduate Studies.

**Article 34**
Studying for a doctoral degree involves one of the following two approaches:
1. Coursework and dissertation with a minimum of 30 educational units after the master's degree in addition to the dissertation.
2. Dissertation and some courses with a minimum of 12 specialized educational units from the major, seminars, or research sessions as required, according to the student's academic background and field of study .

**Article 35**
The academic year is divided into two semesters each one is not less than 15 weeks not counting registration and test period and one summer semester which is not less than 8 weeks in which the teaching period is doubled for each course. In same colleges the study may be .yearly - based according to the Universty Council which does not contradict with this unified regulating rules of Gradute Studies.

**Article 36**
1. The maximum residency period for a master's degree must not be less than four semesters and not more than eight semesters; not including the summer sessions.
2. The residency period for a doctoral degree must not be less than six semesters and not more than ten semesters; the summer sessions are not included.

**Article 37**
The maximum residency period for a degree starts from the registration for graduate courses up to the submission date of a report from the student's advisor with a copy of the thesis (or any other requirements to the student program) to the Department Chairman.

**Article 38**
A graduate student must take at least 70% of the required educational units in the University awarding the degree. All work related to his

thesis/ dissertation must be completed in the same University.

**Article 39**

A student cannot graduate until all the degree requirements are completed. At graduation, the general grade of the student is to be "very good " (B) at least .

**System of Examinations**

**Article 40**

Conducting and grading graduate courses for diploma, master and doctoral degrees should follow the undergraduate studies and examination rules and regulations which were approved by the Higher Education Council in its second meeting on 11/6/1416 H, with the exception of the following:

1. A minimum of " good " ( C ) grade is required from the student to pass a course.
2. The Council of the Deanship of Graduate Studies should set appropriate policies as per the department council's recommendation and approval of the college Council with regard to substitute examinations and courses requiring a duration of study of more than one semester.
3. Master's students -if required by the program- and doctoral students must pass comprehensive oral and written examinations after the completion of all the required coursework. This comprehensive examination should be conducted by a specialized committee according to regulations set by the University Council as per the recommendations of the Department Council and the approval of the College Council concerned and the Council of the Deanship of Graduate Studies. This examination should cover the student's major field of the study as well as the other related fields if exist. The student will be considered a candidate for the degree in question if he passes the examination at the first time. In case of failure in the examination or part of it, a second chance will be given to the student within the following two semesters. Failure to pass the examination the Council a second time will incur dismissal from the program. The marks scored by the student are to be recorded according to the regulating rules of Undergraduate Studies and Examination which were approved by the Higher Education Council, in its second meeting on 11/6/1416 H, subject to what is stipulated in Article 40 of the unified regulating rules for Graduate Studies in Saudi universities, i.e., the exceptions mentioned.

**Rules for the Comprehensive Test for the Doctorate**

1. The comprehensive examination is composed of two parts: written and oral.
2. The comprehensive examination (written and oral) will be in the major field and secondary fields (if any).
3. The comprehensive exam aims to measure the student's capability, depth and areas:
a. Knowledge: the exam aims to measure the student's capability, depth and comprehension to understand the major field subjects, and also secondary fields (if any).
b. Analysis : the exam aims to measure the student's capability in analyzing and making complementary action between concepts and conclusion, and in suggesting reasonable solutions and reasonable answers for questions directed to him/her.
4. The Comprehensive Exam Committee:
a. The department council establishes an exam committee of odd numbered members, from full professors and associate professors, An assistant professor, with two years experience as assistant professor can be chosen as a member of this committee.
b. The committee is responsible for preparing the comprehensive exams, to correct them, and to announce exam results. The committee then raises the exam results to the department council for approval.
c. If the program requirements contain a major field or secondary fields from outside the department, then it is so necessary that one of the staff members of the concerned department/departments should be a member of the committee.
5. Written Exam: a. The written exam is to be held during the semester coming after the student has finished the courses. The exam is held at a time determined by the exam committee. After the approval of the department council, the student can postpone the exam for one semester.
b. Failing to pass the exam, the student can be given an extra chance to re-take the exam, during the two following semesters.

c. Failing to pass the exam in the extra chance, the student is to be dismissed and this is to be according to the recommendation of department council and college Council, and approval of Deanship of
Graduate Studies council.
6. Oral Examination: a. After passing the written exam, the student should sit for the oral exam, at a time decided upon by the exam committee.
b. Failing to pass the oral exam, the student has the right to re-take an
extra oral exam at any time, but not later than the next semester.
c. Failing to pass the extra oral exam, the student will be dismissed, and this is to be according to the recommendation of the department council and the College Council, and approval of the Deanship of Graduate Studies Council.
7. The duration (time) of the Comprehensive Exam: According to the recommendation of concerned department council, the college council determines the duration (time) of each of written and oral exams.
8. The marks needed to pass the Comprehensive Exam:
a. Each exam (written and oral) has an independent full mark (100).
b. PhD student passes the written and oral exams, if he scores at least 70% in written and 70% in oral, from each member of the committee.
c. Master's degree student passes the written and oral exams, if he achieves at least 70% in written, and 70% in oral, from most of the members of the exam committee.
9. The college must submit to the Deanship of Graduate studies the results of written and oral exams, in two weeks from the date of the exam.

**Thesis /Dissertation**
**Preparation of Thesis/Dissertation and Supervision**:
**Article 41**
On joining the program, each graduate student should be assigned an academic advisor. The advisor will guide and help the student to choose the subject of the thesis/dissertation and research plan according to the regulations approved by the University Council, as per recommendations of the Council of the Deanship of Graduate Studies.

**Article 42**
After passing all the admission requirements and completing at least 50 % of the required courses, with a minimum cumulative GPA of"B" ,the graduate student should submit his/her thesis/dissertation proposal, if any, to the department concerned. If the proposal is approved, the Department Council will assign either a thesis advisor, and co-advisor if required, or thesis committee members and its chairman. Subsequently, this information should be submitted to the Council of the Deanship of Graduate Studies for approval, as per the recommendations of the College Council.

**Article 43**
Master's thesis should reflect originality and involve a new contribution, and doctoral dissertation should also reflect originality and innovation, together with an effective contribution to the advancement of knowledge in the student's field of study.

**Article 44**
Subject of master's thesis and doctoral dissertation should be written in Arabic. Other languages can be used in some majors with the approval of the University Council as per recommendations of the Department and College Councils, and the Council of the Deanship of Graduate Studies. In such cases, an Arabic perfect summary must be included.

**Article 45**
The thesis/dissertation advisors must be of professorial or an associate professorial rank who are faculty members of the University. An assistant professor may be nominator as master thesis advisor if he worked two years as assistant professor and has at least two papers published or accepted for publication in his field of specialty in refereed journals. then the refereed books can be considered instead of papers. A professor or associate professor from the same department can participate and help in supervision. The assistant professor can participate and help in supervision years an assistant professor and has at least one paper published or accepted for publication (in his field of specialization) in a reference journal.

**Article 46**
The thesis/dissertation advisor may be a non-faculty member of the University with distinguished qualifications and experience in academic research. This requires the approval of the University Council, based on recommendations by the Department Council concerned, the College Council, and the Council of the Deanship of Graduate Studies, and in accordance with the following rules:

A. Masters Thesis
   a. The holder of a doctorate
   b. That have been on obtaining a doctorate at least 3 years
   c. To have at least 3 papers in the area of concern – papers published or accepted for publication in scientific journals.
B. Doctoral Thesis
   a. The holder of a doctorate
   b. That have been on obtaining a doctorate at least 5 years
   c. To have at least 6 papers in the area of concern – papers published or accepted for publication in scientific journals.

**Article 47**
Based on the nature of the thesis/dissertation, a co-advisor can be assigned from other departments in the University, provided that the thesis/dissertation advisor is assigned from the department awarding the degree.

**Article 48**
A faculty member can be in the same time co-advisor or co-advisor for a maximum of four thesis and when deeply necessary, the number can be raised to five following the recommendations of the Department Council concerned and the approval of the College Council, and the Council of the Deanship of Graduate Studies. For the purpose of calculating a faculty thesis/ dissertation will be counted as one credit hour, whether the faculty member is the sole advisor or the major advisor.

**Article 49**
If the advisor cannot continue supervising the thesis /dissertation, or if his service to the University is discontinued, the Department concerned should suggest a replacement, to be approved by the College Council and the Council of the Deanship of Graduate Studies.

**Article 50**
By the end of each semester, the advisor should report, in detail to the department chairman about the student’s progress, to copy of the report should be sent to the Dean of Graduate Studies.

**Article 51**
Student completion of the thesis/dissertation must be reported by the advisor to the Chairman of the Department concerned, in order to initiate the completion of the procedure determined by the Council of the Deanship of Graduate Studies. The procedures are:

Names of member of examiners raised to the graduate studies council and decision should be taken in one month from the date of the College Board.

- After the approval of the Deanship of Graduate Studies on the formation of the Examination panel the department head, refer the thesis to the members of the committee and set a date for discussion.
- The discussion of the thesis can be in public, or may be confidential, and the decision of the committee is immediately made after discussion.
- In the case of non-validity of the thesis or the discussion altogether, the Dean of Graduate Studies should be notified; to cancel the student’s enrollment.
- The time between the approval of the Deanship of Postgraduate Studies on the formation of the judging panel must not exceed four months (not counting the public holidays within this period).

**Article 52**
Based of the academic advisor’s report a lack of commitment by a student towards his studies and other academic duties will result in an academic warning by the Department Council concerned. If, after two warnings, no improvement is evident, the Council of the

Deanship of Graduate Studies may dismiss the student as per the recommendation of the Department Council.

The time between acceptance of the research proposal and submitting of the thesis should not exceed 2 semesters for the Masters degree and four semesters for the Ph.D.

**Thesis/Dissertation Defense**
**Article 53**
Based on the recommendations of the Department and College Councils concerned, a Defense Committee is formed by the Council of the Deanship of Graduate Studies.

**Article 54**
The Master's thesis Defense Committee must fulfill the following requirements:
1. It must comprise an odd number of members, chaired by the thesis advisor.
2. The Committee must comprise at least three members. The advisor and co-advisor if any should not constitute a majority in the Committee.
3. The Committee members should meet the conditions of the thesis supervision.
4. At least one member of the Committee must be a professor or an associate professor.
5. Decisions of the Committee should be based on a majority vote of at least two thirds of the total number of members.

**Article 55**
The Doctoral Dissertation Defense Committee must fulfill the following requirements:
1. It must comprise an odd number of members, not less than three, and chaired by the thesis advisor.
2. The Committee members must be of the rank of professors or associate professors. The advisor and co-advisor (if any) should not constitute a majority in the committee.
3. At least one member of the Committee must be of Professor rank.
4. One member of the Committee must be from outside the University.
5. Decisions of the Committee should be based on a majority vote of at least two thirds of the total number of members.

**Article 56**
If, for any reason, the thesis reason dissertation advisor cannot participate in the defense committee, due to his death or his service to the University is discontinued, or his presence outside the country in task for a long time, the department concerned should suggest a replacement who should be approved by the college council and council of the deanship of graduate studies.

**Article 57**
A report is prepared and signed by all members of the thesis/dissertation committee. The report must be submitted to the Department Chairman concerned within one week of the date of the public defense. The report must include one of the following recommendations:
1. The thesis/dissertation is accepted and recommended for the award of the degree.
2. The thesis/dissertation is accepted with some modifications, without a re-defense being necessary. A member of the committee is delegated to recommend awarding of the degree after ensuring that the required modifications are implemented within three months from the date of the first public defense. This period can be waived by the University Council.
3. Further work is recommended on the thesis/dissertation, followed by a second defense within a certain period of time to be decided by the Council of the Deanship of Graduate Studies, based on the recommendations of the Department Council concerned. This period must not exceed one year from the date of the first defense.
4. The thesis/dissertation is rejected.
Each committee member has the right to submit his own comments or reservations in a separate report both to the Department Chairman concerned and the Dean of Graduate Studies, within two weeks of the date of the defense.

**Article 58**
The Department Chairman concerned must submit the report of the Thesis/Dissertation Committee to the Dean of Graduate Studies not

later than three weeks after the date of the defense.

**Article 59**
The Dean of Graduate Studies must submit the recommendations to award the degree to the University Council for approval.

**Article 60**
A master's thesis advisor from outside the university will be given compensation of five thousand Saudi Riyals (SR 5,000.00). A doctoral dissertation advisor from outside the University will be given compensation of seven thousand Saudi Riyals (SR7,000.00).

**Article 61**
A faculty staff member of the University to whom the thesis/dissertation is submitted receives one thousand Saudi Riyals (SR1,000.00) member or a non-faculty member from the University to whom the thesis/dissertation is submitted receives one thousand five hundred Saudi Riyals (SR1,500.00) for participation the Doctoral Defense Committee and one thousand saudi riyals (SR 1,000) for participation in the master defense Committee. A committee member from outside the Kingdom receives two thousands five hundreds Saudi Riyals (SR2,500.00). If the Committee member is from outside the city in which the University is located, whereby the thesis/ dissertation is defended, he should be given a roundtrip air ticket from his place of residence (city/country) and rent of suitable accommodation and living for a maximum of two nights in addition to honorarium indicated above, whether the Committee member is from the Kingdom of Saudi Arabia or from outside. If the Committee member is blind or a female, his/her companion should be given air ticket and accommodation rent for a maximum of two nights. In case of necessity, and according to the nature of study, the Council of the Deanship of Graduate Studies can add one or two nights, as per the recommendation of the Department and college Councils, as extended stay for the committee member.

**Gradute Studies / General Regulations**
**Article 62**
The University Council approves the regulations for the evaluation of the graduate studies programs as per the recommendations of the Council of the Deanship of Graduate Studies. The results of the evaluation should be submitted to the University Council.

**Article 63**
At the end of each academic year, the Department Chairman should submit a report to the Dean of the College concerned and the Dean of Graduate Studies regarding the progress of graduate studies in the Department.

**Article 64**
Whatever is not explicitly stated in this document should follow the rules of the Council of Higher Education and Universities and their implementation rules and regulations as practiced in the Kingdom.

**Article 65**
This document will cancel all the previous graduate studies regulations in the Saudi Universities and it will be implemented from the first academic year following its approval date. The University Council may take the appropriate action in cases where students joined a University under the old regulations.

**Article 66**
A University Council may issue its own implementation rules regarding the progress of graduate studies without contradicting the regulating rules of this document.

**Article 67**
The Council of Higher education and Universities has the right to interpret the regulations of this document.

# Deanship of Educational Services

The deanship's main responsibility is the Preparatory Year Program (PYP) at Qassim University. The program provides a foundation for students' knowledge in science, medicine, mathematics and English—the foundation for their subsequent University-level courses.

The use of the (PYP) for scientific and medical specializations is supported by their successful implementation at other Saudi universities. Because of the importance and necessity of the Preparatory Year Program, the University has embarked on its implementation to realize the following objectives:

1) To increase the employability of graduates of science specializations (engineering, computers and other sciences) in the public and private sectors by improving their computer literacy and English language skills.

2) To prepare students to use English as the medium of education in scientific and medical specializations. Students study a weekly total of sixteen hours distributed among the four language skills (reading, listening, speaking and writing). In addition, the high school–level subjects of mathematics and natural sciences (physics, chemistry and biology) are reviewed in English.

3) To develop applied computer skills by offering the ICDL (International Computer Driving License) as the basis of a course.

4) To address the issue of academically challenged students and their high rate of dropout from the scientific and medical colleges. The Preparatory Year Program affords both students and the University an opportunity to identify student's abilities and their readiness to join one of the medical or scientific colleges.

5) To offer new opportunities for fair competition between students in view of the varying evaluation conditions to which students were subjected at the end of their high school education. Students are assigned to suitable colleges according to their GPA during the Preparatory Year Program, regardless of their grades in high school. Thus, each student is evaluated according to criteria and conditions that are deemed suitable for studying at the university level in a particular specialization.

6) To ensure that students' Preparatory Year GPA is not included in the calculation of their GPA after joining any particular college. The calculation of the GPA begins afresh in the newly joined college. This process helps the students acclimate to the new environment in a way that does not affect their overall university GPA. The GPA in the Preparatory Year Program is a competitive instrument between students, and concerned colleges use it as the primary tool to determine admission to their colleges.

### Study Curriculum

- The curriculum in the Preparatory Year Program consists of two semesters of study. For more information about each course and the books and references used, please see the course descriptions available on the home page of the Preparatory Year Program website: www.pyp.edu.sa.

# Training and Scholarships

Every year the Univeristy encourages a number of faculty members to pursue studies in foreign universities in specialized domains in order to enhance their skills. This initiative helps in promoting research as well as preparing the faculty members to assume greater responsibilities in future. The total number of Ph.D. scholarships offered by the University for studies abroad are 143, while the numbers sent for Masters degree are 333. In addition to this, the University also sent 51 Faculty members to pursue fellowship in various specialities.

Qassim University has so far enrolled more than 60000 undergraduate students since its inception, which is indicative of its substantial contribution to the Education field.

## Colleges and Specializations

| No. | Name of the College | Date of Foundation | Location | Specializations |
|---|---|---|---|---|
| | College of Agriculture and Veterinary Medicine | AH | Main Campus | Plant protection and production, Veterinary medicine, Animal production and breeding, Food science and human nutrition |
| | College of Science | AH | Main Campus | Physics, Chemistry, Mathematics |
| | College of Engineering | AH | Main Campus | Electrical engineering, Electronics & Communications Engineering, Civil engineering, Mechanical engineering |
| | College of Computer Science | AH | Main Campus | Computer science, Computer engineering, Information technology |
| 6 | Community College in Buraida | AH | Buraida | Applied Medical Sciences |
| | Community College in Onaiza | AH | Onaiza | Applied Medical Sciences, Natural and Applied Scienecs |
| | College of Arts and Science in Buraida | It was restructured in AH. | Buraida | Mathematics, Physics, Chemistry, Computer Science |
| | College of Arts and Science in Onaiza | It was restructured in AH. | Onaiza | Mathematics, Physics, Biology, Computer Science |
| 10 | College of Arts and Science in Al-Miznib | It was restructured in AH. | Al-Miznib | Physics, Mathematics |
| 11 | College of Arts and Science in Al-Bukairiyyah | It was restructured in AH . | Al-Bukairiyyah | Physics, Mathematics |
| 12 | College of Arts and Science in | It was | Al-Rass | Mathematics, Physics, Chemistry, |

| | | | | |
|---|---|---|---|---|
| | Al-Rass | restructured in AH. | | Computer Science, Science Laboratories |
| 13 | College of Arts and Science in Uklat Al-Sukoor | It was restructured in AH. | Uklat Al-Sukoor | Mathematics, Physics, Computer Science |
| | College of Engineering in Onaiza | AH | Onaiza | Electrical engineering, Electronics & Communications Engineering, Civil engineering, Mechanical engineering |
| 15 | College of Arts and Science in Al-Badayye | AH | Al-Badayye | Mathematics, Physics, Computer Science |
| 16 | College of Arts and Science in Dhariyya | AH | Dhariyya | Mathematics, Physics |
| 17 | College of Arts and Science in Al-Asiyyah | AH | Al-Asiyyah | Mathematics, Physics, Computer Science and Informatics |

# Deanships

## Deanships of Academic Development

To promote the performance of its programs and realize its different objectives, the University took the initiative to apply for permission to establish the Deanship of Academic Development. Permission was granted—Thanks be to Allah—with Royal Consent and Higher Education Council Decision No. 12/38/1426.

**The deanship aims to:**

- Unify the development path and coordination between various channels concerned with promoting research and education;
- Ensure the quality of the educational process through continued commitment to academic programs and carried out with staff training programs and a commitment to scientific research;
- Strive for superior academic evaluation and accreditation by cooperating with the necessary institutions;
- Make use of relevant technologies to increase the quality of the educational process and scientific research;
- Adhere to the scientific method and an emphasis on furthering research that will add to the prestige of the University;
- Brief the University administration on the state of the University in the fields of education, scientific research and community service;
- Prepare special reports on performance levels, as measured by accredited criteria, in light of comparative studies with local and foreign universities;
- Review the work of administrative and financial units and work with officials to eliminate all shortcomings and increase overall performance;
- Implement strategic plans as required by the changing circumstances surrounding the University;
- Ensure the application of academic and administrative rules and regulations within the University;
- Work to ensure the availability of statistical data and information to satisfy the needs of decision makers at the University or other units in need of this data;
- Advocate strategic research and studies that are concerned with future planning and development and
- Recognize local and regional changes, especially those related to higher education.

The deanship embraces the development units and committees that are concerned with different aspects of University affairs. These committees are supervised by distinguished professors who are interested in various developmental aspects. Among the most important of these units are the following:

### 1. The Unit for Skill Development

The unit strives for the development of academic and administrative performance within the University by holding training sessions and workshops for all the University affiliates, teaching staff members, lecturers and demonstrators. The unit holds training sessions in various fields in which trainers from both the Kingdom and overseas participate. These training sessions are not restricted to Qassim University affiliates; they are also available for teaching staff members from other universities and sectors.

### 2. The Unit of Administrative Development

The unit aims to assist the university in developing the strategic methods that will provide the suitable techniques to improve the performance of the university in two main areas : administrative performance and future financial performance .

### 3. Center of E-Learning and Distance Learning

The unit aims to explore ways to use modern educational tools that emphasize individual learning through technology. The unit provides a means to those with special needs who cannot commute to the University to pursue their education. In these matters, the unit makes the appropriate recommendations to decision makers at the University.

### 4. The Unit of Prediction Studies

The unit is dedicated to strategic research and studies that emphasize predictive planning and development as well as the monitoring of local and regional changes, especially those related to higher education.

Qassim University Bulletin

## Deanship of Graduate Studies

The Deanship of Graduate Studies was established in 2004 as an independent deanship for graduate studies. The deanship undertook the important task of supervising the graduate program within the University in coordination with other colleges. The program was developed to provide ambitious Saudi students the opportunity to pursue their education beyond the university level and increase their academic qualifications.

The deanship also oversees the graduation ceremonies for all graduate students in all colleges. In this regard, the deanship oversaw the graduation of the first batch of master’s students from the College of Agriculture and Veterinary Medicine in AY2004–2005.

The master’s programs at the University include the following specialties:

- Arabic Language,
- Fundamentals of Islam,
- Holy Quran Studies,
- History,

- Sociology and Social Services,
- Business Administration,
- Fundamentals of Education,
- Animal Reproduction,
- Islamic Studies,
- The Prophet's Sunnah (The Prophet's Way),
- Faith,
- Geography,
- Veterinary Science,
- Mathematics,
- Teaching: Ways and Methodology,
- Islamic History,
- Modern History,
- Instructional Technology of Education,
- Curriculum of Instruction,
- Poultry,
- Economics,
- Educational Psychology,
- Computer Science,
- Plant Protection and
- Plant Production.

## Deanship of Admissions and Registration

The Deanship of Admissions and Registration is in charge of all admissions procedures to the University. It has simplified these procedures to the extent possible through the use of advanced technology and a firm commitment to the accuracy and privacy of students' academic and personal information. Special attention is given to increasing students' awareness of their academic standing, performance and overall well-being within the program. The purpose of this is to allow students to take a more active role in the application process, be more informed on their standing and better use electronic self-service resources.

The deanship aims to

- Work to ensure a seat at the University for every student who satisfies admissions criteria;
- Work to attract high-caliber students to the University from both in and outside the Qassim region;
- Ensure that students are aware of the rules and regulations related to their study and examinations;
- Document students' academic records and continuously update them electronically;
- Work to develop and adapt technology, so that students can keep abreast of their academic affairs anywhere and at anytime;
- Strive to distribute students' fees punctually and without difficulty and irregularities and
- Document students' graduation procedures smoothly and conveniently within the time limit specified by the University curriculum.

## Deanship of Community Service

The Deanship of Community Service acts as an intermediary between the University and all other sectors and institutions of the community. Accordingly, the Deanship employs the expertise, capabilities and resources available at the University to offer scientific diplomas and specialized training in a variety of courses in science, technology and management. The goal of this process is to contribute to the satisfaction of community needs and aspirations.

### The deanship aims to

- Serve students who were not accepted in any of the University departments, as well as other members and institutions of the community at large;
- Strengthen the relationship between the University and the community and promote cultural, technical and managerial awareness for all community members;
- Provide students who were not accepted in any of the University colleges an opportunity to continue their education and acquire qualifications, enabling them to compete in the labor market, by offering a variety of courses and specialized scientific diplomas;
- Satisfy the needs of the public and private sectors by offering various specialized short courses;
- Organize and administer scientific conferences and symposia with the goal to exchange and transfer experience and expertise in the different areas of knowledge and
- Strengthen University relationships with all the public, private and charity sectors of the community.

## Deanship of Library Affairs

The Deanship of Library Affairs is one of the fastest growing deanships at Qassim University and was created after the issue of the High Royal Decree authorizing the establishment of the University. The libraries in existence at the two former branches of

King Saud University and Imam Mohamed Ibn Saud Islamic University were under the



administration of their relevant colleges. Technically, they were under the administration

of the Deanship of Library Affairs at Imam University, but administratively they were under the supervision of one of the supporting deanships.. The deanship began its duties using the material and human resources available at the College of Business and Economics. With the completion of its permanent location, the deanship finally moved in 2005 to the building of the General Administration, with its administrative offices occupying a section of the Central Library. Since then, it has administered the former libraries of the University.

## The Consultative Committee of the Deanship

A permanent Consultative Committee for the Deanship of Library Affairs was formed and includes deanship officials and experienced university teaching staff members whose views and proposals might benefit the performance of the libraries and their activities. This was carried out with the consent of his Excellency, the

University Rector, in Administrative Decision No. 479.

## Deanship of Scientific Research

The Deanship of Scientific Research provides an important role in community service and in transforming the community through the creation of a highly qualified workforce. This is achieved through the use of research and consultation centers located within the different colleges of the University.

The University aims to create an environment in which public and private sectors of the community work together with research and consultancy centers at the appropriate colleges. The goal is to align the University with the national strategy of using higher education to transform the traditional economy of Saudi Arabia into a knowledge-based economy. To realize this strategic objective, the Deanship of Scientific Research directs applied and consultative research at the University in a way that serves developmental needs and fosters cooperation between the University and the public and private sectors.

In a world characterized by the universality of knowledge, constant change and the availability of managerial, technical and scientific experiences and their supporting means, the deanship's goal is to realize the following objectives:

- To provide appropriate plans and strategies for entering the market of scientific studies, applied research and development and consultative services and offer training in the University centers and on the job,
- To market the considerable scientific apparatuses available to the University and devote its resources to the service and development of different sectors of the national economy,
- To improve services and production methods in the public and private sectors by applying the scientific method that is conducive to development and innovation,
- To strengthen the University links with the public and private sectors in the field of scientific research by conducting specialized studies and providing varied consultative services,
- To offer new methods and channels for financing research projects at the University by the public and private sectors and encourage monetary and service donations by individuals and institutions for this purpose,
- To coordinate with various commercial, industrial, engineering, service, agricultural and other sectors in the region to synchronize the needs of these sectors with the academic, research, consultative and study programs at the University and

To initiate agreements with the external beneficiaries to ensure the representation of the University in the companies or commercial projects it establishes or in which it participates to preserve its rights.

## Deanship of Student Affairs

The Deanship of Student Affairs is one of several supporting deanships at Qassim University. This deanship is concerned with serving students in all non-educational aspects of University life. Through its services and activities, the Deanship provides opportunities for students to practice their hobbies and better use their leisure time.

The deanship also provides direction and guidance to students and helps them overcome any difficulties that may adversely affect their study. The deanship emphasizes aiding the growth of a mature and productive student body and continually strives to make its services more widely available so that students can take advantage of the available resources. The deanship includes the following directorates and units:

1. Administrative Affairs Unit,
2. Financial Affairs Unit,
3. Directorate of Student Activities,
4. Directorate of Orientation and Guidance,
5. Directorate of Food Services,
6. Student Fund Directorate,
7. Scholarship Sponsorship and Foreign Student Unit and
8. Female Students Transportation Unit.

## Deanship of Quality Assurance and Accreditation

The goal of the Deanship of Quality Assurance and Accreditation is to create an atmosphere of excellence and creativity within university academia. The deanship's mission is to improve both the quality of the academic and the administrative performance of the University to achieve its strategic goals. The deanship conducts checks to determine whether its goals are being realized. The objectives of the deanship are to manage the University's quality review process (which ensures the quality of procedures and practices underlying undergraduate and graduate learning, teaching, assessment and support), provide advice and guidance to both academic and non-academic departments, coordinate activities designed to both ensure and promote the quality of the University's workings and operations and monitor the effectiveness of the University's internal quality assurance.

## Deanship of Faculty and Staff Affairs

This Deanship of Faculty and Staff Affairs is responsible for recruiting employees for the University's posts and positions in accordance with civil service regulations and procedures. It selects the personnel for each post and determines the appropriate salary and work conditions in addition to all other relevant procedures, such as appointment, promotion, transfer and remunerations.

With increased expansion in its work and range of activities and tasks, the administration was upgraded from control under a junior administration to the present deanship status. The deanship is the main group overseeing employee interests and affairs, has a wide range of authority and assumes sole responsibility for the application and interpretation of University regulations and their implementation.

As the University has expanded academically and administratively, the range of responsibilities of the deanship has also widened, indicating its increasing role in running the University's affairs in the near future.

## Deanship of Information and Technology

The Deanship of Information and Technology works to achieve the following goals:

1. To provide statistical services in studies and research in and outside the University;

2. To provide electronic publication services using state-of-the-art techniques;
3. To construct an interactive site on the Internet by building a communication network at the regional level and equipping it with the necessary technical services to furnish fresh information in different fields;
4. To provide digital content in the different disciplines to fulfill the needs of students and researchers;
5. 
6. To propose and construct databases suited to the nature of scientific programs and educational activities provided by the University;
7. To provide training services on applications pertaining to the fields of computer science, statistics and information to increase the efficiency of University affiliates, students and any other interested parties;
8. To make the tools of modern electronic management available to all departments and administrations of the University and design and develop systems and programs suited to university needs and
9. To make maximum use of information and communication technology and the voluminous and ever increasing amount of electronic information on the Internet and other sources of electronic information and adapt them to benefit researchers and students.

## Center for E-Learning and Distance Education

The Center for E-Learning and Distance Education aims to provide ways to use modern learning methods based on individual and self-education through the use of computer technologies, which facilitate easy and convenient communication of information to students. The center also offers learning opportunities to students whose special circumstances do not allow them to attend regular classes at the University. The center evaluates all prospects and possibilities for e-learning and distance education and makes appropriate recommendations to decision makers at the University.

# Colleges


كلية الزراعة والطب البيطري
Agriculture & Veterinary College

## College of Agriculture and Veterinary Medicine

### Vision:

Development of the educational programs, training of employees and staff members, development of links with the local, regional and international scientific organizations in an endeavor of achieving scientific superiority in veterinary and agriculture in both plant and animal sectors, obtaining international recognition and accreditation.

### Mission:

1. Building of high mental and professional knowledge and skills in students in their different specializations during their academic life and this can be achieved through introduction of modern Curricula and intensive training.
2. Graduation of specialized national staff in the field of veterinary medicine agriculture in both plant and animal sectors and they should be highly efficient and professional in discovering and solving the agricultural and veterinary problems that confront the agriculture and veterinary community.
3. Developing and expanding the concept of safe and ideal usage of chemicals in agriculture and the contribution in irrigation water economy and natural resources and is to be done by means of innovative advanced scientific approaches.
4. Establishing the college as a pioneer in scientific research and this is accomplished by conduction of distinguished and innovative research.
5. Community and environment services and offering of veterinary and agricultural consultation to farmers and related bodies.

### Values

The college is keen in implementation of the following values:

*Honesty and Faithfulness in the work*
*Cooperation*
*Efficiency and competition*
*Creativity and innovation*
Affiliation and Community service.

### Aims:

1. Qualifying a national cadre specialized in agriculture, nutrition and veterinary medicine to participate in the development of plans laid down by the Kingdom for agriculture, food processing, nutrition and veterinary medicine. This will be achieved through the study programs offered by the College departments.
2. Carry research and academic studies, with their needed laboratory and field experiments facilities, and field application of their results, to develop agriculture and animal production and upgrade all aspects of veterinary services, as well as nutrition and nutritional programming in the Kingdom.
3. Environmental and community services in the fields of agriculture, nutrition

and veterinary medicine in the area and solve those emerging problems facing farmers, animal owners and citizens especially in Qassim area and in the Kingdom at large.

The Master degree of Veterinary medicine (MVM) was the first graduate program established by the College of Agriculture and Veterinary Medicine. It is organized by the Department of Veterinary Medicine. The first qualified veterinarians with MVM graduated in the academic year 1425/1426H. The master degree program in the Department of Plant Production and Protection has been started in academic year 1428/1429H. The College is currently planning to lay down an MS program in animal production, which is currently in its final touches. This will be followed by MS programs in Food Science and human nutrition in a near future.

## About:

Teaching started in the College of Agriculture and Veterinary Medicine in 1402/1403H. From that date, the College has witnessed continuous developments in various academic, buildings, study programs and scientific research. This is performed in a general context of a scientific vision that coincides with the objectives of the needs of the Kingdom. To date, 1519 students graduated from the different specialties of the College.

**Degrees:**

- Bachelor
- Master

**Programs:**

1. Bachelor's degree in Agricultural Production and Protection

2. Master Degree

The Department of Plant Production and Protection offers Master Degrees of Science (M.Sc.) in the following specialties:

a. M Sc in Plant Production
b. M Sc in Plant Protection

## Faculty Members:

**Faculty Plant Production and Protection:**

Prof. Abd Al-RahmanI. Al-Humaid

**Dean of College**

Prof. Khalid N. Al-Redhaiman

**Department Head**

Ahmad I. Al-Turki Associate Professor

**Vice Dean**

Prof. Mohamed A. El-Meleigi

Prof. Ahmad A. Al-Rokaihah

Prof. Yousef A. Alseleem

Prof. Abdul Al-Rahman S. Al-Wasel

Prof. Abdul Al-Rahman M. Al-Moshileh

Prof. Suloiman M. Al-Rehiayani

Dean of Unaizah Community College

Prof. Abdalla Ali Al-Kheraiji

Prof. Dia Aldeen A. Al-Ryes

Prof. Yasser M. El-Hadidi

Prof. Ahmed H. Abdalla

Prof. Ansary E. Moftah

Prof. Khaled A. Osman

Prof. Ragab A. El-Mergawi

Prof.Farid S. Sabra

Prof. Mohamed Z. El-Shinawy

Prof. Mohamed I. Motawei

Prof. Essam M. Ali

Prof. Mohamed A. Al-Deghairi

Prof. Khiery M. Esmail

Prof. Nagdi F. Abd El-Baki

Mahmoud A. Moustafa Associate Prof.

Hesham H. Abd El-Kader Associate Prof.

Mohamed A. Kassem Associate Prof.

Fathy A. Gomah Associate Prof.

Abd Al-Rhman A. Al-Squre Assistant Prof.

Nasser S. Al-Ghumaiz Assistant Prof.

Rafat M. El-Sanhoty Assistant Prof.

Soluman M. Al-Otuq Assistant Prof.

Fahd M. Al-Romian Assistant Prof.

Sultan H. Sultan Assistant Prof.

**Faculty Veterinary Medicine:**

Prof. El-Mahi B. Abdelsalam

Prof. Osama M. Mahmoud

Prof. Attia H. Atta

Prof. Mohamed A. El-Bahi

Prof. Abdelmagid A. Draz

Prof. Mustafa A. Al-Hallag

Prof. Mahmoud M. Abdelnaeim

Prof. Nabil A. Ahmed

Prof. Abdelkader A. Zaki

Prof. Shawkat M. Abdellatif

Prof. Diea G. Allieythi

Mussad A. Al-Dubaib Associate Prof.

Abdulla N. Al-Khalaf Associate Prof.

Ahmed M. Ali Associate Prof.

Khalid B. Al-Harbi Assistant Prof.

Mahmoud E. Hashad Associate Prof.

Ahmed F. Ahmed Associate Prof.

Fahad A. Al-Sobayil Associate Prof.

Naser A. Al-Wabel Associate Prof.

Abdullah F. Al-Sayegh Assistant Prof.

Mohamed T. Abdel-Aal Associate Prof.

**Facutly Production and Breeding:**

Prof. Abrahim H. Al-Homaidan

Prof. Maher H. Khalil

Prof. Abrahim A. Al-Homaidi

Prof. Magdy M. Abd El-Salam

Prof. Moataz M. Fathy

Prof. Moustafa M. Zeitoun

Soliman N. El-Dobaib Associate Prof.

Khalid A. Al-Sobayil Associate Prof.

Mohamed O. Fahmy Associate Prof.

Hossam M. Kamel Associate Prof.

Ali M. El-Saef Assistant Prof.

Mohamed F. El-Zarei Assistant Prof.

Mohamed A. Atia Assistant Prof.

**Facutly of Food Science and Human Nutrition:**

Prof. Suliman N. Al-Dobaib

Prof. S amir A. Salim

Prof. Hassan M. Mousa

Prof. Samir M. Ahmad

Prof. Ramadan A. Habiba

Prof.Mohamed I. Saleh

Mohamad G. Elziney Assistant Prof.

Ahmad M. Abdelsalam Associate Prof.

Abdulla S. Ammar Associate Prof.

**Study Plan of Bachelor's Degree in Agriculture Production Protection:**

Graduation with Bachelor's degree in Agricultural Production Protection requires studying136 credit hours in eight study levels (Terms) as following:

**Level: 1**

| Course | | Title | Credit Unit | | | Pre. |
|---|---|---|---|---|---|---|
| Code | No. | | Lec | Lab. | Total | |
| IC | 101 | Introduction to Islamic Culture | 2 | - | 2 | - |
| ARAB | 101 | Language Skills | 2 | - | 2 | - |
| CHEM | 101 | General Chemistry | 3 | 1 | 4 | - |
| ZOOL | 101 | General Zoology | 3 | 1 | 4 | - |
| ENG | 101 | English Language | 3 | - | 3 | - |
| MATH | 165 | Introduction to Calculus | 3 | - | 3 | - |
| | | Total Units | 16 | 2 | 18 | |

**Level: 2**

| Course | | Title | Credit Unit | | | Pre. |
|---|---|---|---|---|---|---|
| Code | No. | | Lec. | Lab. | Total | |
| BOT | 101 | General Botany | 3 | 1 | 4 | - |
| PHYS | 101 | Principles of Physics | 3 | 1 | 4 | - |
| IC | 102 | Islam and Construction of Society | 2 | - | 2 | IC101 |
| CSC | 121 | Introduction to Computer | 2 | 1 | 3 | - |
| STAT | 122 | Introduction to Statistics | 1 | 1 | 2 | - |
| CHEM | 241 | General Organic Chemistry | 3 | 1 | 4 | - |
| | | Total Units | 14 | 5 | 19 | |

**Level: 3**

| Course | | Title | Credit Unit | | | Pre. |
|---|---|---|---|---|---|---|
| Code | No. | | Lec. | Lab. | Total | |
| IC | 103 | Economic System in Islam | 2 | - | 2 | IC 101 |
| PPP | 210 | Agriculture Extension | 2 | 1 | 3 | - |
| PPP | 211 | Principles of Soil Science | 2 | 1 | 3 | CHEM101 PHYS 101 |
| PPP | 214 | Agricultural Microbiology | 2 | 1 | 3 | BOT101 |
| PPP | 234 | Principles of Entomology | 2 | 1 | 3 | ZOOL 101 |
| BOT | 271 | Plant Physiology | 2 | 1 | 3 | BOT101 |
| | | Total Units | 12 | 5 | 17 | |

**Level: 4**

| Course Code | No. | Title | Credit Unit Lec. | Lab. | Total | Pre. |
|---|---|---|---|---|---|---|
| ARAB | 103 | Expository Writing | 2 | - | 2 | - |
| AGEC | 202 | Principles of Agric. Economics | 2 | - | 2 | - |
| PPP | 223 | Principles of Forestry and Range | 1 | 1 | 2 | |
| PPP | 242 | Principles of Genetics and Plant Breeding | 3 | 1 | 4 | BOT101 |
| PPP | 261 | Soil Fertility and Plant Nutrition | 2 | 1 | 3 | PPP211 |
| AGEN | 313 | Mechanization of Agric. Operations | 2 | 1 | 3 | MATH 165 |
| AGEN | 336 | Irrigation and Drainage | 2 | 1 | 3 | - |
| | | Total Units | 14 | 5 | 19 | |

**Level: 5**

| Course Code | No. | Title | Credit Unit Lec. | Lab. | Total | Pre. |
|---|---|---|---|---|---|---|
| IC | 104 | Principles of Islamic Political System | 2 | - | 2 | IC101 |
| PPP | 312 | Design and Analysis of Agriculture Experiment | 2 | 1 | 3 | STAT122 |
| PPP | 314 | Economic Entomology and Apiculture | 3 | 1 | 4 | PPP234 |
| PPP | 332 | Forage Crops Production | 1 | 1 | 2 | BOT101 |
| PPP | 333 | Plant Propagation | 1 | 1 | 2 | PPP242 |
| PPP | 352 | Production of Field Crops | 2 | 1 | 3 | BOT101 |
| PPP | 375 | Production of Vegetable Crops | 2 | 1 | 3 | BOT101 |
| | | Total Units | 13 | 6 | 19 | |

**Level: 6**

| Course Code | No. | Title | Credit Unit Lec. | Lab. | Total | Pre. |
|---|---|---|---|---|---|---|
| PPP | 321 | Application of Computer in Agric. | 1 | 1 | 2 | CSC 121 |
| PPP | 324 | General Pesticides | 2 | 1 | 3 | CHEM 241 |
| PPP | 325 | Handling and Marketing of Horticulture Crops | 2 | 1 | 3 | BOT 101 AGEC 202 |
| PPP | 342 | Range Management | 1 | 1 | 2 | PPP 223 |
| PPP | 343 | Production of Fruit Crops | 2 | 1 | 3 | BOT 101 |
| PPP | 344 | Fungal Plant Diseases | 2 | 1 | 3 | PPP 214 |
| PPP | 364 | Nematode Plant Disease | 1 | 1 | 2 | PPP 214 |
| | | Total Units | 11 | 7 | 18 | |

**Level: 7**

| Course Code | Course No. | Title | Credit Unit Lec. | Credit Unit Lab. | Credit Unit Total | Pre. |
|---|---|---|---|---|---|---|
| PPP | 414 | Bacterial and Viral Plant Diseases | 1 | 1 | 2 | PPP 214 |
| PPP | 415 | Date Palm Production and Pests | 2 | 1 | 3 | PPP 234 + PPP 344 |
| PPP | 433 | Arborculturing of Arid Lands | 1 | 1 | 2 | PPP342 |
| PPP | 453 | Greenhouse Agriculture | 1 | 1 | 2 | BOT 101 |
| PPP | 491 | References and Periodicals | - | 1 | 1 | - |
| PPP | 493 | Practices and Trainings (1) | - | 3 | 3 | - |
| | | Total Units | 5 | 8 | 13 | |

**Level: 8**

| Course Code | Course No. | Title | Credit Unit Lec. | Credit Unit Lab. | Credit Unit Total | Pre. |
|---|---|---|---|---|---|---|
| PPP | 443 | Ornamental Plants & Gardens Landscaping | 2 | 1 | 3 | BOT 101 |
| PPP | 444 | Weeds and Weed Control | 1 | 1 | 2 | PPP 342 |
| PPP | 461 | Analysis of Soil, Water and Plant | - | 2 | 2 | PPP 211 |
| PPP | 464 | Agriculture Plant Quarantine | 1 | - | 1 | PPP 314 + PPP344 |
| PPP | 492 | Research and Discussion | - | 2 | 2 | PPP 491 |
| PPP | 494 | Practical Training (2) | - | 3 | 3 | PPP 493 |
| | | Total Units | 4 | 9 | 13 | |

**Study Plan of Veterinary Medicine (BVM)**

**1-The Bachelor Degree of Veterinary Medicine (BVM)**

This degree is awarded after completing 10 academic levels comprising a total of 186 units, consisting of the following courses:

**Level (1)**

| Code | No. | Course Title | Credit Units Lec. | Credit Units Lab. | Credit Units Total | Pre. |
|---|---|---|---|---|---|---|
| IC | 101 | Introduction to Islamic Culture | 2 | - | 2 | - |
| ARAB | 101 | Language Skills | 2 | - | 2 | - |
| CHEM | 101 | General Chemistry | 3 | 1 | 4 | - |
| ZOOL | 101 | General Zoology | 3 | 1 | 4 | - |
| ENG | 101 | English Language | 3 | - | 3 | - |
| MATH | 165 | Introduction to Calculus | 3 | - | 3 | - |
| Total number of units | | | 16 | 2 | 18 | |

**Level (2)**

| Code | No. | Course title | Credit Units Lec. | Credit Units Lab. | Credit Units Total | Pre. |
|---|---|---|---|---|---|---|
| BOT | 101 | General Botany | 3 | 1 | 4 | - |
| PHYS | 101 | Principles of Physics | 3 | 1 | 4 | - |
| IC | 10 | Islam | 2 | - | 2 | IC101 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 2 | and Construction of Society | | | | |
| **CSC** | 121 | Introduction to Computer | 2 | 1 | 3 | - |
| **STAT** | 122 | Introduction to Statistics | 1 | 1 | 2 | - |
| **CHEM** | 241 | General Organic Chemistry | 3 | 1 | 4 | CHEM 101 |
| **Total number of units** | | | 14 | 5 | 19 | |

**Level (3)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **IC** | 103 | The Islamic Economic System | 2 | - | 2 | IC 101 |
| **APB** | 211 | Principles of Animal Production | 2 | 1 | 3 | ZOOL 101 |
| **BVM** | 211 | Veterinary Physiology (1) | 2 | 1 | 3 | ZOOL 101, CHEM 101 |
| **BVM** | 212 | Animal Anatomy (1) | 2 | 1 | 3 | ZOOL 101 |
| **BVM** | 232 | Veterinary Histology (1) | 2 | 1 | 3 | ZOOL 101 |
| **PPP** | 202 | Principles of Agricultural Economics | 2 | 0 | 2 | - |
| **BCH** | 301 | Principles of Biochemistry | 2 | 1 | 3 | CHEM 241 |
| **Total number of units** | | | 14 | 5 | 19 | |

**Level (4)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **ARAB** | 103 | Expository Writing | 2 | - | 2 | - |
| **BVM** | 221 | Veterinary Physiology (2) | 3 | 1 | 4 | BVM 211 |
| **BVM** | 252 | Embryology | 2 | 1 | 3 | 101 ZOL |
| **BVM** | 222 | Animal Anatomy (2) | 3 | 1 | 4 | BVM 212 |
| **BVM** | 242 | Veterinary Histology (2) | 3 | 1 | 4 | BVM 232 |
| **BCH** | 302 | Biochemistry | 2 | 1 | 3 | BCH 301 |
| **Total number of units** | | | 15 | 5 | 20 | |

**Level (5)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **BVM** | 313 | Introduction to veterinary microbiology | 2 | 1 | 3 | BCH302 |
| **BVM** | 314 | General Pathology | 2 | 1 | 3 | BVM221 BVM222 BVM242 |
| **APB** | 312 | Design & analysis of agricultural experiments | 2 | 1 | 3 | STAT122 |
| **BVM** | 331 | Endocrinology | 2 | 1 | 3 | BVM221 |
| **BVM** | 374 | Veterinary | 1 | 1 | 2 | ZOOL 101 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | Arthropoda | | | | |
| **BVM** | 334 | Veterinary Protozoology | 1 | 1 | 2 | ZOOL 101 |
| **Total number of units** | | | 13 | 7 | 20 | |

**Level (6)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **BVM** | 323 | Veterinary Bacteriology & Mycology | 2 | 1 | 3 | BVM 313, BVM 383 |
| **BVM** | 324 | Systemic Pathology (A) | 2 | 1 | 3 | BVM 314 |
| **BVM** | 343 | Veterinary Virology | 2 | 1 | 3 | BVM 313, BVM 383 |
| **BVM** | 344 | Systemic Pathology (B) | 2 | 1 | 3 | BVM 314 |
| **BVM** | 364 | Veterinary Helminthology | 2 | 1 | 3 | ZOOL 101 |
| **BVM** | 383 | Immunology | 2 | 1 | 3 | BVM 221 BVM 242,BCH 302 |
| **Total number of units** | | | 12 | 6 | 18 | |

**Level (7)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **APB** | 415 | Animal Nutrition | 2 | 1 | 3 | BCH 301 |
| **BVM** | 414 | Avian Diseases | 3 | 1 | 4 | BVM 323, BVM 343 |
| **BVM** | 415 | Veterinary Pharmacology | 2 | 1 | 3 | BVM 221, BCH 302 |
| **BVM** | 416 | Clinical Medicine (1) | 3 | 1 | 4 | BVM 323, BVM 324 BVM 343 BVM 344 |
| **BVM** | 417 | General Preventive Medicine | 2 | 1 | 3 | BVM 323, BVM 334, BVM 343, BVM 364, BVM 374 |
| **APB** | 437 | Husbandry and Conservation of Wildlife | 1 | 1 | 2 | BVM 323 |
| **Total number of units** | | | 12 | 6 | 18 | |

**Level (8)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **IC** | 104 | Fundamentals of the Islamic Political System | 2 | - | 2 | IC 101 |
| **BVM** | 425 | Therapeutics | 2 | 1 | 3 | BVM415, BVM 416 |
| **BVM** | 426 | Clinical Medicine (2) | 2 | 1 | 3 | BVM 416 |
| **BVM** | 427 | Applied Preventive Medicine | 2 | 1 | 3 | BVM 417 |
| **BVM** | 446 | Clinical Laboratory | 1 | 2 | 3 | BVM 416 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | Diagnosis | | | | |
| **BVM** | 447 | Fish Hygiene | 1 | 1 | 2 | BVM323, BVM334, BVM343, BVM364 |
| **BVM** | 467 | Milk Hygiene | 1 | 1 | 2 | BVM323, BVM 343 |
| **Total number of units** | | | 11 | 7 | 18 | |

**Level (9)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **BVM** | 413 | Scientific terminology | 1 | - | 1 | ENG 101 |
| **BVM** | 418 | Veterinary Surgery (1) | 2 | 2 | 4 | BVM 324, BVM 344 |
| **BVM** | 477 | Meat hygiene | 2 | 1 | 3 | BMV 323,BVM 324, BVM 344 |
| **BVM** | 321 | Computer Applications in Veterinary Medicine | 1 | 1 | 2 | CSC 121 |
| **BVM** | 436 | Zoonotic Diseases | 2 | - | 2 | BVM 323, BVM 343, BVM 364, BVM 374 |
| **BVM** | 438 | Obstetrics and Reproductive Diseases (1) | 2 | 2 | 4 | BVM 323, BVM 334, BVM 343 |
| **BVM** | 456 | Clinical Medicine | 2 | 1 | 3 | BVM 426 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | (3) | | | | |
| **Total number of units** | | | 12 | 7 | 19 | |

**Level (10)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **BVM** | 428 | Veterinary Surgery (2) | 3 | 1 | 4 | BMV 418 |
| **BVM** | 429 | Field Training (Surgery) | - | 1 | 1 | BVM 418 |
| **BVM** | 445 | Veterinary Toxicology and Forensic Medicine | 2 | 1 | 3 | BVM415, BVM 426, |
| **BVM** | 448 | Obstetrics and Reproductive Diseases (2) | 2 | 2 | 4 | BVM 438 |
| **BVM** | 449 | Field Training (Obstetrics) | - | 1 | 1 | BVM 438 |
| **BVM** | 469 | Field Training (Clinical Medicine) | - | 1 | 1 | BVM 456 |
| **BVM** | 487 | Field Training (Preventive Medicine) | 0 | 1 | 1 | BVM 427 |
| **BVM** | 489 | Field Training (Food Hygiene) | - | 1 | 1 | BVM447, BVM 467 |
| **Total number of units** | | | 7 | 9 | 16 | |

**The Master Degree of Veterinry Medicine (MVM)**

The teaching programme for the The Master Degree of Veterinry Medicine is to be conducted by study courses and a thesis as stated in Article 33 paragraph1 of the Unified Postgraduate Studies Act of the Saudi Universities.The candidate must accompolish not less than 28 units divided within four semesters as indicated below:-

| Units | Course |
|---|---|
| **4 (4+0)** | English Language (1) |
| **2 (2+0)** | English Language (2) |
| **2 (1+1)** | Biostatistics and Experimental Design |
| **1 (1+0)** | Research Methodology |
| **3 (2+1)** | Cell biology |
| **(2+1)** | Biochemistry |

Specialization Tracks of the Department for the Master Degree of Veterinary Medicine

**A) The Track of Veterinary Laboratory**

| Units | Course |
|---|---|
| **4 (2+2)** | Clinical Parasitology |
| **4 (2+2)** | Diagnostic Microbiology |
| **4 (2+2)** | Diagnostic Pathology |
| **3 (2+1)** | Clinical Pathology |
| **2 (1+1)** | Special Topics in Parasitology |
| **2 (1+1)** | Special Topics in Pathology |
| **2 (1+1)** | Special Topics in Microbiology |
| **2 (1+1)** | Special Topics in Avian Diseases |
| **2 (1+1)** | Special Topics in Immunology |
| **2 (1+1)** | Pathogenesis and lesions of poisoning |
| **2 (1+1)** | Special Topics in Malnutrition Diseases |
| **2 (1+1)** | The Chemistry of Organ Functions |
| **2 (1+1)** | Special Topics in Veterinary laboratory diagnosis |
| **2 (1+1)** | Electron Microscopy |

**B) The Track of Clinical Sciences**

| Units | Course |
|---|---|
| **2 (1+1)** | General Surgery |
| **3 (2+1)** | Special Surgery |
| **2 (1+1)** | Veterinary Radiology |
| **2 (1+1)** | Veterinary Obstetrics |
| **2 (1+1)** | General Clinical Medicine |
| **2 (1+1)** | Applied Anatomy |
| **2 (1+1)** | Advanced Topics in Veterinary Pharmacology |
| **3 (2+1)** | Reproduction |
| **4 (2+2)** | Andrology and Artificial insemination |
| **2 (1+1)** | Special Topics in Reproductive Physiology |
| **2 (1+1)** | Veterinary Anaesthesiology |
| **2 (1+1)** | Equine Medicine |
| **2 (1+1)** | Ruminants Medicine |
| **2 (1+1)** | Wildlife Diseases |
| **2 (1+1)** | Clinical Toxicology |
| **3 (2+1)** | Clinical Pathology |
| **3 (2+1)** | Special topics in Veterinary Clinical Sciences |

**Scientific degrees offered by Animal Production and Breeding:**

**First**..B.Sc. in Agricultural Sciences (Animal Production and Breeding):
Total credit hours are 136 hour in the following eight semesters:

**Level (1)**

| Code | No. | Course Title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | Lec. | Lab. | Total | |
| **IC** | 101 | Introduction to Islamic Culture | 2 | - | 2 | - |
| **ARAB** | 101 | Language Skills | 2 | - | 2 | - |
| **CHEM** | 101 | General Chemistry | 3 | 1 | 4 | - |
| **ZOOL** | 101 | General Zoology | 3 | 1 | 4 | - |
| **ENG** | 101 | English Language | 3 | - | 3 | - |
| **MATH** | 165 | Introduction to Calculus | 3 | - | 3 | - |
| Total number of units | | | 16 | 2 | 18 | |

**Level (2)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | Lec. | Lab. | Total | |
| **BOT** | 101 | General Botany | 3 | 1 | 4 | - |
| **PHYS** | 101 | Principles of Physics | 3 | 1 | 4 | - |
| **IC** | 102 | Islam and Construction of Society | 2 | - | 2 | IC101 |
| **CSC** | 121 | Introduction to Computer | 2 | 1 | 3 | - |
| **STAT** | 122 | Introduction to Statistics | 1 | 1 | 2 | - |
| **CHEM** | 241 | General Organic Chemistry | 3 | 1 | 4 | CHEM 101 |
| **Total number of units** | | | 14 | 5 | 19 | |

**Level (3)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | Lec. | Lab. | Total | |
| **IC** | 103 | The Islamic Economic System | 2 | - | 2 | IC101 |
| **AGEC** | 202 | Principles of Agricultural Economics | 2 | - | 2 | - |
| **PPP** | 210 | Agricultural Extension | 2 | 1 | 3 | - |
| **PPP** | 214 | Agricultural Microbiology | 2 | 1 | 3 | BOT101 |
| **BCH** | 301 | Principles of Biochemistry | 2 | 1 | 3 | CHEM 241 |
| **PPP** | 332 | Forage Crops Production | 1 | 1 | 2 | BOT101 |
| **CHEM** | 356 | Principles of Analytical Chemistry | 2 | 1 | 3 | CHEM 101 |
| Total number of units | | | 13 | 5 | 18 | |

**Level (4)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | Lec. | Lab. | Total | |
| **ARAB** | 103 | Expository Writing | 2 | - | 2 | - |
| **APB** | 221 | Principles of Animal Nutrition | 2 | - | 2 | BCH 301 |
| **APB** | 223 | Physiology of Farm Animals | 2 | 1 | 3 | BCH 301 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **APB** | 225 | Horse Husbandry | 1 | 1 | 2 | - |
| **APB** | 227 | Poultry Production | 2 | 1 | 3 | - |
| **APB** | 228 | Sheep and Goat Production | 2 | 1 | 3 | - |
| **APB** | 229 | Camels Production | 2 | 1 | 3 | - |
| Total number of units | | | 13 | 5 | 18 | |

**Level (5)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **ZOO** | 351 | Genetics | 2 | 1 | 3 | ZOOL101 |
| **BVM** | 310 | Animal and Poultry Health and Diseases | 2 | 1 | 3 | ZOOL101 |
| **APB** | 311 | Rabbits and Water Fowl Production | 1 | 1 | 2 | - |
| **PPP** | 312 | Design and analysis of Agricultural experiments | 2 | 1 | 3 | STAT122 |
| **APB** | 313 | Nutrition of Farm Animals | 2 | 1 | 3 | APB221 CHEM 356 |
| **APB** | 316 | Poultry Physiology | 1 | 1 | 2 | APB 227 |
| **APB** | 318 | Fish Production | 1 | 1 | 2 | - |

| | | | | |
|---|---|---|---|---|
| Total number of units | 11 | 7 | 18 | |

**Second**..MSc. Degree in the field of Animal Production (Breeding – Nutrition – Physiology – Husbandry).

**Program Requirements:**

1- To finish at least 36 credit hours distributed in three semesters.

2- Submitting a thesis in the field of specialization.

Number of credit units (28 units for courses + 8 units for Thesis and Seminars):

| Code | Course Title | Credits | | |
|---|---|---|---|---|
| | | **Th.** | **Pr.** | **Total** |
| A- Compulsory courses: | | | | |
| **APB 511** | Design and Analysis of Animal Production Experiments | 2 | 1 | 3 |
| **BCH 513** | Advanced Biochemistry | 2 | 1 | 3 |
| **APB 515** | Animal and Poultry Bio-technology | 2 | 1 | 3 |
| **APB 517** | Instruments and Analytical methods | 1 | 1 | 2 |
| **APB 521** | Advanced Animal Breeding and Genetics | 2 | 1 | 3 |
| **APB 522** | Advanced Animal Nutrition | 2 | 1 | 3 |
| **APB 523** | Advanced Farm Animals Physiology | 2 | 1 | 3 |
| Elective Courses... **8 credit hours to be elected by the Department according to the student's specialization:** | | | | |
| **APB 530** | Advanced Computer Applications in Animal Production | - | 2 | 2 |
| **APB 531** | Molecular Genetics | 1 | 1 | 2 |

| | | | | |
|---|---|---|---|---|
| **APB 532** | Digestion and Metabolism | 1 | 1 | 2 |
| **APB 533** | Endocrinology | 1 | 1 | 2 |
| **APB 534** | Advanced Dairy and beef Cattle Production | 1 | 1 | 2 |
| **APB 535** | Advanced Camels and Horses Production | 1 | 1 | 2 |
| **APB 536** | Animal Feedstuffs and Diet Formulation | 1 | 1 | 2 |
| **APB 537** | Advanced Reproductive Physiology | 1 | 1 | 2 |
| **APB 538** | Advanced Sheep and Goat Production | 1 | 1 | 2 |
| **APB 539** | Genetic Evaluation and Improvement of Animal | 2 | - | 2 |
| **APB 540** | Animal and Poultry Production Extension Programs | 2 | - | 2 |
| **APB 541** | Selected Topics | 2 | - | 2 |
| **BVM 531** | Advanced Animal Hygiene and Diseases | 1 | 1 | 2 |
| **FSHN 531** | Animal Products Technologies | 1 | 1 | 2 |
| **AGEC 531** | Economics of Animal and Poultry Production | 2 | - | 2 |
| Thesis: | | | | |
| **APB 600** | Thesis and Seminars | | | 8 |

**Third**...M.Sc. Degree in the field of Poultry Production (Breeding – Nutrition – Physiology – Husbandry).

**Program Requirements:**

1- To finish at least 36 credit hours distributed in three semesters.

2- Submitting a thesis in the field of specialization.

Number of credit units (28 units for courses + 8 units for Thesis and Seminars):

| Code | Course Title | Credits | | |
|---|---|---|---|---|
| | | **Th.** | **Pr.** | **Total** |
| A- Compulsory courses: | | | | |
| **APB 511** | Design and Analysis of Animal Production Experiments | 2 | 1 | 3 |
| **BCH 513** | Advanced Biochemistry | 2 | 1 | 3 |
| **APB 515** | Animal and Poultry Bio-technology | 2 | 1 | 3 |
| **APB 517** | Instruments and Analytical methods | 1 | 1 | 2 |
| **APB 524** | Advanced Poultry Production | 2 | 1 | 3 |
| **APB 526** | Advanced Poultry Nutrition | 1 | 1 | 2 |
| **APB 527** | Advanced Poultry Physiology | 1 | 1 | 2 |
| **APB 529** | Advanced Poultry Breeding and Genetics | 1 | 1 | 2 |
| Elective Courses... **8 credit hours to be elected by the Department according to the student's specialization:** | | | | |
| **APB 530** | Advanced Computer Applications in Animal Production | - | 2 | 2 |
| **APB 540** | Animal and Poultry Production Extension Programs | 2 | - | 2 |
| **APB 542** | Poultry Metabolism | 1 | 1 | 2 |
| **APB 543** | Hatching and Brooding Physiology | 1 | 1 | 2 |
| **APB 544** | Chicken meat and Egg Production | 1 | 1 | 2 |
| **APB 545** | Advanced Rabbit Production | 1 | 1 | 2 |
| **APB 546** | Poultry Diet Formulation | 1 | 1 | 2 |
| **APB 547** | Advanced Fish Production | 1 | 1 | 2 |
| **APB 548** | Turkey and Ostrich | 1 | 1 | 2 |

| | | | | |
|---|---|---|---|---|
| | Production | | | |
| **APB 549** | Poultry Genetic Improvement | 1 | 1 | 2 |
| **APB 550** | Selected Topics | 2 | - | 2 |
| **AGEC 531** | Economics of Animal and Poultry Production | 2 | - | 2 |
| **BVM532** | Advanced Poultry Hygiene and Diseases | 1 | 1 | 2 |
| **FSHN 532** | Poultry and Fish Products Technologies | 1 | 1 | 2 |
| Thesis: | | | | |
| **APB 600** | Thesis and Seminars | | | 8 |

**Study Plan of Food Science and Human Nutrition:**

Graduates from the Department obtain a degree of Bachelor of Science (B. Sc.) in Agricultural Sciences with major in Food Science and Human Nutrition. Total credit hours are 136 divided in 8 levels.

Here is the educational plan for the degree of Bachelor of Science (B. Sc.) in the Department of Food Science and Human Nutrition.

**Level (1)**

| Code | No. | Course Title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **IC** | 101 | Introduction to Islamic Culture | 2 | - | 2 | - |
| **ARAB** | 101 | Language Skills | 2 | - | 2 | - |
| **CHEM** | 101 | General Chemistry | 3 | 1 | 4 | - |
| **ZOOL** | 101 | General Zoology | 3 | 1 | 4 | - |
| **ENG** | 101 | English Language | 3 | - | 3 | - |
| **MATH** | 165 | Introduction to Calculus | 3 | - | 3 | - |
| Total number of units | | | 16 | 2 | 18 | |

**Level (2)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **BOT** | 101 | General Botany | 3 | 1 | 4 | - |
| **PHYS** | 101 | Principles of Physics | 3 | 1 | 4 | - |
| **IC** | 102 | Islam and Construction of Society | 2 | - | 2 | IC101 |
| **CSC** | 121 | Introduction to Computer | 2 | 1 | 3 | - |
| **STAT** | 122 | Introduction to Statistics | 1 | 1 | 2 | - |
| **CHEM** | 241 | General Organic Chemistry | 3 | 1 | 4 | CHEM 101 |
| **Total number of units** | | | 14 | 5 | 19 | |

**Level (3)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **IC** | 103 | The Islamic Economic System | 2 | - | 2 | IC101 |
| **AGEC** | 202 | Principles of Agricultural Economics | 2 | - | 2 | - |
| **PPP** | 211 | Principles of Animal Production | 2 | 1 | 3 | ZOOL 101 |
| **FSH** | 21 | Principle | 2 | - | 2 | CHEM |

College of Agriculture and Veterinary Medicine

| | | | | | | |
|---|---|---|---|---|---|---|
| N | 1 | s of Food Science | | | | 241 |
| PPP | 214 | Agricultural Microbiology | 2 | 1 | 3 | BOT101 |
| BCH | 301 | Principles of Biochemistry | 2 | 1 | 3 | CHEM 241 |
| CHEM | 356 | Principles of Analytical Chemistry | 2 | 1 | 3 | CHEM 101 |
| Total number of units | | | 14 | 4 | 18 | |

**Level (4)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **ARAB** | 103 | Expository Writing | 2 | 0 | 2 | - |
| **FSHN** | 221 | Food Process Engineering | 2 | 1 | 3 | MATH 165 |
| **FSHN** | 222 | Principles of Human Nutrition | 2 | 0 | 2 | BCH 301 |
| **PPP** | 222 | Production of Industrial Crops | 2 | 1 | 3 | BOT 101 |
| **FSHN** | 223 | Food Chemistry | 2 | 0 | 2 | FSHN 211 |
| **FSHN** | 224 | Food Microbiology | 2 | 1 | 3 | FSHN 211 PPP 214 |
| **FSHN** | 25 | Human Physiology | 2 | 1 | 3 | ZOOL 101 |
| Total number of units | | | 14 | 4 | 18 | |

**Level (5)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **FSHN** | 311 | Nutritional Biochemistry | 2 | 1 | 3 | FSHN 222 |
| **FSHN** | 312 | Food Analysis | 1 | 2 | 3 | FSHN 223 CHEM 356 |
| **FSHN** | 313 | Food Processing and Preservation | 2 | 1 | 3 | FSHN 211 |
| **FSHN** | 314 | Food Plant Sanitation | 1 | 1 | 2 | FSHN 224 |
| **FSHN** | 315 | Principles of Dairy Technology | 1 | 1 | 2 | FSHN 211 CHEM 356 |
| **FSHN** | 316 | Community Nutrition | 2 | 0 | 2 | FSHN 222 |
| **FSHN** | 317 | Scientific Terms | 1 | 0 | 1 | FSHN 211 |
| **FSHN** | 318 | Toxicants and Contaminants of Food | 1 | 1 | 2 | FSHN 224 |
| Total number of units | | | 11 | 7 | 18 | |

**Level (6)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **IC** | 104 | Fundamentals of the Islamic Political System | 2 | 0 | 2 | IC 101 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **STAT** | 222 | Applied Bio-statistics | 1 | 1 | 2 | STAT 122 |
| **FSHN** | 321 | Applied Nutrition | 2 | 0 | 2 | FSHN 222 |
| **FSHN** | 322 | Nutrition Through the Life Cycle | 2 | 0 | 2 | FSHN 222 |
| **FSHN** | 323 | Fats and Oils Technology | 1 | 1 | 2 | FSHN 223 |
| **FSHN** | 324 | Diet Planning | 1 | 1 | 2 | FSHN 222 |
| **FSHN** | 325 | Technology of Dairy Products | 1 | 2 | 3 | FSHN 315 |
| **FSHN** | 326 | Principles of Clinical Nutrition | 1 | 1 | 2 | FSHN 311 |
| Total number of units | | | 11 | 6 | 17 | |

**Level (7)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **FSHN** | 411 | Technology of Dates and Confectionery | 1 | 1 | 2 | FSHN 313 |
| **FSHN** | 412 | Meat and Fish Technology | 2 | 1 | 3 | FSHN 313 |
| **FSHN** | 413 | Nutrition and Human Diseases | 2 | 1 | 3 | FSHN 326 |
| **FSHN** | 491 | References and Periodicals | 0 | 1 | 1 | FSHN 317 |
| **FSHN** | 493 | Practical Training (I) | 0 | 3 | 3 | FSHN 313 FSHN 325 |
| Total number of units | | | 5 | 7 | 12 | |

**Level (8)**

| Code | No. | Course title | Credit Units | | | Pre. |
|---|---|---|---|---|---|---|
| | | | **Lec.** | **Lab.** | **Total** | |
| **BUS** | 107 | Management of Food Firms | 1 | 0 | 1 | - |
| **PPP** | 410 | Marketing of Food Products | 1 | 1 | 2 | AGEC 202 |
| **FSHN** | 421 | Quality Control and Sensory Evaluation of Food | 2 | 1 | 3 | FSHN 313 |
| **FSHN** | 422 | Food Biotechnology | 2 | 1 | 3 | FSHN 314 |
| **FSHN** | 423 | Cereal Technology | 1 | 1 | 2 | FSHN 313 |
| **FSHN** | 492 | Research and Seminar | 0 | 2 | 2 | FSHN 491 |
| **FSHN** | 494 | Practical Training (II) | 0 | 3 | 3 | FSHN 493 |
| Total number of units | | | 7 | 9 | 16 | |

## Course Description of Food Science and Human Nutrition:

**FSHN 211 Principles of Food Science 2(2 + 0)**

Introduction to the importance and principles of food science - Historical perspective and current status of food processing - Food constituents - Food deterioration - Safety and quality of foods - Food preservation and processing of plant and animal products (dairy, meat, eggs, fish, vegetables, fruits, cereals, sugar, confectionery, oils and fats). Prerequisite: CHEM 241

**FSHN 221 Food Process Engineering 3(2 + 1)**

Engineering dimensions and units – Mass and energy balances – Fluid flow in food processing – Heat transfer – Mechanical handling of solid materials - Fans and pumps - Psychrometrics - Thermal processing – Refrigeration – Freezing – Evaporation – Dehydration – Industrial safety in food plants.
Prerequisite: MATH 165

**FSHN 222 Principles of Human Nutrition 2(2 + 0)**

Introduction to nutrition - Nutrients - Sources and functions of nutrients – Food groups and selection of balanced diet – Digestion and absorption - Human requirement of nutrients – Determination of energy requirements for humans - Calculation of energy in food.

Prerequisite: BCH 301

**FSHN 223 Food Chemistry 2(2 + 0)**

Chemical composition of food - Physical and chemical characteristics of food components (water, proteins, carbohydrates, lipids, minerals, vitamins, enzymes ..etc.) – Chemistry of food additives (pigments, flavours, preservatives ..etc.) - Chemical and biochemical reactions occurring in food constituents during storage and processing and their effect on the nutritional quality of food – Enzymes role in the food industry.

Prerequisite: FSHN 211

**FSHN 224 Food Microbiology 3(2 + 1)**

Major groups of microorganisms and their relation to production, processing and handling of food with emphasis on sanitation and safety of food and hygienic problems - Importance of microorganisms in food processing and microbial spoilage - Food-borne diseases - Mycotoxins and food poisoning.
Prerequisite: FSHN 211, PPP 214

**FSHN 225 Human Physiology 3(2 +1)**

Cell and tissue structure and function – Function and structure of various systems: circulatory, digestive, respiratory, excretory, skeletal, muscular, nervous, reproductive, endocrine glands, sense organs, lymphatic tissue and blood forming organs.
Prerequisite: ZOOL 101

**FSHN 311 Nutritional Biochemistry 3(2 + 1)**

Composition of the cell – Physiology of human organs related to metabolism – Enzymes – Bioenergetics – Metabolism of carbohydrates, lipids and proteins – Metabolic interrelationships of carbohydrates, lipids and proteins – Role of vitamins and minerals in metabolism.
Prerequisite: FSHN 222

**FSHN 312 Food Analysis 3(1 + 2)**

Sampling and preparation of food samples - Principles and applications of the physical, chemical and instrumental methods used to determine the constituents of food in terms of proteins, carbohydrates, lipids, moisture, minerals and vitamins - Applications of modern analytical techniques in food components analysis.
Prerequisite: FSHN 223 - CHEM 356

**FSHN 313 Food Processing and Preservation 3(2 + 1)**

Principles and methods of food preservation and processing on a commercial scale including chilling, storage, freezing, thermal processing, evaporation, membrane separation, dehydration, freeze drying, irradiation, chemical additives, water activity control, centrifugation, smoking, extrusion, fermentation and others with emphasis on processing of vegetables and fruits, juices and carbonated beverages - Chemical and microbial changes in food due to different preservation methods – Food packaging.
Prerequisite: FSHN 211

**FSHN 314 Food Plant Sanitation 2(1 + 1)**

Studies on the principles of sanitation with emphasis on practical considerations as applied to various food-processing industries - Control of insects, rodents, and microorganisms - Fundamentals of detergents, cleaning and disinfection - Sanitation of water supply and food plants. Transmission of diseases through water and food products - Utilization, treatment and disposal methods of food processing wastes -Inspection and hygienic regulations. Prerequisite: FSHN 224

**FSHN 315 Principles of Dairy Technology 2(1 + 1)**

Milk composition - Physicochemical and microbiological characteristics of milk and their relationships with processing - Quality of raw milk - Principles and dairy processing techniques for liquid milk (pasteurized, sterilized, ultra-high temperature), milk drinks, reconstituted and recombined milk, condensed and dried dairy foods - Cleaning and disinfection of dairy equipment.

Prerequisite: FSHN 211, CHEM 356

**FSHN 316 Community Nutrition 2(2 + 0)**

Survey of current public health nutrition problems among selected target groups in the Kingdom and developing countries, especially those at high risk of malnutrition – Discussion of the multidimensional nature of those problems and of community programs and policies designed to help solve them, including assessment, education and intervention programs – Applied examples will be cited. Prerequisite: FSHN 222

**FSHN 317 Scientific Terms 1(1+ 0)**

Technical scientific terms in the field of food science and human nutrition– Translation of some scientific papers – Listening, watching and over-viewing of English language scientific films in the field of food science and human nutrition. Prerequisite: FSHN 211

**FSHN 318 Toxicants and Contaminants of Food 2(1+1)**

Food poisoning related to natural toxicants present in foods, toxicants formed in processed foods, microbial toxins or environmental contaminants (heavy metals, pesticides, industrial contaminants) - Detection methods of food toxicants. Prerequisite: FSHN 224

**FSHN 321 Applied Nutrition 2(2 + 0)**

Assessment of food habits – Nutrition counseling and education – Nutritional deficiency diseases – Evaluation of nutritional status – Nutrition survey – Nutrition for athletes and vegetarians. Prerequisite: FSHN 222

**FSHN 322 Nutrition through the Life Cycle 2(2 + 0)**

Understand nutritional changes throughout the life cycle including pregnancy, lactation, childhood, adulthood, adolescence and aging. Discuss topics relevant to life cycle changes including body composition and immunity. Prerequisite: FSHN 222

**FSHN 323 Fats and Oils Technology 2(1 + 1)**

Sources of fats and oils - Physical and chemical properties of fats and oils - Equipment, principles, practices and processes related to extraction, processing, storage and distribution of edible fats and oils - Deterioration of fats and oils - Hydrogenation of oils - Utilization of by-products.

Prerequisite: FSHN 313

**FSHN 324 Diet Planning 2(1 + 1)**

Dietary standards – Food composition tables – Balanced diet – Use of the exchange system and food groups for diet planning – Calculation of energy requirements – Evaluation of diet and nutritional status – Applications in diet

planning.
Prerequisite: FSHN 222

**FSHN 325 Technology of Dairy Products**
**3(1 + 2)**

Principles, practices and processes related to the manufacturing and distribution of high-quality dairy products, including cheeses, cultured dairy foods, cream, butter, butter oil, anhydrous milk fat, and frozen dairy products - Whey and its utilization - Nutritive value of dairy products.
Prerequisite: FSHN 315

**FSHN 326 Principles of Clinical Nutrition**
**2(1 + 1)**

Role of diet for health and disease - Different theories on the role of diet in prevention and treatment of diseases - Special nutritional demands of ill-health such as intolerance, allergy, obesity, diabetes, heart-, kidney and malabsorption diseases and cystic fibrosis.
Prerequisite: FSHN 311

**FSHN 411 Technology of Dates and Confectionery 2(1 + 1)**

Varieties of dates – Chemical composition and nutritive value of dates - Storage and processing technology of dates - Date products - Utilization of dates processing wastes - Sources of sugar - Equipment, principles, practices and processes related to the manufacturing, packaging and storage of sugar - Coca and chocolates processing - Artificial sweeteners.
Prerequisite: FSHN 313

**FSHN 412 Meat and Fish Technology 3(2 + )**

Physical, chemical, microbiological and functional characteristics of meat, poultry, eggs, and fish - Technology of storage and processing of meat, poultry, eggs, and fish into high-quality food products - Spoilage of meat, fish and their products - Composition and nutritive value of meat, poultry, egg and fish products - Utilization of by-products and processing wastes.
Prerequisite: FSHN 313

**FSHN 413 Nutrition and Human Diseases**
**3(2 +1)**

In-depth information into the role of diet for health and disease – The role of diet in treatment and prevention of diseases such as diabetes, cardiovascular, kidney, gastrointestinal, liver diseases and cancer.
Prerequisite: FSHN 326

**FSHN 421 Quality Control and Sensory Evaluation of Food 3(2 + 1)**

Basic concepts of quality control and assurance - Determination of grades and standards of quality using chemical, physical, microbiological and sensory evaluation techniques - Factors affecting the quality of food products such as appearance, flavour, texture, nutritional value, safety and wholesomeness - Organization and management of quality control and assurance - Hazard Analysis of Critical Control Points (HACCP) - Good Manufacturing Practices (GMP) - Applications of new technologies in reducing the risks of food-borne diseases - Basic principles and methods of sensory evaluation of food - Panel selection and factors affecting sensory verdict - Principles of Statistical Quality Control (SCQ) - Food standards and regulations in Saudi Arabia and other countries.
Prerequisite: FSHN 312 - FSHN 313

**FSHN 422 Food Biotechnology 3(2 + 1)**

Introduction to industrial fermentation technology and bioreactor systems - Use of microorganisms and enzymes to produce products with high economic value (amino acids, vitamins, enzymes, antibiotics, organic acids and biomass) - Use of microorganisms and enzymes in utilization of food processing wastes - Basics and techniques of biotechnology and their applications in foods. Genetic engineering of foods - New topics in fields of biotechnology

related to the food.
Prerequisite: FSHN 314

**FSHN 423 Cereal Technology 2(1 + 1)**

Structure and composition of cereal grains in relation to milling and extraction processes and production of starches - Flours and milling by-products - Cereal processing techniques for bakery products, malting, extrusion, fabricated foods, breakfast cereal and macaroni manufacturing - Comparative nutritional evaluation for flours, grains, and finished products.
Prerequisite: FSHN 313

**FSHN 491 References and Periodicals 1(0 + 1)**

Train the students to use references and periodicals in library – Guide the students to write-up and present scientific materials – Train the students to use the Internet to collect references, articles and books related to the fields of specialization.
Prerequisite: FSHN 317

**FSHN 492 Research and Seminar 2(0 + 2)**

Train the students to use references and periodicals. Knowing the methods of research methodology – Writing a report and presentation and discussion of a specific topic in the field of food science and human nutrition (term paper).
Prerequisite: FSHN 491

**FSHN 493 Practical Training (I) 3(0 + 3)**

Students are required to spend a specific training session in the departmental laboratories and pilot plants. Students are requested to submit comprehensive technical reports at the end of the training session.
Prerequisite: FSHN 313, FSHN 325

**FSHN 494 Practical Training (II) 3(0 + 3)**

Students are required to spend a specific training session in some of the leading food factories and hospitals in the Kingdom – Submission of comprehensive technical reports at the end of the training session.
Prerequisite: FSHN 493

**FSHN 495 Cooperative training 9(0 + 9)**

Students are required to spend 6 months in some of the leading food factories and hospitals in the Kingdom – Submission of comprehensive technical reports at the end of the training session.
Prerequisite: ----

**Course for Non-Major Students**

**FSHN 443 Technology of Animal Products 3(2 + 1)**

Milk as a raw material - Composition and characteristics of milk - Microbiology of milk - Quality of raw milk - Transportation and storage of raw milk - Overview of principles of preservation and processing of dairy products - Nutritive value of dairy products - Dairy by-products and their utilization - Cleaning and disinfection of dairy equipment - Physical and chemical properties of meat - Postmortem changes - Overview of principles of preservation and processing of meat and eggs - Meat spoilage - Nutritive value of meat products - Meat by-products and their utilization.
Prerequisite: APB 327 – APB 411

**Course from other Departments**

**BUS 107 Management of Food Firms 1(1 +0)**

Management concepts of food firms and its importance - Administrative responsibilities in planning, organization, staffing, leading and decision making- Patterns of food firms management -Brief review about the major activities in food firms.

**CSC 121 Introduction to Computer 3(2 +1)**

Introduction – Type of computers and networks – Hardware – Operating systems –

Number systems – Arithmetic operations – Logical operations – Windows – Word – Excel – PowerPoint – Internet – Web browsers – Electronic mail – Homepages.

**STAT 122 Introduction to Statistics 2(1 + 1)**

Definition of statistics –Data presentation and summarization – Descriptive parameters – Principles of theory of probability – Discrete distribution – Normal distribution – Student distribution – F distribution.

**AGRC 202 Principles of Agricultural Economics 2(2 +0)**

Introduction to agricultural economics as an applied social science. Basic concepts of demand and supply for agricultural products. Economic and social characteristics of agriculture. The role of agriculture in the national economy. Introduction to the major areas of agricultural economics (farm management, production economics, marketing, natural resources, cooperative organization). Policy and development.

**ABP 211 Principles of Animal Production 3(2 +1)**

Introduction – Importance of animal production worldwide and in the Kingdom in particular – Relationship between animal and plant production – Animal production problems in the Kingdom – Poultry classification – Breeds in farm animals – management of farm animals and poultry – Principles of nutrition, physiology and breeding of farm animals and poultry – Animal products – Improvement programs of animal production in the Kingdom. Prerequisite: ZOOL 101

**PPP 214 Agricultural Microbiology 3(2 +1)**

History of microbiology, microbial theory, microbial groups, sterilization, methods of microbiology, classification of microbes and their activities and diversity, fungi, bacteria, viruses, algae, protozoa and nematodes, occurrence and reproduction, use of micro-organisms in biotechnology. Prerequisite: BOT 101

**PPP 222 Production of Industrial Crops 3(2 +1)**

Morphological description – The importance of the industrial crops (vegetables, fruits, oils, sugar, and leguminous crops) – Effect of environmental conditions on productivity and quality – Harvest and post-harvest methods related to industrial crop production. Prerequisite: BOT 101

**STAT 222 Applied Bio-statistics 2(1 +1)**

Measures of dispersion – Tests of hypothesis – Test of sample mean and two means – Chi-square test – Correlation and regression – Experimental accuracy and sources of errors in experiments – Ideal sample size in experiments – Analysis of variance – Experimental designs (completely random – randomized blocks – Latin square) – Factorial experiments of completely random and randomized block designs. Prerequisite: STAT 122

**PPP 410 Marketing of Food Products 2(1 +1)**

Marketing concepts and objectives – Characteristics of Agro-food products – and its relations to marketing – Agro-food markets - Agro-food marketing phases and functions – Marketing mix – Marketing margins and costs – Marketing efficiency – Foreign Trade for agro-food products – Problems of agro-food products.
Prerequisite: PPP 202

# College of Architecture and Planning

## Vision:

The College of Architecture, Planning and Design (CAD&P) is committed to providing a comprehensive education that will enable its graduates to make significant contributions to the region and the broader global community through conscientious participation in practice.

## Mission:

The College of Architecture, Planning and Design (CAD&P) grounds its curriculum in the conviction that good design results from a combination of a deep understanding of culture, ethical engagement in society and a respect for the creative skills needed to build a sustainable material culture. Against this background, the school is committed to the primary objective of providing its students with relevant, professional instruction in the fields of architecture, interior design, industrial design and visual communication.

## Objectives:

- The College of Architecture, Planning and Design (CAD&P) meets its objectives through degree programs that feature the following:

- An environment that encourages achievement and personal growth
- A faculty of professionals who balance continuing scholarship and creative work with their desire for excellence in teaching
- A comprehensive advising and student counseling system that tracks student development and progress a general education curriculum that offers a solid foundation
- A clear and consistent approach that is evident throughout the curriculum
- A variety of courses that are continually updated to reflect rapidly changing design practices and the growing role of digital communication

- A respect for culture, traditions and needs of society

## ABOUT

The Architecture and Design College (ADC) is committed to preparing professionals in the design and architectural sectors through professional undergraduate programs in the academic areas of Architecture, Interior Architecture, Industrial Design, and Visual Communication. Collaboration, community engagement, innovation, global connection and critical practice are core values intertwined in all of the programs at the College of Architecture, and Design. ADC students learn in unique and flexible settings from innovative faculty and through progressive pedagogical models. The College of Architecture and Design maintains the right to limit enrollment in all programs and may retain student work for exhibition or for records and accreditation purposes.

Architecture and Design College, Qassim University is one of the modern colleges among

Saudi Arabia. The Royal Decree to establish the college was issued on 18 / 1 / 1430 Hijri. The college had received its first batch of students starting from the academic year 1430-1431 Hijri. Enrolled student must pass the preparatory year and shall be assigned by the Deanship of Admissions and Registration in the University, and then it is required to pass qualifying skill tests of the College as well as the personal interview.
The study plan follows the rules of the semester figures as the college education system is based on studio-based learning. Study language is English. Study duration is five years after the preparatory year followed including the professional year at the end of program.

## Degrees:

Bachelor

## Programs:

**Department of Architecture offers:**

- Bachelor of Architecture
- Bachelor of Interior architecture (Propose)

**Department of Design offers (Proposed):**

- Bachelor of Science in Industrial Design
- Bachelor of Science in Visual Communication

## Faculty (Architecture):

Abdulrahman Almarshood

Active Dean, Associate Prof.

Abdulaziz Alaboodi

Vice-Dean, Assistant Prof.

Ahmad Alhzmi Associate Prof.

Gene Blanticous Associate Prof.

Ahmed Ibrahim Ossman Assistant Prof.

Tomas-Tahir Assistant Prof.

Djamel Delmi Assistant Prof.

Assad Gazaal Assistant Prof.

Abdulsalam Almushaygeh (on leave)

Lecturer

Abdulaziz Alhurabi (on leave)

Lecturer

Asef Rayn Lecturer

Faheem Mohd Lecturer

Asim Mobeen TA

Sulayman Altami (on Leave) TA

## Study Plan:

**Semester 1**

| Cours e Code | Course Title | L T | L B | T U | C R | Pre-Req |
|---|---|---|---|---|---|---|
| **DES 101** | Design Studio I | 0 | 1 2 | 0 | 6 | |
| **DES 183** | History of Material Culture I | 2 | 0 | 1 | 3 | |
| **DES 160** | Library Instructions | 0 | 2 | 0 | 1 | |
| **ENG 104** | Critical Thinking | 3 | 0 | 0 | 3 | |
| **MATH 108** | Trigonometry and Analytical Geometry | 3 | 0 | 0 | 3 | |

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|---|---|---|---|---|---|---|
| **IC101** | Islamic Culture (1) | 2 | 0 | 0 | 2 | |
| Total Credit Hours: 18 | | | | | | |

**Semester 2**

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **DES102** | Design Studio II | 0 | 12 | 0 | 6 | DES 101 |
| **DES184** | History of Material Culture II | 2 | 0 | 1 | 3 | DES 183 |
| **DES110** | Digital Media in Design | 0 | 6 | 0 | 3 | |
| **ENG 106** | Expository Writing and Reading | 3 | 0 | 0 | 3 | |
| **IC102** | Islamic Culture (2) | 2 | 0 | 0 | 2 | |
| Total Credit Hours: 17 | | | | | | |

**Semester 3**

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **ARC 201** | Architecture Design Studio I | 0 | 12 | 0 | 6 | DES 102 |
| **ARC 227** | Principles of Architecture Design | 3 | 0 | 0 | 3 | |
| **PHYS 105** | Physics for Architecture | 3 | 0 | 0 | 3 | |
| **GE215** | Introduction to Design | 2 | 2 | 2 | 3 | |
| **ARAB 101** | Arabic Language Skills | 2 | 0 | 0 | 2 | |
| Total Credit Hours: 17 | | | | | | |

**Semester 4**

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **ARC 202** | Architecture Design Studio 2 | 0 | 12 | 0 | 6 | ARC 201 |
| **ARC 224** | History of Architecture I | 2 | 0 | 1 | 3 | |
| **DES 241** | Theory of Design I | 2 | 0 | 0 | 2 | |
| **CE 232** | Survey for Architecture | 2 | 2 | 0 | 2 | |
| **CE 257** | Structural Design for Architecture | 2 | 2 | 0 | 3 | |

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|---|---|---|---|---|---|---|
| | I | | | | | |
| **ENG 221** | English Language Competency | 2 | 0 | 0 | 2 | |
| Total Credit Hours: 18 | | | | | | |

**Semester 5**

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **ARC 301** | Architecture Design Studio III | 0 | 12 | 0 | 6 | ARC 202 |
| **ARC 324** | History of Architecture II | 2 | 0 | 1 | 3 | ARC 224 |
| **ARC 321** | Construction Systems I | 2 | 2 | 0 | 3 | |
| **DES 342** | Theory of Design II | 2 | 0 | 0 | 2 | DES 241 |
| **CE 331** | Environmental Control Systems | 2 | 0 | 0 | 2 | |
| **ARAB 102** | Arabic Editing | 2 | 0 | 0 | 2 | |
| Total Credit Hours: 18 | | | | | | |

**Semester 6**

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **ARC 302** | Architecture Design Studio IV | 0 | 12 | 0 | 6 | ARC301 |
| **ARC 322** | Construction Systems II | 2 | 2 | 0 | 3 | ARC322 |
| **CE357** | Structural Design for Architecture II | 2 | 2 | 0 | 3 | CE257 |
| **ME332** | Building Energy and Environment | 2 | 0 | 0 | 2 | |
| **IC103** | Islamic Culture (3) | 2 | 0 | 0 | 2 | |
| **XXXxx** | Free Course | 2 | 0 | 0 | 2 | |
| Total Credit Hours: 18 | | | | | | |

**Semester (Summer I)**

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **ARC379** | Internship of Architectu | 1 | 0 | 0 | 1 | |

| | re I | | | | | |
|---|---|---|---|---|---|---|

Semester 7

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **ARC 401** | Architecture Design Studio V | 0 | 12 | 0 | 6 | ARC 302 |
| **ARC 405** | Housing | 2 | 0 | 0 | 2 | |
| **GE 482** | Projects Management | 3 | 0 | 0 | 3 | |
| **YYY yyy** | College Elective | 3 | 0 | 0 | 3 | |
| **IC104** | Islamic Culture (4) | 2 | 0 | 0 | 2 | |
| **XXX xxx** | Free Course | 2 | 0 | 0 | 2 | |
| Total Credit Hours: 18 | | | | | | |

Semester 8

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **ARC 402** | Architecture Design Studio VI | 0 | 12 | 0 | 6 | ARC 401 |
| **ARC 409** | Professional Practice | 2 | 0 | 0 | 2 | |
| **DES 434** | Islamic Heritage | 3 | 0 | 0 | 3 | |
| **YYY yyy** | College Elective | 2 | 0 | 0 | 2 | |
| **YYY yyy** | College Elective | 3 | 0 | 0 | 3 | |
| **XXX xxx** | Free Course | 2 | 0 | 0 | 2 | |
| Total Credit Hours: 18 | | | | | | |

Semester (Summer II)

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **ARC479** | Internship of Architecture II | 1 | 0 | 0 | 1 | ARC379 |

Semester 9

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **ARC 501** | Architecture Design Studio VII | 0 | 12 | 0 | 6 | ARC 402 |
| **ARC XXX** | Department elective | 3 | 0 | 0 | 3 | |
| **ARC XXX** | Department elective | 3 | 0 | 0 | 3 | |
| **ARC XXX** | Department elective | 3 | 0 | 0 | 3 | |
| Total Credit Hours: 15 | | | | | | |

Semester 10

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **ARC 502** | Architecture Design Studio VIII | 0 | 12 | 0 | 6 | ARC 501 |
| **ARC XXX** | Department elective | 3 | 0 | 0 | 3 | |
| **ARC XXX** | Department elective | 3 | 0 | 0 | 3 | |
| Total Credit Hours: 12 | | | | | | |

**TOTAL: 170 Credit Hours**

**University Requirement (12 c.h.)**

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **IC101** | Islamic Culture (1) | 2 | 0 | 0 | 2 | |
| **IC102** | Islamic Culture (2) | 2 | 0 | 0 | 2 | |
| **IC103** | Islamic Culture (3) | 2 | 0 | 0 | 2 | |
| **IC104** | Islamic Culture (4) | 2 | 0 | 0 | 2 | |
| **ARAB 101** | Arabic Language Skills | 2 | 0 | 0 | 2 | |
| **ARAB 102** | Arabic Editing | 2 | 0 | 0 | 2 | |
| Total Credit Hours: 12 | | | | | | |

**College Requirement (47 c.h.)**

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **DES 101** | Design Studio I | 0 | 12 | 0 | 6 | |
| **DES 102** | Design Studio II | 0 | 12 | 0 | 6 | DES 101 |
| **DES 183** | History of Material Culture I | 2 | 0 | 1 | 3 | |
| **DES 184** | History of Material Culture II | 2 | 0 | 1 | 3 | DES 183 |
| **DES 160** | Library Instructions | 0 | 2 | 0 | 1 | |
| **DES 110** | Digital Media in Design | 0 | 6 | 0 | 3 | |
| **DES 241** | Theory of Design I | 2 | 0 | 0 | 2 | |
| **DES 342** | Theory of Design II | 2 | 0 | 0 | 2 | DES 241 |
| **DES 434** | Islamic Heritage | 2 | 0 | 0 | 2 | |
| **ENG** | Critical | 3 | 0 | 0 | 3 | |

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|---|---|---|---|---|---|---|
| 104 | Thinking | | | | | |
| **ENG 106** | Expository Writing and Reading | 3 | 0 | 0 | 3 | |
| **ENG 221** | English Language Competency | 2 | 0 | 0 | 2 | |
| **GE215** | Introduction to Design | 2 | 2 | 2 | 3 | |
| **GE482** | Projects Management | 3 | 0 | 0 | 3 | |
| **MATH 108** | Trigonometry and Analytical Geometry | 3 | 0 | 0 | 3 | |
| **ARC 379** | Internship of Architecture I | 1 | 0 | 0 | 1 | |
| **ARC 479** | Internship of Architecture II | 1 | 0 | 0 | 1 | ARC 379 |
| Total Credit Hours: 47 | | | | | | |

**University Electives (8 c.h.)**

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **STAT 301** | Statistics | 3 | 0 | 0 | 3 | |
| **DES** | Islamic | 3 | 0 | 0 | 3 | |

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| **305** | Geometric Pattern | | | | | |
| **DES 310** | Design and Psychology | 3 | 0 | 0 | 3 | |
| **DES 315** | Safety and Security | 2 | 0 | 0 | 2 | |
| **DES 325** | Saudi Traditional Architecture | 2 | 0 | 0 | 2 | |
| **DES 320** | Urban Economics | 3 | 0 | 0 | 3 | |
| **DES 325** | Urban Landscape | 3 | 0 | 0 | 3 | |
| **DES 330** | Sustainable site construction | 3 | 0 | 0 | 3 | |

**Outside Department Requirements (15 c.h.)**

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **PHYS 105** | Physics for Architecture | 3 | 0 | 0 | 3 | |
| **CE 232** | Survey for Architecture | 2 | 2 | 0 | 2 | |
| **CE** | Structural Design for | 2 | 2 | 0 | 3 | |

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|---|---|---|---|---|---|---|
| **257** | Architecture I | | | | | |
| **CE 357** | Structural Design for Architecture II | 2 | 2 | 0 | 3 | CE 257 |
| **CE 331** | Environmental Control Systems | 2 | 0 | 0 | 2 | |
| **ME 332** | Building Energy and Environment | | | | | |
| Total Credit Hours: 15 | | | | | | |

**Inside Department Requirements (76 c.h.)**

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **ARC 201** | Architecture Design Studio I | 0 | 12 | 0 | 6 | DES 102 |
| **ARC 202** | Architecture Design Studio II | 0 | 12 | 0 | 6 | ARC 201 |
| **ARC 301** | Architecture Design Studio II | 0 | 12 | 0 | 6 | ARC 202 |
| **ARC 302** | Architecture Design Studio III | 0 | 12 | 0 | 6 | ARC 301 |
| **ARC 401** | Architecture Design Studio IV | 0 | 12 | 0 | 6 | ARC 302 |
| **ARC 402** | Architecture Design Studio V | 0 | 12 | 0 | 6 | ARC 401 |
| | | | | | | |
| **ARC 501** | Architecture Design Studio VI | 0 | 12 | 0 | 6 | ARC 402 |
| **ARC 502** | Architecture Design Studio VII | 0 | 12 | 0 | 6 | ARC 501 |
| **ARC 224** | History of Architecture I | 2 | 0 | 1 | 3 | |
| **ARC 324** | History of Architecture II | 2 | 0 | 1 | 3 | ARC 224 |
| **ARC 227** | Principles of Architecture Design | 3 | 0 | 0 | 3 | |
| **ARC 321** | Construction Systems I | 2 | 2 | 0 | 3 | |
| **ARC 322** | Construction Systems II | 2 | 2 | 0 | 3 | ARC 321 |
| **ARC 405** | Housing | 2 | 0 | 0 | 2 | |
| **ARC 409** | Professional Practice | 2 | 0 | 0 | 2 | |
| Total Credit Hours: 67 | | | | | | |

**Department Electives (15 c.h.)**

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| History Preservation | | | | | | |

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|---|---|---|---|---|---|---|
| **ARC 430** | Preservation of Historic Archaeology | 3 | 0 | 0 | 3 | |
| **ARC 431** | Sustainable Cities & Transportation | 3 | 0 | 0 | 3 | |
| **ARC 432** | History Survey & Inventory Methods | 3 | 0 | 0 | 3 | |
| **ARC 433** | Architecture Conservation | 3 | 0 | | | |
| ART | | | | | | |
| **ARC 440** | Interactive Spaces | 3 | 0 | 0 | 3 | |
| **ARC 441** | Digital Photography | 3 | 0 | 0 | 3 | |
| **ARC 442** | Islamic Arts | 3 | 0 | 0 | 3 | |
| Interior Architecture | | | | | | |
| **ARC 450** | Color and Lighting | 3 | 0 | 0 | 3 | |
| **ARC 451** | Interior Construction Elements | 3 | 0 | 0 | 3 | |
| **ARC 452** | Furniture and Material | 3 | 0 | 0 | 3 | |

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|---|---|---|---|---|---|---|
| Landscape Architecture | | | | | | |
| **ARC 460** | Planting Design Theory | 3 | 0 | 0 | 3 | |
| **ARC 461** | Computers in Landscape Arch | 3 | 0 | 0 | 3 | |
| **ARC 462** | Landscape Perception | 3 | 0 | 0 | 3 | |
| Planning Public Policy & Management | | | | | | |
| **ARC 470** | Land Use Growth and Management | 3 | 0 | 0 | 3 | |
| **ARC 471** | Strategic Planning | 3 | 0 | 0 | 3 | |
| **ARC 472** | Principles of Urban Design | 3 | 0 | 0 | 3 | |
| **ARC 473** | Site Planning | 3 | 0 | 0 | 3 | |
| Architectural Material Science | | | | | | |
| **ARC 480** | Building Technology | 3 | 0 | 0 | 3 | |
| **ARC 481** | Global issues in Architecture | 3 | 0 | 0 | 3 | |
| **ARC 482** | Sustainable Architecture | 3 | 0 | 0 | 3 | |

**Free Courses (6 c.h.)**

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **XXX xxx** | Free Course | 2 | 0 | 0 | 2 | |
| **XXX xxx** | Free Course | 2 | 0 | 0 | 2 | |
| **XXX xxx** | Free Course | 2 | 0 | 0 | 2 | |
| Total Credit Hours: 6 | | | | | | |

**Science and Literature Course (55 c.h.) NAAB requires 44**

| Course Code | Course Title | LT | LB | TU | CR | Pre-Req |
|---|---|---|---|---|---|---|
| **ENG 104** | Critical Thinking | 3 | 0 | 0 | 3 | |
| **ENG 106** | Expository Writing and Reading | 3 | 0 | 0 | 3 | |
| **ENG 221** | English Language Competency | 2 | 0 | 0 | 2 | |
| **GE 215** | Introduction to Design | 2 | 2 | 2 | 3 | |
| **GE 482** | Projects Management | 3 | 0 | 0 | 3 | |
| **MATH 108** | Trigonometry and Analytical Geometry | 3 | 0 | 0 | 3 | |
| **IC 101** | Islamic Culture 1 | 2 | 0 | 0 | 2 | |
| **IC 102** | Islamic Culture 2 | 2 | 0 | 0 | 2 | |
| **IC 103** | Islamic Culture 3 | 2 | 0 | 0 | 2 | |
| **IC 104** | Islamic Culture 4 | 2 | 0 | 0 | 2 | |
| **AR 101** | Arabic Language Skills | 2 | 0 | 0 | 2 | |
| **AR 102** | Arabic Editing | 2 | 0 | 0 | 2 | |
| **PHYS 105** | Physics for Architecture | 3 | 0 | 0 | 3 | |
| **CE 232** | Survey for Architecture | 2 | 2 | 0 | 2 | |
| **CE 257** | Structural Design for Architecture I | 2 | 2 | 0 | 3 | |
| **CE 357** | Structural Design for Architecture II | 2 | 2 | 0 | 3 | |
| **CE 331** | Environmental Control Systems | 2 | 0 | 0 | 2 | |
| **ME 332** | Building Energy and Environment | 2 | 0 | 0 | 2 | |
| **XXXxxx** | Free Course | 2 | 0 | 0 | 2 | |
| **XXXxxx** | Free Course | 2 | 0 | 0 | 2 | |
| **XXXxxx** | Free Course | 2 | 0 | 0 | 2 | |
| Total Credit Hours: 50 | | | | | | |

## Course Description:

**DES101 Design Studio I 6(0-12-0)**

Introduces the principles, conceptual and critical skills, and the techniques of design. Students learn to observe the world critically and meticulously and to analyze both the broad structures and the small details of visual phenomena. Students master skills needed to conceptualize and communicate their observations through traditional means (drawing, painting and drafting), as well as through digital and other media. They learn craft and acquire making skills with a variety of materials and methods. Class assignments, critiques and presentations will enable students to begin developing an aesthetic awareness coupled with critical thinking skills.

**DES102 Design Studio II 6(0-12-0)**

**Pre-Rq. DES101**

Continues the principles of design, with an emphasis on testing aesthetic and perceptual assumptions. Students develop problem-solving techniques through individual design solutions. While Design I focuses on skills and the discovery and critical understanding of the phenomenal world, Design II is primarily concerned with manipulation and synthesis, and the design and creation of unique two- and three-dimensional design concepts.

**DES183 History of Material Culture I 3(2-2-0)**

Explores global approach to art, architecture and design. Investigates the technological, religious and social forces that helped to reveal the universality of the human impulse to design. Examines ideas, techniques and design methods thematically within a chronological framework covering the time span from the Stone Age to the Industrial Revolution.

**DES184 History of Material Culture II 3(2-2-0)**

**Pre-Rq. DES183**

Explores the developments in architectural thinking and in all aspects of design during the modern era. Investigates thematically the evolution of ideas and processes that shaped contemporary movements in architecture and design. Discusses contemporary concerns, forms, ideas and attitudes of 20th and 21st century design and architecture.

**DES160 Library Instruction 1(0-2-0)**

This course deals with available resources and research methods that help students understand how to use library and Internet resources. Students will formulate a research strategy, develop search skills, and evaluate sources.

**DES110 Digital Media in Design 2(0-6-0)**

Builds on the development and skills associated with digital design. Helps students gain a more complete understanding of how digital media is used in electronic design, through working with the latest in industry-learn the capabilities available to communication designers. Emphasizes the creation, preparation and projects. Not open to multimedia design and visual communication students.

**DES241 Theory of Design 1 2(2-0-0)**

Introduction to architecture - the definition of the components and aesthetic concepts associated with them, providing the student bases utilitarian design spaces architecture by relying on the study of human factors and their different effects on the elements of comfort, efficiency and safety, as well as to introduce the fundamentals and standards design of buildings (the properties of the space architecture - aesthetic concepts - impact of the environment and function - design principles and configurations architecture - walkways and elements of movement), the comprehensive analysis and plan design and supplies functional Tiblogia movement in buildings, private residential, educational buildings, cultural, public housing, commercial, sports, and includes scheduled explain the analytical stages of various design, data and graphics used at each stage.

**DES342 Theory of Design 2 2(2-0-0)**

**Pre-Rq. DES241**

Continuation of the Introduction and definition of architecture and components (along with the decision theories -1) and the course aims to study the blanks architecture in terms of functional requirements for the use of component architecture and study the shapes and structures of architectural and development and to identify problems, design and determine how to deal with the analysis of some famous buildings. In addition to the work of a comprehensive analysis and plan design and functional requirements, typology movement in the health and administrative buildings, transportation, industrial and agricultural buildings.

**DES434 Islamic Heritage 2(2-0-0)**

Study of important trends in the arts and Islamic architecture and introduce students to its basic recourses with a focus on contemporary thought leaders and those interested in the creators and architects, and others. It contains methods for studying and analyzing the current situation of selected models of Islamic Cities and procedures for research on population activities and crafts for the social development of the visual values inherent in these configurations. The course aims to support and deepen the background of the student's heritage and history of Islamic Art and the emphasis on the themes of Islamic architecture, architectural heritage, architecture of local and regional levels. Identify the domain and the environment of Islamic history: the features and attributes, methods and principles to identify features, perception and image of the environment and behavioral patterns, architecture and the environment , Architecture as an expression of culture (models and analytical studies). Islamic architectural heritage in the Saudi Arabia: analysis, vocabulary, and alternatives to deal with the heritage - the literature and the most important trends, studies and models applied.

**ENG104 Critical Thinking 3(3-0-0)**

This course explores the process which we develop and support the beliefs and evaluate the strength of arguments made by others in architecture real life situations. It includes practice in inductive and deductive reasoning, presentation of arguments in oral and written form, and analysis of the use of language to influence thought.

**ENG106 Expository Writing and Reading**

**3(3-0-0)**

The course emphasize on the written and reading expressions on organizing and developing methods of explanatory articles. It is includes; patterns study, use of critical thinking applications, focus on writing skills building, and preparation of research papers.

**ENG221 English Language Competency 2(2-0-0)**

Introduces theories and principles of effective speaking with emphasis on: audience Analysis and adaptation, types of speech such as introductory, impromptu, demonstrative, informative and persuasive; listening, organization, content development, use of language, extemporaneous delivery and interview tips. Designed to improve the student’s ability to research, organize, develop and make presentation.

**GE215 Introduction to Design 2(2-0-0)**

The purpose of this decision to provide curriculum architecture through a focus on: individual discipline and the art of teamwork communication, cooperative, contribute, solving problems and achieving quality standards to prepare students to write a technical reports.

Introduction to project management, initiating process-defining project, planning process, project execution process, project control process and project closing process. Computer applications on Primavera Project Planning and MS Project.

**MATH108 Trigonometry and Analytical Geometry 3(3-0-0)**

The course is a study of right triangles, trig functions, inverses, identities and trigonometric equations and their applications.

**ARC379 Internship I 1(0-0-0)**

The objective of the cooperative training program is to link the students with advanced level of experience as a professional trainee in the environment of design, where each student's practice a daily profession involved in a governmental or private architecture institution. This may include any of the following: project management, customer relations and business development, research, feasibility studies, reports preparation; in cooperation with engineers and other consultants, design presentations, in addition to construction documentation in detailing and drafting, construction management.

**ARC479 Internship II 1(0-0-0)**

**Pre-Rq. ARC379**

Sequel to the first cooperative training plus the exit to the field, the trainee and verify the application of schemes on the ground.

## Second: College Electives

**STAT Statistic 3(3-0-0)**

This course provides an elementary introduction to probability and statistics with applications. Topics include: basic probability models; combinatorics; random variables; discrete and continuous probability distributions; statistical estimation and testing; confidence

**DES305 Islamic Geometric Pattern 3(3-0-0)**

This decision to study models for decorative geometric shapes employed Muslim artists decorate artwork applied to the cloth and ceramics, wood and iron work to spruce up the architectural elements used as doors and Windows and the Mihrabs, domes and Mkornsat. From such models would learn student employment principles and techniques employed in the design of this geometric shapes and can be developed and used as a decorative element in architecture.

**DES310 Design and Psychology 3(3-0-0)**

This decision to study Psychology and founded the most important recent trends of psychology, and study human behavior and its impact on the design process, examine some of the models applied psychology in the design process.

**DES315 Safety and Security 2(2-0-0)**

This course includes the concept of security and safety installations, software security and safety occupational, construction security steps, the role and responsibility of the safety occupational, security team, planning and design for security operations and safety responsibilities of various departments for security, security laws, the curriculum is designed to provide article scientific and engineering design for foundations and rates designed to make work design (architect or by specialization) be resistant to fire, where he works to reduce human and material losses to the fire event of minimal risk through the following factors: (design, material, mode of resistance and firefighting), examines those factors according to the stages of project design, and experience in the last statement of principles and criteria to be met by means of escape, caution and safety requirements must be met in preparing the draft fire prevention installations and industrial and commercial management, schools and homes.

**DES325 Saudi Traditional Architecture 2(2-0-0)**

This course includes the study of the factors effects in social, cultural, environmental and technical on traditional architecture in Saudi Arabia with a special attention on the various regional differences, in addition to studying the traditional settlements and buildings with determining the factors affecting them and their components with a special focus on applied in the Saudi Arabia, field visits, measurements of buildings and registered.

**DES320 Urban Economics 3(3-0-0)**

This course includes the study of the economy concept and its foundations, and how it can be achieved in urban projects in addition to an introduction to engineering management and planning of engineering projects. It is includes; a web charts-duration and cost, introduction to economics, foundations of economic laws, interest and relationship time domain, extinction, replacement, and inflation.

**DES325 Urban Landscape 3(3-0-0)**

The urban landscape occupies a unique and privileged place in our cultural experience. As a cultural and aesthetic artifact, the urban landscape may be regarded as the vision a society projects about itself into the future. This course considers the forces that have given shape to the urban landscape as it has evolved in modern, industrialized cities over the course of the 20th century. We consider how the ideas of urban planners and architects, the needs of capital, the constraints of the environment, and the actions of differently positioned urban subjects collide to shape urban space.

**DES330 Sustainable site construction 3(3-0-0)**

Introduction to sustainable engineering design alternatives and principles for construction and site development from preconstruction through design and the construction phase.

## Third: Department Requirements (Outside Department)

**PHYS105 Physics for Architecture 3(3-0-0)**

The course includes linear and circular equilibrium. As well as Newton's laws of motion and vibrations, work, energy and power, hydraulics, heat and energy transfer.

**CE232 Survey for Architecture 3(2-2-0)**

Basic procedures, calculations and field data recording techniques used in surveying. Correct procedures for the use of surveyor’s tape, engineer’s level, and total station and rod to establish locations and elevations.

**CE257 Structural Design for Architecture I**

**3(2-2-0)**

It covers the physical principles that govern classical statics and strength of materials through the design of timber components of architectural structures including building process and the selection of structural timber systems and plywood construction.

**CE357 Structural Design for Architecture II**

**3(2-2-0) Pre-Rq. CE257**

Architectural case studies are used to examine conceptual development, structural design, building process and the selection of structural steel and concrete systems. Topics such as tension, flexural and compression members; and connections are studied using calculations, design aids, rules of thumb and the latest CSA design standards; computer applications.

**CE331 Environmental Control Systems 2(2-0-0)**

It covers the principals of environmental control systems including heating, cooling, lighting, acoustics, fluid delivery systems and their associated performance with reference to other systems such as vertical transportation and plumbing.

**ME332 Building Energy and Environment**

**2(2-0-0)**

Studies the physical phenomena that make climate (rain, humidity, temperature, wind, heat transfer methods, solar radiation, vapor in air, air leakage and water condensation and wind movement. Studies indoor thermal environment and thermal comfort of building occupants. Discusses examples of how these phenomena are used in building design.

## Fourth: Department Requirements (Inside Department)

**ARC201 Architectural Design Studio I 6(0-12-0)**

**Pre-Rq. DES102**

Studio-based investigation of the fundamentals of making architectural form and space with emphasis on design inquiry, exploration and process. Concentrates on classic instances of form sources in architectural and interior design: function, experience, structure, construction and context. Digital media are integral to the studio, and students receive instruction in software appropriate for design purposes

**ARC202 Architectural Design Studio II**

**6(0-12-0) Pre-Rq. ARC201**

Continues the content and purpose of ARC 201 with increased emphasis on design development and physical and technical resolution. Digital media are integral to the studio, and students receive continued instruction and practice in software appropriate for design.

**ARC301 Architectural Design Studio III**

**6(0-12-0) Pre-Rq. ARC202**

Advances the fundamentals of the making of architectural form based on concepts derived from space, structure and building construction. Studio-based projects emphasize design buildings with conventional, short-span structural systems.

**ARC302 Architectural Design Studio IV**

**6(0-12-0) Pre-Rq. ARC301**

Includes studio-based projects with emphasis on the tectonics of building structure and envelope. Building case studies and design projects explore a range of material and construction system types including steel, wood, masonry and reinforced concrete.

**ARC401 Architectural Design Studio V**

**6(0-12-0) Pre-Rq. ARC302**

Requires design of open site projects of moderate scale with emphasis on building form derived from the analysis of site context and site planning strategies.

**ARC402 Architectural Design Studio VI**

**6(0-12-0) Pre-Rq. ARC401**

Comprises a comprehensive building design project integrating building technologies with other non-technical design issues. Introduces programming and includes a detailed, design development of an aspect of building technology.

**ARC501 Architectural Design Studio VII**

**6(0-12-0) Pre-Rq. ARC402**

Requires researchdirected investigation involving architecture and urban design.

**ARC502 Architectural Design Studio VIII**

**6(0-12-0) Pre-Rq. ARC501**

Research-directed design studio based on a topic related to some aspect of architectural design (history/theory, technology, representation, urban or heritage resource management etc.). Students pursue directed research in support of a design investigation.

**ARC224 History of Architecture I 3(2-2-0)**

**Pre-Rq. DES184**

Explores the developments in architectural thinking and in all aspects of design during the modern era. Investigates thematically the evolution of ideas and processes that shaped contemporary movements in architecture and design. Discusses contemporary concerns, forms, ideas and attitudes of 20th and 21st century design and architecture.

**ARC324 History of Architecture II 3(2-2-0)**

**Pre-Rq. ARC224**

Mies, Gropius, Le Corbusier, and others constructed modernist canon as much with their manifestos-provocative, assertive, entirely subjective texts packaged in the rhetoric of objectivity-as with their buildings. This course studies the major texts and concepts that have produced architecture in the twentieth century. Study will be made of the modernist legacy and its basis in a canon that has experienced transformations across the course of decades, while retaining essential principles and mythic status today.

**ARC227 Principles Architectural Design 3(3-0-0)**

Illustrates fundamental varieties of form in the built environment via thematic treatment of select historical examples. Develops an inclusive conceptual framework for varieties of scale in the built environment. Introduces spatial organization, light, material, structure, societal and physical setting, economy and purpose as fundamental aspects of an ecology within which humans form space for their activities. Presents core visits and discussions.

**ARC321 Construction Systems 1 3(2-2-0)**

Offers an in-depth review of building materials and their properties as they relate to methods of construction and contemporary construction practices used to prepare sites and to erect the building's basic structure. Covers site preparation, foundations, concrete, steel and timber structures, and masonry work. Discusses the basics of producing construction drawings.

**ARC322 Construction Systems 2 3(2-0-2)**

**Pre-Rq. ARC321**

Offers an in-depth examination of the materials and building. Uses a case study approach to demonstrate the evolution of the building process of the major components that are built following the erection of the building's basic structure. Covers stairs, doors, windows, joints. Investigates design considerations and construction methods with hands-on experience in producing detailed drawings.

**ARC405 Housing 2(2-0-0)**

The planning of rooms, houses, and groups of houses. Analysis of climatological, physical, psychological, and social needs and their influence on the planning of housing. Government regulations, costs and financing and their impact on housing. Includes single-family detached, row housing, walk ups, and low-rise construction. Limited work in other buildings. Lectures, seminars, and drawing problems.

**ARC409 Professional Practice 2(2-0-0)**

Case study analysis of buildings, including the design process, building detailing, construction methods, government regulation, owner satisfaction, and post-construction forensics.

## Fifth: Department Electives

**ARC430 History Archaeology in Preservation 3(3-0-0)**

The cultural heritage architect and representative of the legacy boasts its generations, different types and forms of the pride of nations and his pride and proof of the originality and authenticity, that is, expression of national identity and the link between the past and present, It is unfortunate to have that heritage, until recently, been prone to loss and destruction , and therefore extinction and neglect that caused the damage and ruin or by leakage to the outside. Definition of the sense of the impact or effects and also the concept of protection or the protection of monuments, and how to care for heritage impact and maintained and repaired, and took the appropriate monitor budgets in the range of possibilities for them to spend on repairs and maintenance, rehabilitation and the provision of roads and other services.

**ARC431 Sustainable Cities & Transportation**

**3(3-0-0)**

Introduce students to the concept of sustainability in general and sustainability in cities, particularly environmental issues related to cities, a brief history of urban planning - mass transit systems within cities - the characteristics and the foundations run metro lines - to predict the size of movement within the cities - the properties of systems of river transport - planning, ports and shipping lanes and breakwaters with a simplified study of the impact of waves - planning sidewalks and use the theory of queues in the calculation of standby time - to create different means of transportation for people with special needs. the definition of sustainable urban: they design a strategic all-inclusive does not rule out a living, struggling for the continuing search for peace, independence, financial , the effective participation, sustainable development, cultural appreciation, and social justice. As well as introduce students to the concept of sustainable development and its relationship to the development of cities and sustainability. Planning and transportation and management - traffic volume study design - Study ways to wait - control equipment

**ARC432 History Survey & Inventory Methods**

**3(3-0-0)**

Studies of ancient monuments and Islamic, to identify the theories of modern archeology, and anthropology, and geoarchaeology, analysis and study of Findings, and areas of museums and maintenance of monuments, in addition to the intensification of field training and practice, to include science assistance from imaging, and mapping surveyors, and mapping, an Introduction to space . (History - Definitions - Classification of Science survey - units of measurement - Exploration - Drawing sketches spatial, network tools cadastral effects, the study of types of architectural monuments and other survey methods Archaeological Site, and to identify the phases of the study carried out by archaeologists to the site, the definition of student method of mapping for most archaeological sites are discovered. and the type of map is drawn on the importance of the site and the objectives of the study and the amount of time and money-extended, the student's education method of mapping simplified after it is the measurement of dimensions, whether the steps or using a measuring tape. and used in other cases, special tools to clear the archaeological site carefully, and detailed mapping has, in addition to exit the field for training in micro-site, registration data effect on the map register. and can provide us with places who take superficial information on when and how to use the site.

**ARC433 Architecture Conservation 3(3-0-0)**

History; theory of conservation; building analysis; planning law and development; conservation technology; design intervention; area conservation; vernacular architecture; conservation of the modern movement; historic parks and gardens.

**ARC440 Interactive Spaces 3(3-0-0)**

Students will be exposed to various interaction paradigms and strategies for creating responsive environments. They will learn the how to extract semantics from the responses, movements and participation of the audience and also how to engage in dialogue with them to create a meaningful and rich dialogue. This course will explore both the technical and dramaturgical level of interactive spaces. It will present a survey of recent body biometrics and tele-metric technology that could be used in an interactive project. It will dedicate special attention to optical solutions such as computer vision and image processing. The media focus will be towards the real-time generation of sound and visual scopes with a specific attention to their integration into space.

**ARC441 Digital Photography 3(3-0-0)**

The aim of this course is to provide students with a comprehensive overview of photography as a digital medium. Coursework will provide a platform for students to explore technique and process as well as their own creative pursuits. Particular emphasis will be placed on concept development, digital capture, editorial technique, digital presentation, and printing. Post-production software programs will be introduced, but not highlighted in this class.

**ARC442 Islamic Arts 3(3-0-0)**

This is a survey of Islamic art from the period of the early caliphates (c. 700) to the heights of the Islamic empires (c. 1700), combined with close examinations of the issue of aniconism in the Islamic artistic tradition and of relationships between the Islamic and western traditions

**ARC450 Color and Lighting 3(3-0-0)**

Lectures, demonstrations, exercises, and projects focusing on the use of color applied to the three-dimensional architectural context. Color theory is explored with the multiple effects of changing light.

**ARC451 Interior Construction Elements**

**3(3-0-0)**

Exploration of the process of designing, detailing, and constructing furniture and millwork. Introduction to the materials of architectural millwork and the technologies of construction. Studio exercises provide experience in both design and execution of furniture and millwork.

**ARC452 Furniture and Material 3(3-0-0)**

Exploration of the various materials and finishes available to the interior designer, their inherent characteristics, and the ways in which they can be combined into construction assemblies. Emphasis on interior finish materials and textiles.

**ARC460 Planting Design Theory 3(3-0-0)**

Traditional ways plants are used in landscape design. Composition and design characteristics of plant materials. Technical considerations for selection, climate, cultural suitability, availability, costs, and maintenance.

**ARC461 Computers in Landscape Arch 3(3-0-0)**

Laboratory, lecture, and demonstration classes to introduce software applications specific to required landscape architecture courses.

**ARC462 Landscape Perception 3(3-0-0)**

Interdisciplinary approaches to exploring the reciprocal relationship between people and the landscapes of everyday life. Through readings, discussion, in-class activities and mini-projects, students study place attachment, relationships to nature, environmental attitudes and perception, personal space, territoriality, urban public space, diversity, participation, and the politics of space

**ARC470 Land Use Growth and Management**

**3(3-0-0)**

Provides an understanding of contemporary land use issues (including sprawl, smart growth, new urbanism, transit-oriented development, and Washington' s Growth Management Act) and examines their environmental impact and social welfare implications. Analyzes best-practice techniques of growth management.

**ARC471 Strategic Planning 3(3-0-0)**

Uses case-based and problem-based approaches to teach the techniques of planning, decision-making, and analysis common to critical infrastructures.

**ARC472 Principles of Urban Design 3(3-0-0)**

Examines major concepts, principles and theories of urban design. Reviews the historic development of urban surveys current urban design issues, trends and practices in both the Western and non-Western/Islamic contexts.

**ARC473 Site Planning 3(3-0-0)**

Focuses on the site as a fundamental component of building design. Examines the interrelationship of intended site use with the environment. Examines topography, vegetation and landscape, climate, geography as well as theoretical aspects of site development. Emphasizes the synthesis of programmatic and environmental requirements into a coherent concept for building placement and site improvements.

**ARC480 Building Technology 3(3-0-0)**

The course consists of presentations by specialists in the various technologies of buildings including planning, financing, code reinforcement, materials, architecture, engineering, project management, construction, building management services, safety, and maintenance.

**ARC481 Global issues in Architecture 3(3-0-0)**

Examines our emerging understanding of global issues confronting humankind, including population growth, declining reserves of non-renewable resources, etc. Gives an overview of the environmental impact of human communities through history.

**ARC482 Sustainable Architecture 3(3-0-0)**

Develops a greater focus on holistic and sustainable approaches to design. Covers issues such as demand and supply of energy and water and the generation of waste. Reiterates the principles of reduce, reuse and recycle. Predominant emphasis is on practical strategies directly applicable in design. Material is presented as lectures and seminars, supplemented with readings.

# College of Computer Science

## Vision:

The College of Computer is looking to achieve the reconnaissance in the education and the scientific research in all fields of computer.

## Mission:

To prepare superior highly qualified scientific and technical cadres who are ready to work and compete in Computer fields, to continue their postgraduate studies, to achieve the reconnaissance in researches and scientific studies and in transmitting knowledge and in the settlement of technology to serve and to develop society.

## Aims:

1. Prepare student in fundamentals of Computer fields.
2- Suitable preparation of student for postgraduate and research in Computer fields.
3- Create the suitable atmosphere for students to apply their knowledge and experience in Computer fields.
4- Improve student professional capabilities towards analytical and innovative thinking.
5- Encouragement of staff and students for scientific research towards servicing the society and solving his problems.
6- Settlement of knowledge and technology in Computer fields.
7- Continuous development and renewing of the academic plan in order to match the fast and successive alterations in all fields.

## About:

As the global arena is witnessing rapid development in various areas of computer, and since the working fields need the scopes of computers to meet the needs of customers and users of these techniques in addition to the necessary developments of the services provided in these areas. The Custodian of the Two Holy Mosques, the Prime Minister, Chairman of the Board of Higher Education Council, has issued his approval for the resolution of the Higher Education Council at its thirty-fifth meeting numbered (12/35/1426) to establish a college of computer in Qassim University concerning all fields of computer. The academic plan includes five years of which is a preparatory year, then four years of specialized study in three departments, which are: Computer Science Department, Computer Engineering Department, Information Technology Department. The College also includes an Information Technology Department for females.

## Degrees:

Bachelor

Master

## Programs:

Bachelor of Science in Computer Science

Bachelor of Science in Computer Engineering

Bachelor of Science in Information Technology

Master of Science in Computer Science

## Departments:

**1. Computer Science**

**2. Computer Engineering**

**3. Information Technology**

## Centers:

1. Students Club
2. Computer Club
3. Students Rest and Sport Area
4. Faculties Rest Area
5. Computer Center
6. Students Affairs
7. Research Center

## Faculty Members:

**Department of Computer Science**

| | |
|---|---|
| Abubakr Hamdi-Cherif | Associate Prof. |
| Gamil Abdel Azim | Associate Prof. |
| Abdul Naser Rachid | Associate Prof. |
| Abdullah Mohammed Alaraj | Assistant Prof. |
| Saleh Naser Al-Sulmi | Assistant Prof. |
| Mohamed Taher Ben Othman | Assistant Prof. |
| Mohammed Abdullah Al-Hagery | Assistant Prof. |
| Sameh Talat Khuffash | Assistant Prof. |
| Master Prince Syed | Assistant Prof. |
| Gufran Ansari | Assistant Prof. |
| Munir Ahmed Rabbani | Assistant Prof. |
| Syed Khizer | Assistant Prof. |
| Abdel Aziz Mohammed Abbas | Lecturer |
| Shahid Iqbal Nazir Hussain | Lecturer |
| Mahmoud Taha Jarbou | Lecturer |

**Programs:**

BS Degree Program: Computer Science

MS Degree Program: Computer Science

**First Program:**

BS Degree Program: Computer Science

**Second Program:**

MS Degree Program: Computer Science

## Study Plan of Computer Science:

**Level -3**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC101** | Introduction to Islamic Culture | 2 |
| **Arab101** | Language Skills | 2 |
| **Phys104** | General Physics (2) | 4 |
| **Math105** | Different Calculus | 3 |
| **CEN111** | Logic Design | 4 |
| **CSC152** | Concepts of Algorithms & Computer Programming | 4 |
| | Total | 19 |

**Level-4**

| Course Code | Course Title | Credit |
|---|---|---|
| **Arab103** | Expository Writing | 2 |
| **Math106** | Integral Calculus | 3 |

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| | | |
|---|---|---|
| **Math109** | Linear Algebra and Analytical Geometry | 3 |
| **IT125** | Database | 4 |
| **CEN126** | Computer Architecture | 3 |
| **CSC153** | Object Oriented Programming | 4 |
| | Total | 19 |

**Level-5**

| Course Code | Course Title | Credit |
|---|---|---|
| **Math203** | Differential and Integral Calculus | 3 |
| **Stat224** | Introduction to Statistics & Probability | 3 |
| **CSC225** | Assembly Language | 3 |
| **CSC244** | Concepts of Algorithms | 3 |
| **CSC276** | Computer Graphics | 4 |
| **CSC283** | Discrete Structures | 4 |
| | Total | 20 |

**Level-6**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC102** | Islamic and Construction of Society | 2 |
| **Math207** | Differential Equations | 3 |
| **CSC214** | Data Structures | 4 |
| **IT224** | Visual Programming | 4 |
| **CSC237** | Programming Language Concepts | 3 |
| **CSC229** | Operating Systems | 4 |
| | Total | 20 |

**Level-7**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN301** | Signals and Systems Analysis | 4 |
| **CEN333** | Microprocessors Systems | 4 |
| **CSC338** | Compiler Design | 3 |
| **CEN345** | Computer Networks | 4 |
| **CSC346** | Software Engineering | 3 |
| | Total | 18 |

**Level-8**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC103** | The Islamic Economical System | 2 |
| **CSC313** | Algorithms Analysis & Design | 3 |
| **CSC327** | Operations Research and Programming Applications | 3 |
| **CSC357** | Internet Techniques & Web | 3 |

| | | |
|---|---|---|
| | Programming | |
| **CSC392** | Selected Topics in Computer Sciences | 3 |
| **CSC393** | Systems Programming | 3 |
| | Total | 17 |

**Level-9**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC104** | Fundamentals of the Islamic Political System | 2 |
| **CSC414** | Introduction to Unix/Lunix Systems | 3 |
| **IT463** | Knowledge Base Systems Applications | 3 |
| **CSC448** | Optimization Techniques | 3 |
| **IT481** | Communication Skills | 2 |
| **CSC498** | Graduation Project (1) | 2 |
| | Total | 15 |

**Level-10**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC445** | Introduction to Crytopgraphy & Information Security | 3 |
| **IT450** | Multimedia Data | 3 |
| | Management | |
| **CSC458** | Distributed Systems & Parallel Processing | 3 |
| **CSC463** | Artificial Intelligence | 4 |
| **CSC499** | Graduation Project (2) | 4 |
| | Total | 17 |

## Course Description (Computer Science):

**CEN 111 Logic Design (**4h)

This course discusses the Digital computer and information (numbering systems, Arithmetic operations, Decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, Combinational circuits simplification, CMOS circuits), Combinational logic design (design procedure, decoders, multiplexes, Binary adder and subtracted), Sequential circuits (latches, flip flops, synchronous sequential circuits analysis and design), Analysis and design of synchronous sequential machines, Representation, state reduction and realization; Finite state machines.

**Textbook:** M. Mano, Digital Design, 3rd Ed., 2002.

**IS 125 Database(4h)**

This course discusses the Database definition, Database system, Overview of database management, database system architecture, Introduction to Relational databases, An Introduction to Structured Query Language(SQL), Database Integrity, Views, Normalization, Database design, Practical Applications.

**CEN 126 Computer Architecture (3h)**

This course discusses the Review of logic design principles. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design. System software. Micro-programmed CPU. Comparison between CISC, RISC and VLIW processors. Introduction to memory organization; I/O operations; Introduction to parallel processing techniques.

**CSC 237 Programming Languages Concepts (3h)**

This course discusses the Preliminaries. Evolution of the Major Programming Languages. Describing Syntax and Semantics. Lexical and Syntax Analysis. Names, Binding, Type Checking, and Scopes. Data Types. Expressions and Assignment Statements. Statement-Level Control Structure. Subprograms. Implementing Subprograms. Abstract Data Types. Support for Object-Oriented Programming. Concurrency. Exception Handling and Event Handling. Functional Programming Languages. Logic Programming Languages.

**CSC 283 Discrete Structures (4h)**

**Introduction to Discrete Structures**: This course discusses the algorithmic language. **Logic**: propositions, predicate logic, proofs, mathematical induction. **Sets**: special sets, operations, properties and identities, application of logic to knowledge-based systems. **Relations**: graphical and matrix representations, equivalence and order relations, application to databases **Functions:** types, cardinality, application to functional languages **Undirected Graphs**: Simple graphs, Eulerian paths, Hamiltonian circuits, trees, application to syntax diagrams **Directed Graphs** digraphs, consistent labeling, paths problems, Warshall's algorithm, shortest paths and Dijkstra's algorithm, application to routing in computer networks. **Machines and Computations**: automata as models, finite state automata (FSA) without outputs, FSA as language recognizers and their limits, introduction to Turing Machines, application of FSA to problem-solving.

**CSC 276 Computer Graphics (4h)**

This course discusses the Computer Graphics Applications Survey. **Color models** (chromaticity diagram, RGB, CMY, YIQ, HSV, and HLS color models). **Graphics Output Primitives** (coordinate frames, DDA, Bresenham's algorithm, circle-drawing, fill-area primitives algorithms). **2D Graphics** (2D cartesian coordinates, curves and parametric equations, functions and transformations, inverse functions. **3D Graphics** (vectors in 3D, dot and cross product, homogeneous coordinates, correlation between cartesian and homogeneous coordinates). **Geometric transformations** (2D geometric transformations, matrix representation and homogeneous coordinates, inverse transformations, 2D composite transformations). **Geometric representation** Lagrange polynomials of degree n, Hermite cubic polynomial, Bernstein polynomial, interpolation problem, Spline interpolation, problem of approximation, Bezier-Bersnstein approximation, Bezier-B-Spline approximation, quadric surfaces.

**CSC 152 Concepts of Algorithms and Computer Programming (4h)**

This course discusses the Problem-solving, algorithmic design, Introduction to Programming, Structured Program Development, Program Control, Functions, Arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.

**IS 224 Visual Programming (3h)**

This course discusses the Selecting a Visual Language, Knowing the concepts and procedures used in Visual Languages, Syntax and semantics of the language used. Types of Data, conditional statements, recursion, data structures, modular programming, review of Object-Oriented Programming concepts and techniques, User Interface Design rules, Materializing an interface into a set of visual objects, File types, File organizing techniques, File usages, Publishing an interface on the web, Basic concepts of Human Computer Interaction, Comparison between the selected language and other visual languages.

**CSC 338 Compiler Design (3h)**

This course discusses the design and implementation of compilers. Compiler organization, algorithms for lexical, syntactic and semantic analysis, top-down and bottom-up parsing (e.g., recursive descent, LL, LR, LALR parsing). Symbol table organization, error detection and recovery, intermediate and object code generation, and code optimization. Student has to implement a compiler for a simple high level language as project.

**CSC 225 Assembly Language (3h)**

This course discusses the Introduction to PC hardware, PC software requirements, assembly language programmers requirements, program logical and control, string operations, arithmetic operations for processing binary data, assembling linking and executing a program.

**CSC 214 Data Structures (4h)**

This course discusses the Functions in C - Structures and pointers - Memory Management functions, Concepts and Definition of abstract data type, Array as ADT, Stack and operations, Queue and operations Linked List and stack as list, Queue as list and applications, Sorting, recursion, Tree Introduction to Graphs, Projects and Exercises.

**CSC 346 Software Engineering (3h)**

This course discusses the Software Engineering Concepts, System Engineering Concepts, Software Process, Analysis Concepts and Principles, Analysis Modeling Design, Real -Time System Design, Software Testing Techniques, Technical Metrics for Software, Project.

**CSC 229 Operating Systems (4h)**

This course discusses the Computer System Structure, Operating System Concepts, Operating System Structure, Procedures, CPU Scheduling, Process Synchronization, Batch Files, Recovery Console, Memory Management, Virtual Memory, File-System Interface, Storage Structure, Data Storage on Disks, File-Systems: Fat,Fat32, NTFS, Distributed Systems, Hardware Protection, The Linux system

**CSC 244 Concepts of Algorithms (3h)**

This course discusses the Growth function and Recurrence, Divide-and-Conquer: (Strassen, Fibonacci, Polynomial Multiplication), Heap Sort, Quick Sort, Bubble Sort, Insertion Sort, Merge Sort, Hash Table, Binary Search Tree, Dynamic Programming, Greedy Algorithms.

**CEN 333 Microprocessor Systems (3h)**

This course discusses the Architecture and Instruction set of different 16 bit microprocessors; Microprocessor chips. **Supporting chips**: Buffers, decoders, system clock generator, reset system. Memory chips and subsystems Interfacing 16-bit Microcomputers. Architecture of Microprocessor based systems, design technique, memory and I/O devices interfacing to the microprocessor, interfacing technique. **I/O techniques**: Interrupts, Direct memory access; **System development and design tools techniques**: hardware and software.

**CSC 153 Object Programming (4h)**

This course discusses the Introduction to Object - Oriented Programming, Program Control Structures, Functions, Arrays, Pointers and Strings, Classes Part I: Classes and data abstraction, Classes Part II: Operator Overloading, Inheritance Virtual Functions and Polymorphism.

**CEN 301 Signals and Systems (4h)**

This course discusses the Time-domain analysis of signals: Mathematical and graphical representation. Classifications. Basic operations. Basic signals. Sampling and aliasing. Time-domain analysis of systems: Block diagram representation. Differential and difference equation representation. Impulse and step responses. Frequency-domain analysis of signals: Spectra of continuous-time and discrete-time signals. Frequency-domain analysis of systems: Frequency response of continuous-time systems: Bode plot, Nyquist plot, feedback and its effects on system stability. Frequency response of discrete-time systems. Laplace transform and its applications. Z-transform and its applications: Relationship with Laplace. Exercises should be solved using MATLAB.

**CEN 345 Computer Networks (4h)**

This course discusses the **Introduction to computer networks**: Network Types, Overview of data transmission, Introduction to network protocols, The Internet protocol. **Network topologies**; Network architecture and the OSI reference model; The physical and Data Link Layer , flow and errors control, ARQ Stop/wait, Sliding window protocols, **DLC standards**: HDLC, PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, Hubs, routers, Ethernet Switches; **Network Layer Services**: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.

**CSC 393 Systems Programming (3h)**

This course discusses the Study of one particular processor, assembly for this processor. Introduction to the assembly language of this processor. Design and implementation of an assembler (translation to machine code). Linkers and loaders: Absolute loaders; Program relocation; Program linking; Data structures; Dynamic loading; Bootstrap loaders. Macro processors: Data structures and logic flow for a simple one-pass macro processor; Concatenation of macro parameters; Generation of labels in macro expansions; Conditional macro expansion; Macro processing within an assembler; General-purpose macro processors. Project.

**CSC392 Selected Topics for Computer science(3h)**

This course discusses the advanced topics in computer sciences are proposed, like: Java Object-Oriented programming, **Object-Oriented Software Engineering,** Application Programs, Operating Systems Design and implementation, Distributed Operating Systems, Distributed Computing, Introduction to Parallel Computing.

**CSC357 Internet Techniques web programming (3h)**

This course discusses the An overview of connecting to and navigating within the Internet system and the World Wide Web: Navigation. Search Engines. Advanced search techniques. Design of web pages using HTML, XML and Java. TCP/IP. Client/Server architectures. Mastering Connectivity. Security.

**CSC 327 Operations Research &Applications programming (3h)**

This course discusses the OR Approach, Methodology And Applications: modeling, constraints, objective and criteria. Problems of multiple criteria optimization, model validation and systems design. Mathematical programming; simulation, gaming; heuristic programming. Examples,: theory of inventory. Production; linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. Theory of games for two-person competitive situations. Project management through PERT-CPM.

**CSC 313 Algorithms Analysis and Design (3h)**

This course discusses the Introduction to Algorithms Analysis and Design, General Algorithms: 1- Greater Common Divisor Algorithm, 2- Smaller Common Multiple Algorithm, 3- Pascal-Triangle Algorithm, 4- Inverse Number Algorithm, 5- Recursive Algorithm), Algorithms And Procedures, Algorithm Analysis: (Algorithm Efficiency, Algorithm Run-time, Algorithm Complexity, Computation Horner Algorithm Complexity Degree, Multiplication Two Polynomials Complexity Degree, Computation Using While Loop Algorithm Complexity Degree), Sorting Algorithms: (Insert Sort Algorithm, Selection Sort Algorithm, Bubble Sort Algorithm, Heap Sort Algorithm, Merge Sort Algorithm, Qsort Algorithm, Files Sorting Algorithms), Searching Algorithms, Backtracking Algorithms: (8-th Queen Problem, Optimal Option Problem).

**CSC 498 Project I (2h)**

Student will study, design and develop an integrated system, and he will be examined at the end of the semester.

**IS 463 Knowledge base systems Application (3h)** This course discusses the Review of first-order logic, relational algebra, and relational calculus. Fundamentals of logic programming. Logic for knowledge representation. Architecture of a knowledge-base system. Fundamentals of deductive databases. Top-down and bottom-up query processing. Some important query processing strategies and their comparison. Project or term paper on current research topics.

**IS 481 Communication skills (3h)**

This course covers written, oral, and interpersonal communication. Students will hand in short pieces of writing each week, will make oral presentations several times in the semester, and will work together in simulated project meetings and other realistic scenarios of pair and small group interaction.

**CSC 448 Optimization Techniques (3h)**

This course discusses the Unconstrained optimization theory. Convex functions and convex sets. Algorithms for unconstrained optimization (Steepest descent Newton methods Conjugate gradient methods). Constrained optimization theory (Kuhn-Tucker conditions). Special problems: (Linear programming Quadratic Programming). Algorithms for constrained optimization. Since this is a course on optimization *techniques* you will need to be able to program with high level programming languages (e.g C/C++, Java, C#).

**CSC 414 introduction to Unix and Linux (3h)**

This course discusses the User/kernel interface, fundamental concepts of Unix, user authentication, basic and advanced I/O, file system, signals, process relationships, and inter-process communication. Fundamental development and debugging tools such as "make" and "gdb" will also be covered.

**IS 491 Multimedia Data Management (3h)**

This course discusses the Significance and value of multimedia for a variety of end users. Multimedia data storage. Use of multimedia hardware for capture and management of sound, graphics and video. Multimedia development tools  programming, scripting and design skills. Use of multimedia authoring tools for producing multimedia applications

**CS 463 Artificial Intelligence (4h)**

Introduction & Definitions. Agent and examples. Uninformed Search. Heuristic Search. Constrained Search Problems CSP). Logical agents. First Order Logic and examples Machine Learning. Project.

**CSC 458 Distributed Systems and Parallel (3h)**

This course discusses the Introduction to distributed systems, processes and processors, parallel architecture (multi-computers, multi-processors), communication in parallel systems, performance of parallel systems, examples of parallel programming, introduction to distributed systems, distributed algorithms, types of distributed systems, compatibility of distributed systems and discovery of the end of processes.

**CSC 445 Introduction to Cryptography and information security (3h)**

This course discusses the Basic concepts of cryptography and secure data: Overview of Cryptography and information security, Mathematical Overview, Shannon and cryptography, Transposition, Substitution Ciphers, Rotor Machine and Poly alphabetic Ciphers, Block Ciphers: symmetric key systems, DES, AES, Public Key Systems, Knapsack System, RSA System, Key Management, Digital Signatures and Authentication, Stream Ciphers, Linear Shift Registers, Non-Linear Shift Registers, Watermarking and Steganography, Applications.

**CSC 499 Project II (4h)**

Student will study, design and develop an integrated system. Examination to be held at the end of the semester.

## Second Program:

**MS Degree in Computer Science**

**Study Plan:**

**Level-11**

| First Year | | | |
|---|---|---|---|
| Semester | **Course code** | **Course Title** | **Credit Hours** |
| **First Semester** | CSC 501 | Algorithmic Problem Solving | 3 |
| | CEN 504 | Computer Networks | 3 |
| | CSC 506 | Software Engineering and Knowledge Engineering | 3 |
| | | Credit hours for 1st Semester | 9 |

Level-12

| Semester | Course code | Course Title | Credit Hours |
|---|---|---|---|
| **Second Semester** | CSC 502 | Theory of Computation | 3 |
| | CEN 508 | Database and Data Mining | 3 |
| | --- xxx | A course from the first chosen track | 3 |
| | | Credit hours for 2nd | 9 |

| | | | |
|---|---|---|---|
| | | Semester | |
| | | Total credit hours for 1st Year | 18 |

**Level-13**

| Second Year | | | |
|---|---|---|---|
| Semester | **Course code** | **Course Title** | **Credit Hours** |
| **Third Semester** | --- +++ | A course from the second chosen track | 3 |
| | --- +++ | A course from the second chosen track | 3 |
| | --- +++ | A course from the second chosen track | 3 |

**Level-14**

| | | | |
|---|---|---|---|
| **Fourth Semester** | **CSC 600** | **Thesis** | **12** |

**Optimal Tasks:**

**First Track:**

| | | | |
|---|---|---|---|
| | **CEN** | **Networking in the TCP/IP** | **3** |
| **Computer Systems and Networks** | **510** | **Environment** | |
| | CSC 512 | Computer Security | 3 |
| | CSC 514 | Distributed Systems | 3 |
| | CEN 516 | Design and Implementation of Real-time Systems | 3 |
| | CEN 518 | Interconnection Networks | 3 |
| **Database and Data Mining** | CSC 520 | Data Warehouse and Mining Systems | 3 |
| | IT 522 | Web Databases and Information Retrieval | 3 |
| | IT 524 | Hypermedia and Geographical Information Systems | 3 |
| | CSC 526 | Web Intelligence | 3 |

**Second Track:**

| Optional Track | Course code | Course title | Credit hours |
|---|---|---|---|
| **Software Engineering and** | CSC 530 | Object-Oriented Software Development | 3 |
| | CSC 532 | Software Quality Management | 3 |

| | | | |
|---|---|---|---|
| **Knowledge Engineering** | CSC 534 | Software Measurements | 3 |
| | CSC 536 | Software Verification and Validation | 3 |
| | CSC 538 | Knowledge Engineering | 3 |
| | CSC 539 | Advances in Programming Languages | 3 |
| **Computer Graphics and Human-Computer Interaction (HCI)** | CSC 540 | Computer Graphics | 3 |
| | CSC 542 | Numerical and Symbolic Computation | 3 |
| | CSC 544 | Human-Machine Communication and User-Interface Design | 3 |
| | CSC 546 | Applied Computer Graphics and Multimedia | 3 |
| **Artificial Intelligence** | CSC 550 | Artificial Intelligence | 3 |
| | CSC 552 | Machine Learning | 3 |
| | CSC 554 | Knowledge-Based Systems | 3 |
| | CSC 556 | Pattern Recognition | 3 |
| | CEN 558 | Digital Image Processing | 3 |
| | CSC 559 | Intelligent Bioinformatics | 3 |

## Course Description:

**CORE COURSES**

**CSC 501: Algorithmic Problem Solving (3h)**

Contents: Review of the major data structures – Basic design techniques – Divide and conquer – Greedy method – Backtracking – Dynamic programming – Heuristics – Parallel algorithms – Analysis of algorithms – Orders of magnitudes – Lower bound theory – Time and space – Complexity – NP-hard and NP-complete problems – Correctness of algorithms – Structure of algorithms.

**CSC 502: Theory of computation (3h)**

Contents: Finite state automata and regular expressions – Regular sets – Pumping lemma – Context-free grammars (CFGs) and derivation trees – Chomsky and Greiback Normal Forms – Context-free languages (CFLs) – Recognizers – Turing machines – Recursive and recursively enumerable languages – Decidability problems – The halting problem – Rice's theorem and Chomsky hierarchy.

**CEN 504: Computer Networks (3h)**

Contents: Review of general concepts - LAN and WAN - Management of token ring networks - ISO model of seven layers - TCP/UP - Network standard specifications - Urban networks - Large bandwidth networks - Gates - Network design and performance - Network programming - Error detection - Security and privacy.

**CSC 506: Software Engineering and Knowledge Engineering (3h)**

Contents: Review of known methodologies – Analysis of software requirements – Real-time software - Software cost, quality, testing and measurements - Object programming – Knowledge engineering issues: knowledge representation using rules, frames & logic, basics of logical inference, and basics of search.

**CSC 508: Database Systems (3h)**

Contents: Review of Basic Modelling Techniques and DBMS Concepts - Components and Functions of a DBMS - Query processing and optimization - Concurrency control - Security - Recovery - Integrity in DBMSs - Distributed databases - Study of intelligent database systems - Study of different object-oriented data models - Introduction to XML technologies - Project: Development of a database application.

**TRACK: Computer Systems and Networks**

**CEN 510: Networking in the TCP/IP Environment (3h)**

Contents: Review of network technologies for LANs and WANs - Inter-networking: Concepts and architectures - Internet addressing: IP addresses - Internet routing protocols: Gateways - Internet error control - Protocol layering in Internet environments - UDP and TCP transport protocols - Broadcasting and multi-casting in Internet environments. Internet Domain Name Service - Application development in a TCP/IP environment: Client/Server Model - UNIX Interface to TCP/IP: socket interface - Standard TCP/IP applications.

**CSC 512: Computer Security (3h)**

Contents: Advance topics in Cryptography; Authentication; Integrity; Key Distribution and Certification; Access Control: Firewalls; Attacks and Countermeasures: Mapping, Packet Sniffing, IP Spoofing, Denial-of-Service and Distributed Denial-of-Service Attacks, Hijacking; Security in Many Layers: HTTPS, Secure E-mail, Secure Sockets Layer (SSL) and Transport Layer Security (TLS), IP sec, Security in wireless networks such as IEEE 802.11, Mobile agents security.

**CSC 514: Distributed Systems (3h)**

Contents: General concepts of operating systems - Distribution: concepts and definitions - Architecture of distributed systems - Control in distributed systems: Centralized vs. distributed - Classification and implementation of different naming schemes – Inter-process communication - Resource allocation and implication on load sharing - Load balancing - Process migration - Clock synchronization - Concurrency control in distributed environments.

**CEN 516: Design and Implementation of Real-Time Systems (3h)**

Contents: Definitions and classification - Hard real-time systems and soft real-time systems - Applications and support real-time languages - Specific hardware interfaces - Data collection and processing - Types and levels of control in real-time systems (e.g. closed-loop control) - Real-time operating systems – Predictability - Methodologies for design and implementation.

**CEN 518: Interconnection Networks (3h)**

Contents : Graph-theoretical approach - Criteria to evaluate interconnection networks - Issues in designing interconnection networks - Classification and evaluation - Higher-performance computers - Flynn's taxonomy - Computational speedup - Factors limiting speedup - Grosch's and Amdahl's laws - Different interconnection networks: Mesh, Binary Tree, Hypertree, Pyramid, Butterfly, Hypercube, Cube Connected Cycles, Shuffle Exchange, de Bruijn, Star and Star-Connected Cycle Networks.

**TRACK Database and Data Mining**

**CSC 520: Data Warehouse and Mining Systems (3h)**

Contents: Introduction to Decision Support Systems (DSS) - Development of DSS - Data modelling techniques and development of data warehouse in an architecture environment - Study of different data warehouse architectures and development techniques - User-Interface for data warehouses - Data mining - Application domains for data warehouse and mining - Project: Development of a prototypical data warehouse/mining system.

**IT 522: Web Databases and Information Retrieval (3h)**

Contents: Modelling - Query operations - Mark up languages - XML technologies and its applications - Searching the Web - IR models and languages - Indexing and searching - Digital libraries - Project: Designing and developing parts of IR Systems.

**IT 524: Hypermedia and Geographical Information Systems (3h)**

Contents: Multimedia and hypermedia Systems - Development methodologies - Query processing and browsing tools - Development of hypermedia systems on the World Wide Web (www) Databases - WWW and its browsing tools - Conceptual modelling and analysis of spatial data - Spatial reasoning - Query processing - Indexing techniques - Data storage – Hyper maps - Spatial knowledge - Different application domains - Project: Development of a prototype system.

**CSC 526: Web Intelligence (3h)**

Contents: Interactions between AIE (Artificial Intelligence Engineering) and AIT (Advanced Information Technology) - Classical AIE: knowledge engineering, representation, planning, and discovery, data mining – New AIE: brain informatics, human level AI, intelligent agents, social network intelligence - AIT: wireless networks, ubiquitous devices, social networks, and data/knowledge grids, cloud computing, Next generation of Web systems and services.

**TRACK: Software Engineering and Knowledge Engineering**

**CSC 530: Object-Oriented Software Development (3h)**

Contents: Review of known methodologies and principles of Object Engineering - Unified Modelling Language (UML) - Comparative study of available methodologies - Conversion methodology to object design - Evaluation of object design and use of object metrics - Use of object methodology - Case Study.

**CSC 532: Software Quality Management (3h)**

Contents: Introduction to quality management systems and total quality - ISO quality system and its application to software industry - Capability maturity model (CMM) and its five levels - Tick IT system - Quality assurance - Application of quality systems - Software tools for quality - Case study.

**CSC 534: Software Metrics (3h)**

Contents: Importance of measurements and metrics in software - Basics of measurements - Experimental measurements - Collection of measurements - Analysis of measurements - Measurements used for functionality size – effort, cost and time - Zeipf law - Structure measurements - Information flow measurements - Building software metrics - Planning for software measurements - Measurements of object oriented software - Tools used in software measurements - Case study.

**CSC 536: Software Verification and Validation (3h)**

Contents: Formal techniques: proving programs correctness - Checking consistency and completeness - Testing data - Inspections and reviews - Unit/module testing - White and black box testing - Functionality, Alpha, Beta testing - System integration - Tool support for testing - Faults vs. failures. Verification of implementation against both requirements and design - Techniques for critical software - Trustworthiness vs. reliability - Safety analysis - Multi-version programming - Software reliability - Case study.

**CSC 538 Knowledge Engineering (3h)**

Contents: Knowledge engineering process - Identification of knowledge-based application - Knowledge elicitation techniques (including interviewing techniques, LaFrance knowledge acquisition grids, concept dictionary, goal reduction trees...) - Knowledge modeling based on Common KADS - Knowledge-based development: block diagram, interaction diagram, validation and verification of knowledge-bases.

**CSC 539: Advances in Programming Languages (3h)**

Contents: Review of formal languages - Standard models of programming languages - Concept of typing - Scope of variables - Subroutines - Logical programming - Execution environment - Visual programming - Object oriented programming - Design and programming of VOOR languages - Programming in visual environment - Visual programming and software engineering.

**TRACK: Computer Graphics and Human-Computer Interaction (HCI)**

**CSC 540: Computer Graphics (3h)**

Contents : Mathematics for computer graphics in three dimensions - Hierarchical representation and basic shapes - Surfaces and curves in three dimensions - Three dimensional modelling - Solid bodies modelling - Three dimensional viewing - Visible surface - Illumination and shades - Texture mapping - Animation techniques - Case study with Open GL.

**CSC 546: Applied Computer Graphics and Multimedia (3h)**

Contents: Traditional animation - Computer animation tools - 3D-animation environment - Special animation techniques - Today's animation systems (hardware/software) - Applications of computer animation - Virtual and augmented reality.

**CSC 542: Numerical and Symbolic Computation (3h)**

Contents: Numerical solution of systems of linear equations, nonlinear equations and nonlinear systems of equations –Numerical differentiation and integration - Ordinary differential equations and partial differential equations - Numerical Optimization – Introduction to Symbolic Computation - Analytic Symbolic Computation - Symbolic-numeric algorithms for polynomial systems - High level of Scientific Programming - Study of problems in Symbolic Computation - Use of Symbolic and Numeric Tools. Case study using Maple / Mathematical / MATLAB and/or SCI LAB.

**CSC 544: Human-Machine Communication and User-Interface Design (3h)**

Contents: Introduction to Human sensory systems - Human memory and human learning theories and cognition - User interface styles: Design considerations - Dialog content design - Visual Design - Basic Interaction-handling models - Introduction to human-computer dialog management - Visual form recognition: pen computing - Fingerprint input systems - Font and symbol design - Introduction to speech computing - Speech presentation - Speech understanding and recognition - Speech generation - Gesture and odour Input/ Output.

**TRACK: Artificial Intelligence**

CSC 550: Artificial Intelligence (3h)

Contents: Introduction to AI and problem solving – Knowledge representation – Automatic theorem proving – Learning by example – Learning by analogy – Learning by discovery – Self-reference and self-production – Reasoning: causal, commonsense, and default reasoning - Measure-based approaches - Reasoning with uncertainty – Confirmation theory – Belief theory – Necessity and possibility theory – Theory of endorsements – Spatial and temporal reasoning.

**CSC 552: Machine Learning (3h)**

Contents: Concept learning and the general-to-specific ordering - Decision tree learning - Artificial neural networks - Evaluating hypotheses - Bayesian learning - Computational learning theory - Instance-based learning - Genetic algorithms - Learning sets of rules - Analytical learning - Combining inductive and analytical learning - Reinforcement learning - Support Vector Machines – Kernel methods.

**CSC 554: Knowledge-Based Systems (3h)**

Contents: Expert systems - Presentation of knowledge representation paradigms - Rule-based systems - Inference rules - Resolution - Reasoning under uncertainty - Developing a knowledge-based system prototype, from knowledge acquisition (including mock interviews with a domain expert) - Knowledge modelling, design, implementation and testing - Prototype system development using tools such as Eclipse or CLIPS (Fuzzy CLIPS).

**CSC 556: Pattern Recognition (3h)**

Contents: The content of the course may be designed from the areas: Image processing and analysis - Speech processing - Geographical information system - Fuzzy reasoning - Computer vision - Perception and any other emerging relevant topic(s).

**CEN 558: Digital Image Processing (3h)**

Contents: Physical descriptions of continuous images – Sampling and quantization of images – Matrix representation of image forming – Filtering - restoration and enhancement – Feature extraction and scene analysis.

**CSC 559 Intelligent Bioinformatics (3h)**

Contents: Basics of molecular biology - Artificial Intelligence techniques: Search algorithms, Heuristics, Optimality, Graphs in Bioinformatics, Grammars, Languages and Automata - Probabilistic Approaches: Bayesian networks, Markov networks - Nearest neighbor approach for secondary structure protein folding prediction, Clustering - Identification (Decision) Trees: Gain criterion, Over fitting and pruning – Soft computing for Bioinformatics - Cellular Automata - Hybrid Methods: Neural-genetic algorithm, Genetic algorithm and KNN, Genetic programming and neural networks for determining gene – gene interactions in epidemiology.

**Thesis**

**CSC 600: Thesis**

Contents: The thesis research topic is chosen by the student and approved by the Department Council.

## Department of Computer Engineering:

**Faculty Members:**

| | |
|---|---|
| Abdullah Ibrahiem Al-Shoshan | Professor |
| Salem Nasri | Associate Prof. |
| Ahmad Ali Al-Hajji | Associate Prof. |

| | |
|---|---|
| Ashraf S. Nasr | Assistant Prof. |
| Ashraf Mokhtar Karim El-Din | Assistant Prof. |
| Samir Ahmed Elsagheer, | Assistant Prof. |
| Yasser A. Ahmed, | Assistant Prof. |
| Mahmoud Y. El Aidy, | Assistant Prof. |
| Abou El-Maaty Metwally | Assistant Prof. |
| Anowar Hussain Sadiyal | Assistant Prof. |
| Saeed Saleh Salloum, | Assistant Prof. |
| Mohammad Ali Azzam, | Assistant Prof. |
| Sameh Awaida | Assistant Prof. |
| Adel Al-Aqeel, | Lecturer |
| Mohammad Sajjid, | Lecturer |
| Allam Shahata | Lecturer |

## Programs:

BS Degree Program: Computer Engineering

### First Program:

BS Degree Program: Computer Engineering

## Study Plan of Computer Engineering (CEN):

**Level-3**

| Course Code | Course Title | Credit |
|---|---|---|
| **Arab101** | Language Skills | 2 |
| **IC101** | Introduction to Islamic Culture | 2 |
| **Phys104** | General Physics (2) | 4 |
| **Math105** | Differential Calculus | 3 |
| **CEN111** | Logic Design | 4 |
| **CSC152** | Concepts of Algorithms & Computer Programming | 4 |
| | Total | 19 |

**Level-4**

| Course Code | Course Title | Credit |
|---|---|---|
| **Arab103** | Expository Writing | 2 |
| **Math106** | Integral Calculus | 3 |
| **Math109** | Linear Algebra and Analytical Geometry | 3 |
| **IT125** | Database | 4 |
| **CEN126** | Computer Architecture | 3 |
| **CSC153** | Object Oriented Programming | 4 |
| | Total | 19 |

**Level-5**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN201** | Electric Circuits | 4 |
| **Math203** | Differential & Integral Calculus | 3 |
| **Stat224** | Introduction to Statistics & | 3 |

| | | |
|---|---|---|
| | Probability | |
| **CEN226** | Computer Organization & Assembly Language | 3 |
| **CSC244** | Concepts of Algorithms | 3 |
| **CSC283** | Discrete Structures | 4 |
| | Total | 20 |

**Level-6**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC102** | Islam and Construction of Society | 2 |
| **CEN202** | Electronics | 4 |
| **Math207** | Differential Equations | 3 |
| **CSC214** | Data Structures | 4 |
| **CSC229** | Operating Systems | 4 |
| | Total | 17 |

**Level-7**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN301** | Signals and Systems Analysis | 4 |
| **CEN317** | Microprocessor Systems & Microcontroller Lab | 2 |
| **CEN333** | Microprocessors Systems | 4 |
| **CEN345** | Computer Networks | 4 |
| **CSC346** | Software Engineering | 3 |
| | Total | 17 |

**Level-8**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC103** | The Islamic Economic System | 2 |
| **CEN319** | Microprocessors Lab | 2 |
| **CEN327** | Computer Systems Engineering | 4 |
| **CEN342** | Data Transmission | 4 |
| **CEN357** | Digital Signal Processing | 4 |
| **CEN392** | Selected Topics in Computer Engineering | 3 |
| | Total | 19 |

**Level-9**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC104** | Fundamentals of the Islamic Political System | 2 |
| **CEN414** | Wireless & Mobile Networks | 4 |
| **CEN455** | Digital Control | 4 |
| **CEN415** | Embedded Systems | 4 |

| | | |
|---|---|---|
| **IT481** | Communication Skills | 2 |
| **CEN498** | Graduation Project (1) | 2 |
| | Total | 18 |

**Level-10**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN445** | Advanced Computer Networks & Linux | 4 |
| **CEN459** | Intelligent Systems & Robotics | 4 |
| **CEN463** | ASIC & VLSI Circuits Design | 4 |
| **CEN499** | Graduation Project (II) | 4 |
| | Total | 16 |

## Course Description of Computer Engineering (CEN):

**Course Description:**

**CSC 152 Concepts of Algorithms and Computer Programming (4h)**

Problem-solving, algorithmic design, Introduction to Programming, Structured Program Development, Program Control, Functions, Arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.

**CEN 111 Logic Design (4h)**

Digital computer and information (numbering systems, Arithmetic operations, Decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, Combinational circuits simplification, CMOS circuits), Combinational logic design (design procedure, decoders, multiplexes, Binary adder and subtracted), Sequential circuits (latches, flip flops, synchronous sequential circuits analysis and design), Analysis and design of synchronous sequential machines, Representation, state reduction and realization; Finite state machines.

**IT 125 Database (4h)**

Database definition, Database system, Overview of database management, database system architecture,

Introduction to Relational databases, An Introduction to Structured Query Language(SQL), Database Integrity, Views, Normalization, Database design, Practical Applications.

**CEN 126 Computer Architecture (3h)**

Review of logic design principles. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design. System software. Micro-programmed CPU. Comparison between CISC, RISC and VLIW processors. Introduction to memory organization; I/O operations; Introduction to parallel processing techniques.

**CSC 153 Object Programming (4h)**

Introduction to Object-Oriented Programming, Program Control Structures, Functions, Arrays, Pointers and Strings, Classes Part I Classes and data abstraction, Classes Part II: Operator Overloading, Inheritance Virtual Functions and Polymorphism.

**CSC 244 Concepts of Algorithms (3h)**

Growth function and Recurrence, Divide-and-Conquer: (Strassen, Fibonacci, Polynomial Multiplication), Heap Sort, Quick Sort, Bubble Sort, Insertion Sort, Merge Sort, Hash Table, Binary Search Tree, Dynamic Programming, Greedy Algorithms,

**CSC 283 Discrete Structures (4h)**

**Introduction to Discrete Structures**: algorithmic language. **Logic**: propositions, predicate logic, proofs, mathematical induction. **Sets**: special sets, operations, properties and identities, application of logic to knowledge-based systems. **Relations**: graphical and matrix representations, equivalence and order relations, application to databases. **Functions**: types, cardinality, application to functional languages. **Undirected Graphs**: Simple graphs, Eulerian paths, Hamiltonian circuits, trees, application to syntax diagrams. **Directed Graphs**: digraphs, consistent labeling, paths problems, Warshall's algorithm, shortest paths and Dijkstra's algorithm, application to routing in computer networks. **Machines and Computations**: automata as models, finite state automata (FSA) without outputs, FSA as language recognizers and their limits, introduction to Turing Machines, application of FSA to problem-solving.

**CEN 301 Signals and Systems (4h)**

Time-domain analysis of signals: Mathematical and graphical representation. Classifications. Basic operations. Basic signals. Sampling and aliasing. Time-domain analysis of systems: Block diagram representation. Differential and difference equation representation. Impulse and step responses.

**CEN 226 Computer organization and assembly language (3h)**

Assembly language programming requirements, program logical and control, string operations, arithmetic operations for processing binary data, assembling linking and executing a program .**Organization of the CPU**: Implementation of the von Neumann machine, single & multiple bus data paths, instruction set architecture; machine architecture as a framework for encapsulating design decisions, relationship between the architecture and the compiler, Implementing instructions. **control unit**: hardwired & programmed realization. **arithmetic units**: multiplication and division, Instruction pipelining. **Trends in computer architecture**: introduction to instruction-level parallelism. **pipeline hazards:** data and control, reducing the effects of hazards. **Performance**: metrics for computer performance, instruction cycles.

**CEN 202 Electronics (4h)**

overview -Diodes and diode circuits - MOS transistors - MOS logic families - Bipolar transistors and logic families - Design parameters - Storage elements - Interfacing logic families - Operational amplifiers - Circuit modeling and simulation - Data conversion circuits - voltage and current sources - Amplifier design - Integrated circuits building blocks

**CSC 229 Operating Systems (4h)**

Computer System Structure, Operating System Concepts, Operating System Structure, Procedures, CPU Scheduling, Process Synchronization, Batch Files, Recovery Console, Memory Management, Virtual Memory, File-System Interface, Storage Structure, Data Storage on Disks, File-Systems: Fat Fat32, NTFS ,Distributed Systems, Hardware Protection, The Linux system.

**CSC 214 Data Structures (4h)**

Functions in C - Structures and pointers - Memory Management functions, Concepts and Definition of abstract data type, Array as ADT, Stack and operations, Queue and operations Linked List and stack as list, Queue as list and applications, Sorting, recursion, Tree Introduction to Graphs, Projects and Exercises.

Frequency-domain analysis of signals: Spectra of continuous-time and discrete-time signals.

Frequency-domain analysis of systems: Frequency response of continuous-time systems: Bode plot, Nyquist plot, feedback and its effects on system stability. Frequency response of discrete-time systems. Laplace transform and its applications. Z-transform and its applications: Relationship with Laplace. Exercises should be solved using MATLAB.

**CSC346 Software Engineering (3h)**

Software Engineering Concepts, System Engineering Concepts, Software Process, Analysis Concepts and Principles, Analysis Modeling Design, Real-Time System Design, Software Testing Techniques, Technical Metrics for Software, Project.

**CEN 333 Microprocessor Systems (3h)**

Architecture and Instruction set of different 16 bit microprocessors; Microprocessor chips. **Supporting chips**: Buffers, decoders, system clock generator, reset system. Memory chips and subsystems Interfacing 16-bit Microcomputers. Architecture of Microprocessor based systems, design technique, memory and I/O devices interfacing to the microprocessor, interfacing technique. **I/O techniques**: Interrupts, Direct memory access; **System development and design tools techniques**: hardware and software.

**CEN 345 Computer Networks (4h)**

**Introduction to computer networks**: Network Types, Overview of data transmission, Introduction to network protocols, The Internet protocol. **Network topologies**; Network architecture and the OSI reference model; The physical and Data Link Layer , flow and errors control, ARQ Stop/wait, Sliding window protocols, **DLC standards** : HDLC, PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, Hubs, routers, Ethernet Switches; **Network Layer Services**: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.

**CEN 317 Microprocessor Systems & microcontroller Lab (2h)**

Design of 16-bit Microprocessor-based systems including RAM and EPROM interfacing, Parallel and serial port interfacing, timer, interrupt controller interfacing, project. Micro-controllers: programming and interface.

**CEN 319 Microprocessors Lab (2h)**

CPU circuits, Peripheral circuits, Memories Addressing modes, Parallel and Serial Ports and USB , Interrupt modes, Applications.

**CEN 392 Selected Topics in CEN (3h)**

This course is designed to enable students to study variable special topics of interest, which are carefully selected from CEN-related topics. The contents of such a course are to be determined by the instructor and the department.

**CEN 357 Digital Signals Processing (4h)**

Basic Concepts: Sampling, ADC-DAC, aliasing, quantization. Digital Filters: Difference equations, impulse and step responses, Z-transfer function, frequency and phase responses, FIR filters, IIR filters, adaptive filters, optimal filters, non-linear filters. Discrete Fourier Transform: DFT characteristics, Fast Fourier Transform: FFT-spectral analysis, spectrogram, FFT processing, signal segmentation. DSP Implementation: coefficients, integer and floating point DSP systems, DSP chips. Applications: Audio processing, image processing, communications. Exercises should be solved using MATLAB.

**CEN 327 Computer Systems Engineering (4h)**

History and overview - Life cycle - Requirements analysis and elicitation - Specification - Architectural design - Testing - Maintenance - Project management - Concurrent (hardware/software) design - Implementation - Specialized systems -Reliability and fault tolerance.

**CEN 342 Data Transmission (4h)**

**Introduction to communication systems:** wired & wireless, coaxial cables, optical fiber, microwave and satellite communications. **Transmission Impairments:** Noise, attenuation, phase and envelope distortion, non-linearity effect. **Data encoding**: AM, FM and PM modulations, PCM, DPCM and DM, ASK, FSK, PSK and M-ary signal. **Line coding and basic line codes:** RZ, NRZ, Manchester. **Data Multiplexing**: FDM and TDM, spread spectrum, Asynchronous and synchronous transmission. **Interfacing techniques and protocols**: EIA 232, V.24, X.21 standards; **Data transmission over telephone lines**: Modems. **Error detecting techniques. Switching techniques**: circuit switching, packets switching. **Communication Systems:** Telephone Networks, ISDN. **Simulation techniques**.

**CEN 414 Wireless and Mobile Computing (4h)**

Introduction to Wireless Communications (Radio Propagation, Multiple Access, Wireless Communication Systems); Wireless Networks (Packet Radio Network, Wireless LAN/WAN); Mobile Networking (Mobile-IP, Ad-Hoc Networks and Ad-Hoc Routing, Sensor Networks); Wireless Protocols (Wireless TCP, Session Mobility); Information Management (Data Dissemination and

Broadcast Models, Mobile Database and Mobile Transaction); Location-Independent and Location-Dependent Computing Models (Naming, Locating, and Routing, Mobility and Handoff); Disconnected and Weak-Connected Operation Models, File Hoarding and File Systems; Human-Computer Interactions; Mobile Applications and Services. Security in Wireless and Mobile Computing.

**CEN 455 Digital Control (4h)**

Part I: Continuous Systems: Review of mathematical representation of systems, transfer functions, system analysis in frequency and time domains, system stability, compensator design.

Part II: Discrete Systems: System Modeling and representation; Difference equations; review of Z transform; Review of sampling and reconstruction; Stability analysis; Design of discrete-time control systems; State-space techniques.

**CEN 415 Embedded Systems (4h)**

Implementation of embedded digital FPGA systems, architecture, operations, software,hardware/software, design methodology.

**IT 481 Communication skills (2h)**

This course covers written, oral, and interpersonal communication. Students will hand in short pieces of writing each week, will make oral presentations several times in the semester, and will work together in simulated project meetings and other realistic scenarios of pair and small group interaction.

**CEN 498 Project I (2h)**

The student should take a B.Sc. project in related area to his specialization and with technical merit. This project is for two semesters, it is counted two hours in the first semester. At the end of the semester the student submits a report describing his projects and the parts he completed in the first semester and proposed parts in the 2nd semester.

**CEN 459 Intelligent Systems and Robotics (4h)**

**Part I Intelligent Systems**: AI Definitions, Knowledge representation, Search techniques, Connectionist neural networks, learning and adaptation, self-organization, fuzzy set theory and fuzzy logic, intelligent agent, genetic algorithms, Internet applications. **Part II: Robotics:** Introductory historical development of robotics, robot arm kinematics, inverse kinematics, dynamics and control, trajectory planning, use of software packages, sensors, image acquisition and processing, autonomous mobile robots, control architectures, LEGO Mind Storms and other robotic kits & devices for experimentation, applications of mobile robots, Internet and Web Robotics.

**CEN 445 Advanced Computer Networks and Linux OS (4h)**

**Network Layer Protocols**: Optimality principle, Routing Algorithms: Flow based, Distance Vector, Shortest Path. **Congestion control Algorithms**: Leaky Bucket, Traffic Shaping. **Congestion control in ATM**; **Internetworking Protocols**: The Internet Network layer, IP Tunneling and Concatenated Virtual Circuits, IP datagram forwarding, encapsulation, fragmentation, and reassembly; **Transport Layer Protocol** : TCP and UDP, AAL layer in ATM. **Internet protocols**: IP, ARP, RARP, BOOTAP, Error reporting mechanism (ICMP), OSPF routing, BGP, CDIR, IPv6; TCP and UDP; Addressing schemes; Unix Operating System. Troubleshooting, System Problems and Network Problems. **Introduction to Network Management**: Applications and Functions. Network Monitoring, Network Control. Network Performance Evaluation. Introduction, **Introduction to Linux operating system**; Linux Shell Commands, Network services and protocols in Linux (DNS, DHCP, Web, Email, Samba, etc.). Routing in Linux. Basics of Linux kernel, IPv6, Traffic Engineering, ATM networks, MPLS, Quality of Service (QoS), Optical Networking. New topics in network technology.

**CEN 499 Project II (4h)**

In this semester the student continues his work in the project. This may require the student to present his progress monthly. At the end of the semester the student presents a detailed report of developed project and oral presentation. The report should indicate that the student understands the topic and his specific implementation. Any hardware or software should be documented in detail. The students grade is based on his work during the project and commitment to fulfill objectives, on the report, and on his oral presentation.

**CEN 463 ASIC & VLSI Circuits Design (4h)**

Overview of VHDL - Finite state machines review – Introduction to ASIC design methodologies and synthesis tools - VHDL simulation and verification - standard libraries. Introduction to optimization - Introduction to FPGA Synthesis, Elements of computer-aided circuit analysis and layout techniques: Examples: Large-scale MOS design: MOS transistors, static and dynamic MOS gates, programmable logic array design, MOS circuit fabrication, design rules, resistance and capacitance extraction, power and delay estimates, scaling, MOS combinational and sequential logic design, register and clocking schemes, data-path, and control unit design.

## Department of Information Technology:

### Faculty Members:

| | |
|---|---|
| Abdullah Mohammed Alaraj | Assistant Prof. |
| Abdullah Mohammad Alnajim | Assistant Prof. |
| Husam Ahmed Al Hamad | Assistant Prof. |

Mohammed Abdulhameed Ali Al-Shabi Assistant Prof.
Tarek Ahmed Elwardany Assistant Prof.
Zameer Ahmad Adhoni Assistant Prof.
Muhammad Ijaz Muhammad Aslam Lecturer
Mohammed Awad Yousef Tanash Lecturer
Nezar Akhras Lecturer
Saleh Mohammad Albahli Lecturer

**Degrees:**

Bachelor of Information Technology

**Programs:**

BS Degree Program: Information Technology

**First Program:**

BS Degree Program: Information Technology

## Study Plan of Information Technology (IT):

**Level-3**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC101** | Introduction to Islamic Culture | 2 |
| **Arab101** | Arabic Language Skills | 2 |
| **Phys104** | General Physics (2) | 4 |
| **Math105** | Differential Calculus | 3 |
| **CEN111** | Logic Design | 4 |
| **CSC152** | Concepts of Algorithms & Computer Programming | 4 |
| | Total | 19 |

**Level-4**

| Course Code | Course Title | Credit |
|---|---|---|
| **Arab103** | Expository Writing | 2 |
| **Math106** | Integral Calculus | 3 |
| **Math109** | Linear Algebra and Analytical Geometry | 3 |
| **IT125** | Database | 4 |
| **CEN126** | Computer Architecture | 3 |
| **CSC153** | Object Oriented Programming | 4 |
| | Total | 19 |

**Level-5**

| Course Code | Course Title | Credit |
|---|---|---|
| **Math203** | Differential & Integral Calculus | 3 |
| **Stat224** | Introduction to Statistics & Probability | 3 |
| **IT226** | Information Systems Fundamentals | 3 |
| **CSC244** | Concepts of Algorithms | 3 |
| **CSC276** | Computer Graphics | 4 |
| **CSC283** | Discrete Structures | 4 |

| | Total | 20 |
|---|---|---|

**Level-6**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC102** | Islam and Construction of Society | 2 |
| **Math207** | Differential Equations | 3 |
| **CSC214** | Data Structures | 4 |
| **CSC224** | Visual Programming | 4 |
| **CSC229** | Operating Systems | 4 |
| **CSC237** | Programming Languages Concepts | 3 |
| | Total | 20 |

**Level-7**

| Course Code | Course Title | Credit |
|---|---|---|
| **IT326** | Database (2) | 4 |
| **IT340** | Information Systems Analysis & Design | 3 |
| **IT344** | Design and Programming of GUI | 4 |
| **CEN345** | Computer Networks | 4 |
| **CSC346** | Software Engineering | 3 |
| | Total | 18 |

**Level-8**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC103** | The Islamic Economic System | 2 |
| **IT324** | Modern Concepts of Applications Programming | 4 |
| **CSC327** | Operations Research and Programming Applications | 3 |
| **IT342** | Information Systems Engineering | 3 |
| **CSC357** | Internet Techniques and Web Programming | 3 |
| **IT392** | Selected Topics in Information Systems | 3 |
| | Total | 18 |

**Level-9**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC104** | Fundamentals of the Islamic Political System | 2 |
| **CSC414** | Introduction to Unix/Lunix Systems | 3 |
| **IT449** | Data Mining | 3 |
| **IT463** | Knowledge Base Systems Applications | 3 |

| | | |
|---|---|---|
| **IT481** | Communication Skills | 2 |
| **IT498** | Graduation Project (1) | 2 |
| | Total | 15 |

**Level-10**

| Course Code | Course Title | Credit |
|---|---|---|
| **IT450** | Multimedia Data Management | 3 |
| **IT452** | Planning & Management of Information Resources | 3 |
| **IT465** | Decision Support Systems | 3 |
| **IT480** | Electronic Commerce Systems | 3 |
| **IT499** | Graduation Project (2) | 4 |
| | Total | 16 |

## Course Description (Information Technology)

### Course Description:

**CSC 152 Concepts of Algorithms and Computer Programming (4h)**

Problem-solving, algorithmic design, Introduction to Programming, Structured Program Development, Program Control, Functions, Arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.

**IT 125 Database (4h)**

Database definition, Database system, Overview of database management, database system architecture, Introduction to Relational databases, An Introduction to Structured Query Language(SQL), Database Integrity, Views, Normalization, Database design, Practical Applications.

**IT 465 Decision Support Systems (3h)**

Decision-making process, systems modeling and support. Categorization of problem-solving techniques. Data management and concepts of the data warehousing. **Modeling of managerial problems**; linear programming models, simulation models, heuristics and forecasting models. Model-base management systems. DSS user interface design and management. Decision support system construction methods. DSS Hardware, software, and technology Levels. Knowledge-based and expert systems, expert system architecture; representation of knowledge; forward and backward chaining; inferences making process; Applications of expert systems in decision making Group, distributed, and executive decision support systems.

**CEN 111 Logic Design (4h)**

Digital computer and information (numbering systems, Arithmetic operations, Decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, Combinational circuits simplification, CMOS circuits), Combinational logic design (design procedure, decoders, multiplexes, Binary adder and subtracted), Sequential circuits (latches, flip flops, synchronous sequential circuits analysis and design), Analysis and design of synchronous sequential machines, Representation, state reduction and realization; Finite state machines.

**CEN 126 Computer Architecture (3h)**

Review of logic design principles. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design. System software. Micro-programmed CPU. Comparison between CISC, RISC and VLIW processors. Introduction to memory organization; I/O operations; Introduction to parallel processing techniques.

**IT 226 Information Systems Fundamentals (3h)**

Definition of Information Systems, Philosophy of IT Department, IT Courses Interrelations, Survey of information systems technology, Strategies for IT design, Strategic Role for Information and Information Systems, Organizational Structure and Information Systems, Organizational Modeling, Enterprise-wide computing and networking, Conceptual foundations, The Decision-making process, Information Systems Strategic Planning, Information system requirements, designing the information architecture of an organization, Information systems products and services, Managing of Information Systems.

**IT 326 Database (2) (4h)**

DBMS architecture and administration; Centralized and Client-Server approaches, System Catalog, Data Dictionary. Transaction management; Transactions: concepts, characteristics. Recovery techniques, Concurrency control techniques: Serializability, Deadlock, Locking schemes, Time-stamp ordering, Multi-version, Optimistic techniques; DB security; Distributed databases; Distributed DBMS, Data fragmentation and replication, Distributed transactions management. Object-Oriented databases. Introducing to new emerging DB technologies and applications; Web DBs, Multimedia DBs, Data Warehousing and Data Mining.

**CSC 276 Computer Graphics (4h)**

Computer Graphics Applications Survey. **Color models** (chromaticity diagram, RGB, CMY, YIQ, HSV, and HLS color models). **Graphics Output Primitives** (coordinate frames, DDA, Bresenham's algorithm, circle-drawing, fill-area primitives algorithms). **2D Graphics** (2D Cartesian coordinates, curves and parametric equations, functions and transformations, inverse functions. **3D Graphics** (vectors in 3D, dot and cross product, homogeneous coordinates, correlation between Cartesian and homogeneous coordinates). **Geometric transformations** (2D geometric transformations, matrix representation and homogeneous coordinates, inverse transformations, 2D composite transformations). **Geometric representation** (Lagrange polynomials of degree n, Hermite cubic polynomial, Bernstein polynomial, interpolation problem, Spline interpolation, problem of approximation, Bezier-Bersnstein approximation, Bezier-B-Spline approximation, quadric surfaces).

**Graphics Lab:** modeling, rendering, animation using 3D Studio Max from Autodesk. Use of OpenGL.

**CSC 283 Discrete Structures (4h)**

**Introduction to Discrete Structures**: algorithmic language. **Logic**: propositions, predicate logic, proofs, mathematical induction. **Sets**: special sets, operations, properties and identities, application of logic to knowledge-based systems. **Relations**: graphical and matrix representations, equivalence and order relations, application to databases. **Functions**: types, cardinality, application to functional languages. **Undirected Graphs**: Simple graphs, Eulerian paths, Hamiltonian circuits, trees, application to syntax diagrams. **Directed Graphs**: digraphs, consistent labeling, paths problems, Warshall's algorithm, shortest paths and Dijkstra's algorithm, application to routing in computer networks. **Machines and Computations**: automata as models, finite state automata (FSA) without outputs, FSA as language recognizers and their limits, introduction to Turing Machines, application of FSA to problem-solving.

**CSC 229 Operating Systems (4h)**

Computer System Structure, Operating System Concepts, Operating System Structure, Procedures, CPU Scheduling, Process Synchronization, Batch Files, Recovery Console, Memory Management, Virtual Memory, File-System Interface, Storage Structure, Data Storage on Disks, File-Systems: Fat Fat32, NTFS ,Distributed Systems, Hardware Protection, The Linux system.

**CSC346 Software Engineering (3h)**

Software Engineering Concepts, System Engineering Concepts, Software Process, Analysis Concepts and Principles, Analysis Modeling Design, Real-Time System Design, Software Testing Techniques, Technical Metrics for Software, Project.

**IT 340 Information Systems Analysis and Design (3h)**

fundamental knowledge, methods and skills needed to analyze, design and implement computer-based systems. The role of the systems analyst and the techniques employed. Utilizing the structured software development life cycle approach, the development phases are comprehensively discussed and reviewed. The Modeling Techniques: Process Modeling (DFDs), Data Modeling (ERDs), Architectural System Design Modeling, Unified Modeling language forms, and Object-Oriented Modeling. The Course includes an integrated project that covers the whole system analysis and design phases, which the students will fulfill on a group base manner. The Course also emphasizes on developing and improving the skills of interrelating, documenting, and modeling for the students.

**IT 344 Design and programming of GUI (3h)**

Fundamentals of programming and designing of business applications using Visual programming, Common controls and construction of menus in Visual programming, Concepts and applications of data structures and design of graphical user interfaces, adding Database access and Internet access to Visual programming programs.

**IT 449 Data Mining (3h)**

Principles, algorithms and applications of data mining, including algorithms, methods, implementations and applications of mining sequential and structured data, text data, Web data, spatiotemporal data, biomedical data and other forms of complex data.

**IT 342 Information Systems Engineering (3h)**

Application systems implementation, functional testing, user acceptance testing, and installation strategies. The processes of maintaining information systems, types of maintenance, measuring and controlling of maintenance effectiveness. Software quality assurance, quality concepts, the ISO quality factors, technical metrics for software and examples of function-based, specification quality, testing metrics. Technical metrics for object-oriented systems. Information Systems Development Methodologies. Requirements Gathering Engineering. Software Copying Management.

**CEN 345 Computer Networks (4h)**

**Introduction to computer networks**: Network Types, Overview of data transmission, Introduction to network protocols, The Internet protocol. **Network topologies**; Network architecture and the OSI reference model; The physical and Data Link Layer , flow and errors control, ARQ Stop/wait, Sliding window protocols, **DLC standards** : HDLC, PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, Hubs, routers, Ethernet Switches; **Network Layer Services**: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.

**IT 324 Modern Concepts of Application Programming (4h)**

Modern programming Concepts and how to be used to build real world applications needed by Society Organizations. Understanding a problem and analyzing it, sketching a solution, implementing the solution, documenting it and finally presenting the work in a professional manner. Projects to be selected in the domain of modern applications, e.g: Health Information Systems, E-Commerce applications, Academic field, …This course, however, is intended to develop the talents of students and to encourage the spirit of competition, creation, goodness of work, and prettiness of exposition
This course includes 2 or 3 large programming projects per semester.

**IT 450 Multimedia Data Management (3h)**

Significance and value of multimedia for a variety of end users. Multimedia data storage. Use of multimedia hardware for capture and management of sound, graphics and video. Multimedia development tools, programming, scripting and design skills. Use of multimedia authoring tools for producing multimedia applications.

**CSC 244 Concepts of Algorithms (3h)**

Growth function and Recurrence, Divide-and-Conquer: (Strassen, Fibonacci, Polynomial Multiplication), Heap Sort, Quick Sort, Bubble Sort, Insertion Sort, Merge Sort, Hash Table, Binary Search Tree, Dynamic Programming, Greedy Algorithms.

**Course Code: IT 481 Communication skills (2h)**

This course covers written, oral, and interpersonal communication. Students will hand in short pieces of writing each week, will make oral presentations several times in the semester, and will work together in simulated project meetings and other realistic scenarios of pair and small group interaction.

**IT 392 Selected Topics in Information Systems (3h)**

Special topics of current trends in information systems. Engineering Tools and Methods, Simulation, Virtual Reality, Internet Security, Data Warehousing and Mining, Geographic Information Systems, Telemedicine and Medical Informatics, Workflow Management, Quantitative and Qualitative Methods in Information Systems, Global Information Systems Management, Intelligent Agent Technology and Applications, Human Computer Interaction, Computer-Based Learning and Training, Philosophical Foundations of Information Systems, Absorbing Continuous IT Developments in Organizations, IT Professional and Organizational Needs, Organizational Learning and Collaborative Technologies, Understanding and Managing Information Users Behavior, Policy, Legal and Security Issues in IT , and Virtual Organizations.

**IT 463 Knowledge base systems Application (3h)**

Review of first-order logic, relational algebra, and relational calculus. Fundamentals of logic programming. Logic for knowledge representation. Architecture of a knowledge-base system. Fundamentals of deductive databases. Top-down and bottom-up query processing. Some important query processing strategies and their comparison. Project or term paper on current research topics.

**IT 452 Planning & Management of Information Resources (3h)**

Definition of Information Resources and IT Infrastructure, Information Strategy Planning Components (Business Planning, Systems Planning technical Planning). Strategic Planning Steps, used tools, managing the Feedback, Developing strategic, Objectives and Rules. Organizing, Managing, and Developing of Information Resources for the Information Systems Departments, Cost Analysis, Outsourcing Management, IT Contingency Planning and Resources Safety. Human Factors and Performance Measurements. Security issues, Internal auditing, Standards and procedures of the Information Center, Continuous Improvement of IT Resources. Standards of Computer Networks, Planning of Networks, Business Requirements to Construct Networks, Requirements Analysis, Design of Networks, Choosing Network Technologies, Managing Networks, Measuring and continuous Evaluation of Network Performance, Network Maintenance and Development, Economical and Legal Issues of Managing Networks, Network effects on the performance and Productivity of the Organization, Computer Networks and the Organization, Network Management Tools.

**Graduation Project-1(2h)**

The previous courses have provided the IT students with strong and sufficient knowledge to develop information systems. The next logical stage is that the IT student must acquire hands-on experiences on developing real world information systems. In addition, the students should be familiarized with real world problems encounter during the development of real world information systems. Furthermore, the students should be trained to work in teams. In this course, the students will be organized into groups. The number of students in each group should not exceed three students. For each group, a supervisor will be allocated to guide the group in developing a particular information system. In developing an information system, a particular information system development methodology should be used. Each group will develop a real world information system in two stages: The first stage will be carried out in IT 498 and the second stage will be carried out in IT 499. In IT 498, the students of each group must identify a problem domain, define a problem, identify the requirements in details, specify requirements in details, analyze and document the current system, proposed alternative systems, and design a particular system in details which includes the definitions of all the required system models such as the data model and the functional model. At the end of the course, each group must submit a formal report documenting the problem domain, the requirements, specifications, and the system models.

**IT 498 CSC 414**b**introduction to Unix and Linux (3h)**

User/kernel interface, fundamental concepts of Unix, user authentication, basic and advanced I/O, file system, signals, process relationships, and inter- process communication. Fundamental development and debugging tools such as "make" and "gdb" will also be covered.

**IT 499 Graduation Project-II (4h)**

In this course, each group will continue developing the information systems that started in IT 498. Each group must use a particular tool to implement its information system in a good programming practice. This implementation tool must be new and the students have not been experienced in the previous courses. Furthermore, the students must generate a user manual for their information system in an appropriate format. At the end of the term, each group must submit a final report, which documents completely the information system from the problem. definition phase to the test and implementation phase and contains a user manual for the information system.

**IT 480 Electronic Commerce Systems (3h)**

Strategic planning for EC adoption; Business design and architecture for EC applications; Web-based marketing strategies and models; E-Commerce Project Management; Public Policy and Legal Issues of Privacy; Socio-Technical Infrastructure for E-Commerce; Risk Management in E-Commerce Initiatives; E-Transformation; Measuring Effectiveness of E-Commerce Projects; EC and organizational change management; EC and competitiveness; Success and failure in EC implementation; Retailing in E-Commerce; E-Commerce in Banking; Advertisement in E-Commerce; E-Commerce and Online Publishing; E-Commerce in Manufacturing; E-Commerce and Supply Chain Management; E-Commerce and Customer Asset Management; Electronic Payment Systems; Mobile E-Commerce; Modern trends in developing E-commerce systems.

**CSC 327 Operations Research &Applications programming (3h)**

OR Approach, Methodology And Applications : modeling, constraints, objective and criteria. Problems of multiple criteria optimization, model validation and systems design. Mathematical programming; simulation, gaming; heuristic programming. Examples,: theory of inventory. Production; linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. Theory of games for two-person competitive situations. Project management through PERT-CPM.

**CSC 357 Internet Techniques web programming (3h)**

An overview of connecting to and navigating within the Internet system and the World Wide Web: Navigation. Search Engines. Advanced search techniques. Design of web pages using HTML, XML and Java. TCP/IP. Client/Server architectures. Mastering Connectivity. Security.

**CSC 153 Object Programming (4h)**

Introduction to Object-Oriented Programming, Program Control Structures, Functions, Arrays, Pointers and Strings, Classes Part I Classes and data abstraction, Classes Part II: Operator Overloading, Inheritance Virtual Functions and Polymorphism.

## College of Engineering

### Vision:

A locally and regionally recognized college in the engineering education and scientific research, and supporting the sustained development in Qassim region and Kingdom.

### Mission:

College of Engineering at Qassim University seeks to offer a developed and accredited engineering education to satisfy the needs of the job market, and to offer society and research services which support the sustained development in the Kingdom and participate in the knowledge economy.

### Aims:

**I-College Educational Objectives**

1- Preparation of the graduates to have a successful career as engineers in the governmental and private sectors.

2- Preparation of the graduates to pursue their professional development through self learning and advanced degrees.

3- Preparation of the graduates to advance to positions of leadership in their profession.

4- Preparation of the graduates to effectively participate in the sustainable development of the Saudi Society.

**II-Research Objectives:**

1. To establish research links with the industry, energy and construction organizations to help develop and promote these organizations.

2. To establish research centres which participate in developing the scientific research and supporting the academic staff and post-graduate students from inside and outside the university.

3. To offer post-graduate programs which focus on research subjects those serve the Saudi society.

**III-Community–Service Objectives**

1. To contribute and support the different university committees such as committee of missions and training, demonstrators committee and the scientific council, etc.

2. To participate, in cooperation with the university community service deanship, in the promotion of the engineering profession through offering training courses and workshops for engineers and technicians in different engineering fields.

3. To conduct engineering studies and field surveys, and to present technical consultations for solving the society problems.

4. To conduct standard tests on constructions, engineering systems, equipment, machines, devices and materials.

## About:

On 17/1/1423 H, the King Saud University (KSU) council recommended the transformation of the Department of Agriculture Engineering, College of Agriculture and Veterinary at its Qassim Campus into a full Engineering college with three departments, Civil, electrical, and mechanical engineering. In "1425" Qassim University decided to adopt the Preparatory (Foundation) Year Program (PYP) for all scientific colleges. It was a good chance for Engineering College to enhance and improve its programs with the objectives of satisfying the new university –system (PYP) in addition to the job market and accreditation requirements. During the academic year, 2010-2011, all the college programs have been fully accredited by the **ABET**.

## International Accreditation and Historic Achievement

The college made an historic achievement by obtaining international academic accreditation from the Accrediting Board for Engineering and Technology ABET. The college received the official accreditation in August 2010 for all college programs.

The electrical Engineering program has been accredited locally as well. Recently, the mechanical engineering department has been awarded the prize of the distinguished department at the level of the university for the year 1430H/2009G. In addition; the Engineering College is going to offer M.Sc. programs in different fields. English is the official teaching language. Because the college holds staff from different nationalities (Algeria, Egypt, India, Kenya, KSA, Morocco, Pakistan, Philippines, Sudan, Syria, Turkey, and more).

## Degrees:

- Bachelor
- Master

## Programs:

The Engineering College offers four B.Sc. programs:

1. Electric Power Engineering Program
2. Electronics and Communication Engineering Program
3. Civil Engineering Program
4. Mechanical Engineering Program

Admission conditions

Students completed the preparatory year program (**PYP**) with GPA not less than 3.5 out of 5.0 points may be accepted for admission to the engineering college.

List of the university course requirements

| **Course Code** | **Course Title** | **CR** | **LT** | **LB** | **TU** | **Pre-Req** | **Co-Req** |
|---|---|---|---|---|---|---|---|
| **ARB 101** | Linguistic skills | 2 | 2 | - | - | - | - |
| **ARB 103** | Arabic Writing | 2 | 2 | - | - | - | - |
| **IS 101** | Introduction to Islamic culture | 2 | 2 | - | - | - | - |
| **IS 102** | Islam and Community Building | 2 | 2 | - | - | - | - |
| **IS 103** | Economic System in Islam | 2 | 2 | - | - | - | - |
| **IS 104** | Political System in Islam | 2 | 2 | - | - | - | - |
| **Total Credit Hours: 12** | | | | | | | |

**List of the College course requirements:**

| **S. No.** | **Course Code** | **Course Title** | **CR** | **LT** | **LB** | **TU** | **Pre-Req** | **Co-Req** |
|---|---|---|---|---|---|---|---|---|
| **1** | Phys 104 | General Physics | 4 | 3 | 2 | - | - | - |
| **2** | Chem 111 | General Chemistry | 4 | 3 | 1 | - | - | - |
| **3** | Math 105 | Differential Calculus | 3 | 3 | - | 1 | - | - |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **4** | Math 106 | Integral Calculus | 3 | 3 | - | 1 | Math 105 | - |
| **5** | Math 107 | Linear Algebra & Analytic Geometry | 3 | 3 | - | 1 | - | - |
| **6** | Math 203 | Differential and Integral Calculus | 3 | 3 | - | 1 | Math 106 | - |
| **7** | Math 208 | Differential equations | 3 | 3 | - | 1 | Math 203 | - |
| **8** | Math xx1 | **Elective - Math 1** | 3 | 3 | - | 1 | | |
| **9** | Math xx2 | **Elective - Math 2** | 3 | 3 | - | 1 | | |
| **10** | GE 104 | Basics of Engineering Drawing | 3 | 1 | 4 | - | - | - |
| **11** | GE 105 | Basics of Engineering Technology | 2 | 1 | 2 | - | GE 104 | - |
| **12** | CSC 209 | Computer Programming | 3 | 2 | 2 | - | - | - |
| **13** | GE 211 | Introduction to Engineering Design-I | 3 | 2 | 4 | - | - | - |
| **14** | GE 213 | Introduction to Engineering Design-2 | 2 | 2 | 2 | - | GE 211 | - |
| **15** | GE 401 | Engineering Economy | 3 | 3 | - | 1 | - | - |
| **16** | GE 405 | Cooperative Training | 9 | - | - | - | - | - |
| **Total credit-hours 54** | | | | | | | | |

**The two math elective courses may be selected from the following courses:**

| **S. No.** | **Course Code** | **Course Title** | **CR** | **LT** | **LB** | **TU** | **Pre-Req** | **Co-Req** |
|---|---|---|---|---|---|---|---|---|
| **1** | STAT 324 | Probability and statistics | 3 | 3 | | 1 | - | - |
| **2** | Math 244 | Linear algebra | 3 | 3 | | 1 | Math 10 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 7 | |
| 3 | Math 254 | Numerical Methods | 3 | 3 | | 1 | Math 106 & 107 | - |
| 4 | Math 322 | Partial differential equations | 3 | 3 | | 1 | Math 203 & 208 | |
| 5 | Math 328 | Applied operational researches | 3 | 3 | | 1 | Math 107 | |

**The descriptions of the courses required for different programs offered by QEC are given next:**

**Phys 104** - **General Physics (4 h)**

Electromagnetism: Coulomb's law in the electric fields, Gauss law, Electric potential, Energy stored, Capacitance and dielectrics, Current and resistance, Electric energy and power, Direct current circuits, Kirchhoff "s Rules, Magnetic fields, Motion of a charged particle in a magnetic field, Sources of the Magnetic fields, Ampere's law, Faraday 's law, in the inductance, Mutual inductance, Alternative current circuits, RMS values, Impedance, Resonance, Power in RLC circuits. **Nuclear Physics:** Photoelectric effect, Atomic spectrum, Bohr model, Nuclear structure, Radioactivity Decay, Half life, Radioactive Decay.

**CHEM 111** - **General Chemistry (4 h)**

<u>Stoichiometry</u>: SI Units, chemical formulas, the mole, methods of expressing concentration, Calculations based on chemical equations

<u>Gases</u>: laws, kinetic theory, deviation and van der Waals equation

<u>Thermochemistry</u>: Types of enthalpy changes, Hess Law and its applications,, first law of thermodynamics

<u>Solutions</u>: Type of solutions and laws related, colligative properties

<u>Chemical kinetics</u>: Law of reaction rate, reaction order, factors affecting the rates

<u>Chemical Equilibrium</u>: Relation between Kc & Kp, Le Chatelier's principle and factor affecting equilibrium. Ionic equilibrium: Acid and base concepts, pH calculations of acid, base and buffer solutions

<u>Atomic Structure</u>: emission spectrum, Bohr's theory de Broglre's hypothesis, quantum numbers, electronic configuration of elements, consequences of the periodic table

**Math 105** - **Differential Calculus (3 h)**

Real numbers, Functions, Limits, Continuity. Derivatives, Differentials, Chain Rule, Implicit Differentiation. Higher Order Derivatives, Local Extrema, Concavity, Horizontal and Vertical Asymptotes, Applications of Extrema, related rates. Rolle's Theorem, Mean Value Theorem, Inverse Trigonometric Functions

**Math 106** - **Integral Calculus (3 h)**

**Fundamental theorem of calculus, the definite and indefinite integral, numerical integration. Area, volume of revolution, work, arc length. Differentiation and integration of inverse**

**trigonometric functions. The logarithmic, exponential, hyperbolic and inverse hyperbolic functions. Techniques of integration: substitution, by parts, trigonometric substitutions, partial fractions, miscellaneous substitutions. Indeterminate forms, improper integrals. Polar coordinates.**

**Math 107 - Linear Algebra & Analytic Geometry (3 h)**

Introduction to the conic sections, The parabola; translation of coordinate axes, The ellipse, The Hyperbola, Rotation of axes; second degree equation. Systems of linear equations and matrices: Introduction, Gaussian elimination, Matrices and matrix operations, Inverses; Rules of matrix arithmetic, Elementary matrices and a method for finding $A^{-1}$, Further results on systems of equations and inevitability, Diagonal, Triangular and symmetric Matrices. Determinants: Determinants by cofactor expansion, Evaluating determinants by row reduction, Properties of the determinant function, A combinatorial approach to determinants Vectors in 2-space and 3-space: Introduction to vectors, Norms of a vector; vector arithmetic, Dot product, Lines and planes in 3-space.

**Math 203- Differential and Integral Calculus (3 h)**

**Infinite series, convergence and divergence of infinite series, integral test, ratio test, root test and comparison test. Conditional convergence and absolute convergence, alternating series test. Power series. Taylor and Maclaurin series. Functions in two or three variables, their limits, continuity and differentiability, The chain rule, Directional derivatives; gradient, Tangent planes, Maxima and Minima for function in two or three variables, Lagrange multipliers, Double integral and its applications to area, volume, moments and center of mass. Double integrals in polar coordinates. Triple integral in rectangular, cylindrical and spherical coordinates and applications to volume, moment and center of mass. Vector fields, line integrals, surface integrals, Green's theorem, the divergence theorem. Stoke's theorem.**

**Math 208 - Differential equations (3 h)**

Different types of first order differential equations and its applications. Linear differential equations of higher order. Linear differential equations with constant coefficients. Reduction of the order. Series solution of ordinary differential equations. Frobenius's method. Fourier series of odd and even functions. Integration of Fourier series

**GE 104 - Basics of Engineering Drawing (3 h)**
Geometrical construction and basics of lettering, Sketching, Orthographic projection, Sectional and auxiliary views, Dimensioning, Introduction to computer graphics.

**GE 105 - Basics of Engineering Technology (2 h)**
Introduction; Function and planning of workshop; Properties of materials and their applications; Non-ferrous Metals - Ferrous Alloys Production of Iron and Steel, Plain Carbon and Alloy Steels - Tool Steels and the Iron-Carbon Diagram - Heat Treatments of Steels: Heating, Quenching, Tempering, Annealing, Aging, and Surface Hardening, Destructive and Nondestructive Testing of Metals. Workshop metrology; Basic bench work operations; Machining operations; Tools, equipment and machinery used in basic workshop processes: turning, milling, grinding, forging, sheet metal-work; Welding processes: gas welding, arc welding, spot welding. Casting processes: sand casting, die casting; Industrial safety

**CSC 209 – Computer Programming (3 h)**

Introduction to computers and computing fundamentals in JAVA, Data Types, Variables, Operators, Control Structures, Simple input/output statement, Classes & Objects, Methods, Relational and logical expressions, IF-ELSE control structure, The WHILE statement, The FOR statement and looping structure, Introduction to Swing & graphical user interfaces, Arrays Matrix Methods, Vectors, String, Engineering Applications.

**GE 211** - **Introduction to Engineering Design-I 3 (2, 4, 0)**

Engineering design or how engineers approach and solve problems; process and product design; quality principles; working in teams; presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

**GE 213-Introduction to Engineering Design-2(2 h)**

Computer or mathematical modeling of process and product, continuation of quality principles, working in teams, presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self-regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

**GE 401** - **Engineering Economy (3 h)**

**Introduction to engineering economy. Interest formulas and equivalence. Bases for comparison of alternatives. Decision making among alternatives. Evaluating replacement alternatives. Break-even and minimum cost analysis. Cost accounting. Depreciation. Economic analysis of operations. Economic analysis of public projects.**

**GE 405** - **Cooperative Training (9 h)**

The student starts the Cooperation Training during the summer that precedes his final year of study and continues to the end of the next semester in either the Governmental or Private sectors. At the end of training, student must prepare a detailed report which will be orally examined by a special committee of faculty professors.

## The elective courses:

**Stat 324 - Probabilities and statistics (3 h)** Some discrete probability distributions (Uniform, binomial, multinomial, hyper-geometric, negative binomial, geometric and Poisson distributions, Mean and variance for these distributions, relationship between Poisson and hyper-geometric with binomial distributions) **Some continuous probability distributions** (Uniform, standard Normal, Normal, Area under the normal curve, Application of the normal distribution, mean and variance, Normal approximation to the binomial) **Fundamental sampling distributions and data descriptions** (Random sampling, some important statistics, Sampling distribution ( central limit theorem), Sampling distribution of mean and difference between two means for large samples (and for small samples taken from normal distribution), t-distribution (its applications) **One- and Two-sample estimation Problems** (Statistical Inferences, Classical method of estimation, Estimating the mean, Standard error of a point estimate, Prediction Interval, Estimating the difference between two means (for known and unknown (equal) variances ), Estimating a Proportion, determination of the sample size at a specified error) **One-and two-sample tests of hypotheses** (Null and Alternative hypotheses, type I error, type II error, one and two tailed tests, P value, tests concerning a single mean, tests on two means (for variance known and unknown), test on a single proportion) **Simple Linear Regression** (Least squares and the fitted model, Properties of the least square estimators, Inferences concerning the regression coefficients, prediction)

**Math 244** – **Linear algebra (3 h)**

General review of vectors in space and its engineering applications, Euclidean n–space, linear transformation from n-space to m-space and its properties. General vector in space, subspaces, linear independence, row space, column space, and nullspace. Inner products in space, angle and orthogonality in inner product spaces, best approximation: least squares, orthogonal matrices. Eigenvalues and eigenvectors.

**Math 254** - **Numerical Methods (3 h)**

Numerical Solution of non-linear equations and associated errors, convergence rate, solution of system of equations by direct and repeated methods and associated errors, Interpolation and polynomial approximation and associated errors, Numerical differentiation and integration and associated errors, Introduction to numerical solutions for ordinary differential equations

**Math 322** – **Partial Differential Equations (3 h)**

Classification the partial differential equations according the order and linearity, Gamma and Beta functions, The Boundary value problem and orthogonal system, Expansion the functions in Bessel and Legendre functions, Solution of the heat equation by separation of the variable, The governing equation of string., Solution of the wave equation by D'almbert method, Solution of Laplace equation in different regions.

**Math 328** – **Applied operational researches (3 h)** Introduction to operation research methodology and applications, Building of mathematical models, Linear programming models, The simplex algorithm, Duality and sensitivity analysis, Transportation and assignment models, Network models, Integer programming, Using Optimization Software.

## Electrical Engineering Department

**Vision:**

The electrical engineering department aims to be recognized locally, regionally and internationally as a leading department providing high quality programs and services in electrical engineering fields.

**Mission :**

The electrical engineering department seeks to meet the needs of the Saudi society and the region with outstanding electrical engineering programs in education, research, and community service.

**About:**

Electrical engineers are essential to almost every industry. It is in fact difficult to imagine a modern industry without the services of Electrical engineers. Electrical engineering has been and continues to be a corner stone in every new technical development. The job of Electrical engineers usually involves design, feasibility studies, cost analysis studies, installation, operation, and maintenance of plants, processes, or equipment. The focusing of the Electrical engineering department is on teaching, community service, and research. The department faculty recognize the need to provide the graduating engineer with the appropriate background in order to meet the challenges and large demands of a fast growing country such as the Kingdom. The department of Electrical engineering mission is to provide education of quality, research, and community services that cover a broad spectrum of Electrical engineering areas. These areas include evaluation, design, operation, and maintenance of integrated governmental, industrial, and service systems

**Objectives:**

1- Preparation of the graduates to have a successful career as electrical engineers in governmental and private sectors.

2- Preparation of the graduates to pursue their professional development through self learning and advanced degrees.

3- Preparation of the graduates to advance to positions of leadership in their profession.

4- Preparation of the graduates to effectively participate in the sustainable development of the Saudi Society.

**Degrees:**

- **Bachelor**

## Faculty Members (Electrical Engineering):

| | |
|---|---|
| Mohammed A. Abdel-halim | Professor |
| Elsayed Abd-Elaliem Mohamed | Professor |
| Gamal Ata | Professor |
| Khalid Munawar | Professor |
| Abdulrahman F.Almarshoud | Associate Prof. |
| Hussein Mustafa Khodr | Associate Prof. |
| Ahmed Adel Abdelwahab | Associate Prof. |
| Ragaey Abdel-Fattah Saleh | Associate Prof. |
| Mohammed H. Bataineh | Associate Prof. |
| Osama Abdel-Wahhab Salem | Associate Prof. |
| Hossam Abdelsattar Gouda | Associate Prof. |
| Rizwan Akram | Associate Prof. |
| Elsaid Elsayed Elaraby | Assistant Prof. |
| Hamdy Mohamed Abdelhamid | Assistant Prof. |
| Yaseer Arafat Durrani | Assistant Prof. |
| Gene Blantocas | Assistant Prof. |
| Yousef Mohamed Alsaeed | Assistant Prof. |
| El Amjed HAJLAOUI | Assistant Prof. |
| Mohammad Munawwar Shees | Lecturer |
| Mohamed Habashy Mubarak | Lecturer |
| Mr. Madjid TOUBAL | Lecturer |
| Ibrahim Ahmed Abdelkader | |
| Abdulhakeem Nasser Al-Saleem | TA |
| Basim Abdullah Sulaiman Alhumaily | TA |
| brahim Alotaibi | TA |
| Musaed Alrashidi | TA |

**Programs:**

- B.SC Degree Program in Power Engineering
- B.SC Degree Program in Electronics and Communication Engineering

**First Program: B.SC Degree Program in Power Engineering:**

## Study Plan:

**Level 3**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IS 101 | Introduction to Islamic culture | 2 | 2 | - | - | - | - |
| ARB 101 | Linguistic skills | 2 | 2 | - | - | - | - |
| Phys 104 | General Physics | 4 | 3 | 2 | - | - | - |
| GE | Basics of | 3 | 1 | 4 | - | - | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 104 | Engineering Drawing | | | | | | |
| Math 105 | Differential Calculus | 3 | 3 | - | 1 | - | - |
| Chem 111 | General Chemistry | 4 | 3 | 2 | - | - | - |
| **Total credit hours 18** | | | | | | | |

**Level 4**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IS 102 | Islam and Community Building | 2 | 2 | - | - | - | - |
| GE 105 | Basics of Engineering Technology | 2 | 1 | 2 | - | GE 104 | - |
| Math 106 | Integral Calculus | 3 | 3 | - | 1 | Math 105 | - |
| EE 201 | Fundamentals of Electric Circuits | 3 | 3 | - | 1 | Phys 104 | - |
| CSC 209 | Computer Programming | 3 | 2 | 2 | - | - | - |
| GE 210 | Engineering Mechanics | 3 | 3 | - | 1 | Math 107 | Math 106 |
| Math 107 | Linear Algebra & Analytic Geometry | 3 | 3 | - | 1 | - | - |
| **Total credit hours 19** | | | | | | | |

**Level 5**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 103 | Economic System in Islam | 2 | 2 | - | - | - | - |
| EE 202 | Electric Circuit Analysis | 3 | 3 | - | 1 | EE 201 | - |
| EE 203 | Electromagnetism | 3 | 3 | - | 1 | Phys 104 | - |
| Math 203 | Differential and Integral Calculus | 3 | 3 | - | 1 | Math 106 | - |
| EE 205 | Electric Circuits Laboratory | 1 | - | 2 | - | - | EE 202 |
| EE 208 | Logic Design | 3 | 3 | - | 1 | - | - |
| EE 210 | Logic Design Laboratory | 1 | - | 2 | - | - | EE 208 |
| GE 211 | Introduction to Engineering Design-I | 3 | 2 | 4 | - | | |
| **Total credit hours 19** | | | | | | | |

**Level 6**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| Math 208 | Differential equations | 3 | 3 | - | 1 | Math 203 | - |
| GE 213 | Introduction to Engineering Design-2 | 2 | 2 | 2 | - | GE 211 | - |
| Math | Elective Mathema | 3 | 3 | - | 1 | - | - |

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| +++ | tics-1 | | | | | | |
| EE 300 | Instruments & Electrical Measurements | 3 | 2 | 2 | - | EE 205 | - |
| EE 301 | Signals and systems Analysis | 3 | 3 | - | 1 | EE 202 | - |
| EE 312 | Electronics - 1 | 3 | 3 | - | 1 | EE 202 | - |
| EE 313 | Electronics Laboratory – 1 | 1 | - | 2 | - | - | EE 312 |
| **Total credit hours 18** | | | | | | | |

**Level 7**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| ARB 103 | Arabic Writing | 2 | 2 | - | - | - | - |
| ME 321 | Mechanical power engineering | 3 | 3 | - | 1 | Phys 104 | - |
| EE 330 | Electric Machines - 1 | 3 | 3 | - | 1 | EE202, EE203 | - |
| EE 340 | Fundamentals of Power Systems | 3 | 3 | - | 1 | EE202, EE203 | - |
| Math +++ | Elective Mathematics 2 | 3 | 3 | - | 1 | - | - |
| EE 354 | Microprocessors and Interface Circuits | 3 | 2 | 2 | - | EE 301 | - |
| +++ | Free Course | 2 | - | - | - | - | - |
| **Total credit hours 19** | | | | | | | |

**Level 8**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IS 104 | Political System in Islam | 2 | 2 | - | - | - | - |
| EE 331 | Electric Machines - 2 | 3 | 3 | - | 1 | EE 330 | - |
| EE 332 | Electric Machines Laboratory | 1 | - | 2 | - | - | EE 331 |
| EE 343 | Power Systems Analysis | 3 | 3 | - | 1 | EE 340 | - |
| EE 344 | Power Systems Laboratory | 1 | - | 2 | - | - | EE 343 |
| GE 401 | Engineering Economy | 3 | 3 | - | 1 | - | - |
| EE 432 | Power Electronics | 3 | 3 | 1 | 1 | EE 312 | - |
| EE 351 | Principles of Control Systems | 3 | 3 | - | 1 | EE 301 | - |
| **Total credit hours 19** | | | | | | | |

**Level 9**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| GE 405 | Cooperative Training | 9 | - | - | - | - | - |
| **Total credit hours 9** | | | | | | | |

**Level 10**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| EE 446 | High Voltage Engineering | 3 | 3 | - | 1 | EE 340 | - |
| EE 482 | Design of Electrical Protection Systems | 3 | 3 | - | 1 | EE 340 | - |
| EE 4xx | Elective Course - 1 | 3 | - | - | - | - | - |
| EE 4xx | Elective Course - 2 | 3 | - | - | - | - | - |
| +++ | Free Course | 3 | - | - | - | - | - |
| EE 400 | Graduation Project | 3 | - | - | - | GE 405 | - |
| **Total credit hours 18** | | | | | | | |

**The Elective Courses**

In the 10th semester the student should select some elective courses not less than 6 hours

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| EE 401 | Electrical Standard Specifications | 3 | 3 | - | 1 | EE343, EE331 | - |
| EE 411 | Programmable Logic Controllers | 3 | 3 | - | 1 | EE 354 | - |
| EE 441 | Electric Energy Utilization | 3 | 3 | - | 1 | EE 340 | - |
| EE 443 | Control and Operation of Power Systems | 3 | 3 | - | 1 | EE 343 | - |
| EE 444 | Planning and Design of Power Systems | 3 | 3 | - | 1 | EE 343 | - |
| EE 445 | Industrial Power Systems Design | 3 | 3 | - | 1 | EE 340 | - |
| EE 447 | Computer Applications in Power Systems | 3 | 3 | - | 1 | EE 343 | - |
| EE 448 | Selected Topics in Power Systems | 3 | 3 | - | 1 | EE 343 | - |
| EE 433 | Special Electrical Machines | 3 | 3 | - | 1 | EE 331 | - |
| EE 434 | Selection and Installation of Motors | 3 | 3 | - | 1 | EE 331 | - |
| EE 435 | Electric Drive Systems | 3 | 3 | - | 1 | EE432, EE331 | - |
| EE 436 | Advanced Topics in Power Electronics | 3 | 3 | - | 1 | EE 432 | - |
| EE 438 | Selected Topics in Electrical Machines | 3 | 3 | - | 1 | EE 331 | - |
| EE 455 | Applied Control | 3 | 3 | - | 1 | EE 351 | - |
| EE 456 | Digital | 3 | 3 | - | 1 | EE | - |

College of Engineering

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Control Systems | | | | | 351 | |

**Second Program: B.Sc. Degree in Electronics and Communication Engineering:**

**Level 3**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 101 | Introduction to Islamic culture | 2 | 2 | - | - | - | - |
| ARAB 101 | Linguistic skills | 2 | 2 | - | - | - | - |
| Phys 104 | General Physics | 4 | 3 | 2 | - | - | - |
| GE 104 | Basics of Engineering Drawing | 3 | 1 | 4 | - | - | - |
| Math 105 | Differential Calculus | 3 | 3 | - | 1 | - | - |
| Chem 111 | General Chemistry | 4 | 3 | 2 | - | - | - |
| **Total credit hours 18** | | | | | | | |

**Level 4**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 102 | Islam and Community Building | 2 | 2 | - | - | - | - |
| GE 105 | Basics of Engineering Technology | 2 | 1 | 2 | - | GE 104 | - |
| Math 106 | Integral Calculus | 3 | 3 | - | 1 | Math 105 | - |
| EE 201 | Fundamentals of Electric Circuits | 3 | 3 | - | 1 | Phys 104 | - |
| CSC 209 | Computer Programming | 3 | 2 | 2 | - | - | - |
| GE 210 | Engineering Mechanics | 3 | 3 | - | 1 | - | Math 106, Math 107 |
| Math 107 | Linear Algebra & Analytic Geometry | 3 | 3 | - | 1 | - | - |
| **Total credit hours 19** | | | | | | | |

**Level 5**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 103 | Economic System in Islam | 2 | 2 | - | - | - | - |
| EE 202 | Electric Circuit Analysis | 3 | 3 | - | 1 | EE 201 | - |
| EE 203 | Electromagnetism | 3 | 3 | - | 1 | Phys 104 | - |
| Math 203 | Differential and Integral Calculus | 3 | 3 | - | 1 | Math 106 | - |
| EE 205 | Electric Circuits Laboratory | 1 | - | 2 | - | - | EE 202 |
| EE 208 | Logic Design | 3 | 3 | - | 1 | - | - |
| EE 210 | Logic Design Laboratory | 1 | - | 2 | - | - | EE 208 |
| GE | Introductio | 3 | 2 | 4 | - | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 211 | n to Engineering Design-I | | | | | | |
| **Total credit hours 19** | | | | | | | |

**Level 6**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| Math 208 | Differential equations | 3 | 3 | - | 1 | Math 203 | - |
| GE 213 | Introduction to Engineering Design-2 | 2 | 2 | 2 | - | GE 211 | - |
| Math +++ | Elective Mathematics - 1 | 3 | 3 | - | 1 | - | - |
| EE 300 | Instruments & Electrical Measurements | 3 | 2 | 2 | - | EE 205 | - |
| EE 301 | Signals and systems Analysis | 3 | 3 | - | 1 | EE 202 | - |
| EE 312 | Electronics - 1 | 3 | 3 | - | 1 | EE 202 | - |
| EE 313 | Electronics Laboratory - 1 | 1 | - | 2 | - | - | EE 312 |
| **Total credit hours 18** | | | | | | | |

**Level 7**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| ARAB 103 | Arabic Writing | 2 | 2 | - | - | - | - |
| EE 317 | Electronics-2 | 3 | 3 | - | 1 | EE 312 | - |
| EE 319 | Electronics Laboratory-2 | 1 | - | 2 | - | - | EE 317 |
| EE 320 | Communications Principles | 3 | 3 | - | 1 | EE 301 | - |
| Math +++ | Elective Mathematics - 2 | 3 | 3 | - | 1 | - | - |
| EE 354 | Microprocessors and Interface Circuits | 3 | 2 | 2 | - | EE 208 | - |
| CEN 355 | Principles of Networks Engineering | 2 | 2 | - | 1 | - | - |
| +++ | Free Course | 2 | - | - | - | - | - |
| **Total credit hours 19** | | | | | | | |

**Level 8**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 104 | Political System in Islam | 2 | 2 | - | - | - | - |
| EE 322 | Digital Communications | 3 | 3 | - | 1 | EE 320 | - |
| EE 326 | Communications Laboratory | 1 | - | 2 | - | EE 320 | EE 322 |
| EE 401 | Engineering Economy | 3 | 3 | - | 1 | - | - |
| EE 351 | Principles of Control Systems | 3 | 3 | - | 1 | EE 301 | - |
| GE 405 | ICs Technology and Applicatio | 3 | 3 | - | 1 | EE 317 | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | ns | | | | | | |
| **EE 406** | Integrated Circuits Laboratory | 1 | - | 2 | - | - | EE 405 |
| **EE 423** | Wave Propagation and Antennas | 3 | 3 | - | 1 | EE 203 | - |
| **Total credit hours 19** | | | | | | | |

**Level 9**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **GE 405** | Cooperative Training | 9 | - | - | - | - | - |
| **Total credit hours 9** | | | | | | | |

**Level 10**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **EE 420** | Information Theory and Coding | 3 | 3 | - | 1 | EE 320 | - |
| **EE 463** | Mobile Communications | 3 | 3 | - | 1 | EE 320 | - |
| **EE 4xx** | Elective Course - 1 | 3 | - | - | - | - | - |
| **EE 4xx** | Elective Course - 2 | 3 | - | - | - | - | - |
| **+++** | Free Course | 3 | - | - | - | - | - |
| **EE 400** | Graduation Project | 3 | - | - | - | GE 405 | - |
| **Total credit hours 18** | | | | | | | |

**The Elective Courses**

In the 10th semester the student should select some elective courses not less than 6 hours

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **EE 412** | Industrial Electronics | 3 | 3 | - | 1 | EE 317 | - |
| **EE 413** | Power Electronics | 3 | 3 | - | 1 | EE 312 | - |
| **EE 411** | Programmable Logic Controllers | 3 | 3 | - | 1 | EE 354 | - |
| **EE 417** | Communication Electronics | 3 | 3 | - | 1 | EE 317, EE 320 | EE 322 |
| **EE 418** | Analog and Digital Filters | 3 | 3 | - | 1 | EE 317 | - |
| **EE 419** | Selected Topics in Electronics | 3 | 3 | - | 1 | EE 317 | - |
| **EE 421** | Telephone Systems and Traffic Analysis | 3 | 3 | - | 1 | EE 320 | EE 322 |
| **EE 462** | Communication Theory | 3 | 3 | - | 1 | EE 320 | EE 322 |
| **EE 424** | Optical Communication Networks | 3 | 3 | - | 1 | EE 317, EE 320 | - |
| **EE 425** | Computer Network Security | 3 | 3 | - | 1 | EE 355, EE 320 | - |
| **EE 427** | Microwave Engineering | 3 | 3 | - | 1 | EE 320 | EE 322 |
| **EE 428** | Satellite Communications | 3 | 3 | - | 1 | EE 320 | EE 322 |
| **EE** | Selected | 3 | 3 | - | 1 | EE | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 429 | Topics in Communications | | | | | 320 | |
| EE 450 | Industrial Instrumentation | 3 | 3 | - | 1 | EE 208 ,EE 317 , EE 351 | - |
| EE 456 | Digital Control Systems | 3 | 3 | - | 1 | EE 351 | - |
| EE 465 | Network Architecture and Protocols | 3 | 3 | - | 1 | CEN 355 , EE 320 | - |

## Course Description:

**CEN 355 Principles of Network Engineering(2h)**

Introduction to networking principles. Communication channels and their capacity. Multiplexing and switching principles. Packet switching networks. Network structures . High speed networks. Local area networks (LAN's). Ethernet. Wide area networks (WAN's). Switches, Routers and Hubs. Internet, Extranet and Intranet principles. Network standards and OSI model. Network services and their benefits

**Chem 111 General Chemistry (4 h )**

Stoichiometry: SI Units, chemical formulas, the mole, methods of expressing concentration, Calculations based on chemical equations

Gases: laws, kinetic theory, deviation and van der Waals equation

Thermochemistry: Types of enthalpy changes, Hess Law and its applications,, first law of thermodynamics

Solutions: Type of solutions and laws related , colligative properties

Chemical kinetics: Law of reaction rate, reaction order, factors affecting the rates

Chemical Equilibrium : Relation between Kc & Kp, Le Chatelier's principle and factor affecting equilibrium. Ionic equilibrium: Acid and base concepts, pH calculations of acid, base and buffer solutions

Atomic Structure: emission spectrum, Bohr's theory de Broglre's hypothesis, quantum numbers , electronic configuration of elements, consequences of the periodic table

In practical part, the student should do at least 14 experiments.

**CSC 209 Computer Programming (3h)**

Introduction to computers and computing fundamentals in JAVA, Data Types, Variables, Operators, Control Structures, Simple input/output statement, Classes & Objects, Methods, Relational and logical expressions, IF-ELSE control structure , The WHILE statement , The FOR statement and looping structure, Introduction to Swing & graphical user interfaces, Arrays Matrix Methods, Vectors , String , Engineering Applications.

**EE 201 Fundamentals of Electric Circuits (3 h)**

Basic circuit elements and concepts; Basic laws of circuit theory: Ohm's law, Kirchoff's law; Circuit theorems: superposition principle, Thevenin and Norton theorems; maximum power transfer theorem, Techniques of DC circuit analysis: Nodal and mesh analysis; Sinusoidal sources and the concept of phasor in circuit analysis Techniques of AC circuit analysis: Nodal and mesh analysis.

**EE 202 Electric Circuit Analysis (3 h)**

Introduction to concept of active, reactive, complex power and power factor.Three phase circuits; Introduction to Op-Amp: ideal characteristics with simple applications; Frequency response of RLC and resonance; Natural and step response of first and second order circuits; Laplace transform in circuit analysis; Introduction to frequency selective circuits: passive filters, Bode plots; Two-Port networks; Mutual inductance and transformers.

**EE 203 Electromagnetism (3 h)**

Review to vector calculus; Electrostatic fields; Gauss's law and divergence; Electric potential; Dielectrics and capacitance; Poisson's and Laplace's equations; Charge images; Current density and conductors; Magnetostatic fields; Biot–Savart and Ampere's laws; Curl and Stoke's theorem; Magnetic materials and circuits; Self and mutual inductances; Energy in static Fields, Introduction to electromagnetic waves.

**EE 205 Electric Circuits Laboratory (1 h)**

General introduction to the laboratory Voltage, current, and power in DC circuits using KVL and KCL. Superposition, Thevenin's, and Maximum power transfer theorems in DC circuits; Series and parallel AC circuits; Resonance in series and parallel circuit; Maximum power transfer theorem and power factor improvement in AC circuits; Transients in DC circuits; Magnetically-coupled circuits; Three phase circuits.

**EE 208 Logic Design (3 h)**

Introduction to Numbering Systems, including: Binary system, hexadecimal system, Binary codes (Gray and ASCII codes), Logic fates and logic functions, Boolean Algebra, De-Morgan laws, Representation of negative and fractional numbers in binary systems. Combinational Logic Circuits, including: Canonical forms, Simplification using logic algebra and Karnaugh maps (K-maps), Arithmetic logic Units, Half and full Adders, Subtractors, and multipliers. Multiplexers and Demultiplexers, Encoders and decoders, Comparators and Parity generators. Programmable Logic Devices (PLD's) and VHDL, including PAL' PLA's, GAL's, CPLD's and FPGA's, Fundamentals of VHDL. Sequential Logic Devices, including: State machines, Methods of representation, state transition diagrams and tables. Flip-flops (S-R, D, J-K, T, Master-Slave), Gated and clocked flip flops, edge-triggered flip flops. Registers, their types, their operation and applications. Counters, their types, their operation and applications. Introduction to Memory Devices, SRAM and DRAM cells, their operation and organization. Flash memory and its architecture and operation.

**EE 210 Logic Design Laboratory (1 h)**

Familiarization with logic circuits laboratory; Introduction to logic gates; Implementation of Boolean functions using AND and OR gates; NAND and NOR implementation; XOR and adderss; Design of combinational circuits; Flip-flops; Design of sequential circuits; Sequential PLA's.

**EE 300 Instruments & Electrical Measurements (3 h)**

Measurements fundamentals: units and standards, errors, statistical analysis; DC/AC meters construction; loading effect; insertion loss; Difference and instrumentation amplifiers; Oscilloscope: CRT, amplifiers, triggered sweep circuits, attenuation, specifications; Spectrum analyzer, Transducers and sensors: passive and self-generating transducers; Liquid crystal displays (LCDs), CCDs, and optical fiber sensors; Digital measurements: Data conversion principles; Digital voltmeter.

**EE 301 Signals and systems Analysis (3 h)**

Introduction, including: continuous-time and discrete-time signals and systems, analog-to-digital and digital-to-analog conversion. Continuous Signals, including: linear time-invariant (LTI) systems and their properties, Fourier series, Fourier Transform (FT) and its inverse (IFT) and their properties. Convolution and Correlation theory. Discrete Signals, including: linear shift-invariant (LSI) systems and their properties, Discrete Fourier Transform (DFT) and its inverse (IDFT) and their properties. Z-Transform, its inverse and their properties. Mapping Theory, Fast Fourier transform (FFT).

Parseval Theory. Sampling Theory, including: Nyquist sampling criterion, signal aliasing and reconstruction. Fundamentals to Signal processing, including: types of filters (LPF, HPF, BPF, SBF).

**EE 312 Electronics – 1 (3 h)**

Introduction to Semiconductors, including: Crystal lattice, bonds and energy bands in solids. P-N Junction including: Junction formation, I-V characteristics, forward and reverse bias, breakdown voltage. Applications of P-N Junction including Rectification, Zener diode, solar cells and light emitting diode (LED). Bipolar Junction Transistor (BJT), including: BJT types and operation, and its currents and current amplification factor. BJT modes of operation and biasing configurations. BJT current equations and Ebers Moll model. Operating point and bias stability. BJT small signal models and BJT operation as an amplifier. Metal-Oxide-Semiconductor Field Effect Transistor (MOSFET), including: MOSFET types and theory of operation. Channel formation in Enhancement-mode MOSFET and its I-V characteristics in linear and saturation modes. MOSFET biasing configurations. MOSFET small signal models and MOSFET operation as an amplifier.

**EE 313 Electronics Laboratory – 1 (1 h)**

Introduction to the lab tools. I-V characteristics of diode. Clipping circuits using diodes. Rectification using diodes. Zener diode and regulators. BJT dc biasing. CE BJT amplifier. MOSFET dc biasing. CS MOSFET amplifier. Simple AM receiver circuit, MOS digital circuits.

**EE 317 Electronics – 2 (3 h)**

Introduction to Semiconductors, including: Introduction, including basic electronic device and their theory of operation. Multi-stage amplifier, including: RC-Coupled Amplifiers, their frequency response and Bode plots. Feedback and Oscillators, including: Negative and positive feedback, Voltage and current feedback circuits, Stability of feedback amplifiers, Bode contours and Nyquist stability Criteria. Parkhausen criterion. Feedback oscillators (Phase-shift, Wien bridge, Hartley, Colpitts and Clapp oscillators), Negative resistance oscillators, Voltage-controlled oscillator (VCO) and phase-locked loops (PLL). Operational Amplifiers and their Applications, including: Opamp building blocks, linear and non-linear applications, Analog-to-digtal and digital-to-analog converters (ADC and DAC), Multivibrators. Digital Circuits, including: Transistor (BJT and MOSFET) as a switch, Swithching parameters, like fan-out, noise margins and propagation delay. Transistor-transistor logic (TTL) circuits and CMOS logic.

**EE 319 Electronics Laboratory – 2 (1 h)**

PSPICE simulation of electronic circuits. Linear applications of op-amp. Wein-bridge oscillator. Active filters: LPF, and HPF. Schmitt trigger and unstable multi-vibrator. Differential amplifier using BJT. Design and implementation of digital circuits using VHDL. CMOS inverter characteristics. TTL inverter characteristics.

**EE 320 Communications Principles (3 h)**

Basic Elements of a Communication System, including: types of communication systems and their building blocks, receiver, transmitter and channel. Wireless communication systems, Superheterodyne transceivers (TRX). Basic Modulation Techniques, including: Amplitude modulation (AM), Frequency modulation (FM), and phase modulation (PM). Pulse modulation Techniques, including: PAM, PWM and PPM, Pulse Code Modulation (PCM), Differential PCM (DPCM), Delta Modulation (DM). Signal Multiplexing, including: time division multiplexing (TDM), and frequency-division multiplexing (FDM). Introduction to Digital Modulation (Shift Keying), including amplitude-shift keying (ASK), frequency-shift keying (FSK) and phase-shift keying (PSK).

**EE 322 Digital Communications (3 h)**

Introduction to Digital Communications, including: random variables and probability distributions, signal-to-noise (S/N) ratio, probability of error. Coherent Digital Modulation Techniques, including amplitude-shift keying (ASK), frequency-shift keying (FSK) and phase-shift keying (PSK), quadratic PSK (QPSK), Minimum-shift keying (MSK), Gaussian MSK (GMSK). Orthogonal Digital Modulation Techniques. Orthogonal FDM (OFDM). Comparison between Digital Modulation Techniques, including bandwidth, power spectrum and probability of error. Introduction to Information Theory, including: Channel Capacity, source coding, channel coding, inter-symbol interference, error correcting coding techniques.

**EE 326 Communications Laboratory (1 h)**

Basic Modulation & modulation Techniques, including: Amplitude modulation (AM), Frequency modulation (FM). Signal Multiplexing, including: time division multiplexing (TDM), and frequency-division multiplexing (FDM). Superheterodyne radio receiver (RX), measurement of sensitivity, selectivity and fidelity, Pulse modulation Techniques, including: PAM, PWM and PPM, Pulse Code Modulation (PCM), Differential PCM (DPCM), Delta Modulation (DM). Digital Modulation (Shift Keying), including amplitude-shift keying (ASK), frequency-shift keying (FSK) and phase-shift keying (PSK: BPSK, QPSK, M-ary PSK, GMSK). Coding, including: Source Coding, Channel Coding and Error Correcting Codes.

**EE 330 Electric Machines – 1 (3 h)**

Transformers (construction, operation of single-phase transformers, equivalent circuit, voltage regulation and efficiency, auto-transformers, three-phase transformers), AC machinery fundamentals, Synchronous machines (components, internal voltage, equivalent circuit, phasor diagram, performance of turbo-alternator, generator operating alone, parallel operation of alternators, synchronous motors, steady-state operation, motor starting), synchronous machine dynamics: the swing equation, steady state and transient stability.

**EE 331 Electric Machines – 2 (3 h)**

Three-phase induction machines (construction, operation, equivalent circuit, performance characteristics, starting of induction motors, speed control), single-phase induction motors, fundamentals of d.c machines, DC machines (components, classification, performance, motor characteristics, starting of d.c motors, speed control of d.c motors).

**EE 332 Electric Machines Laboratory (1 h)**

Equivalent circuit of transformers; Three-phase connections and harmonic problems; Equivalent circuit of three-phase and single-phase induction motors; Load testing of induction motors; Starting of single-phase induction motors; Equivalent circuit of synchronous machine: Performance of synchronous motors; Terminal characteristics of dc machines

EE 340 Fundamentals of Power Systems (3 h)

Power system components and elements: generation – transmission - distribution; Generation of electrical energy: main sources – alternative sources; Transmission line conductors; Electric insulators: types – parameters; Transmission line parameters: series impedance, shunt admittance; Analysis of transmission lines: short line – medium line – long line; Power cables parameters: series impedance, shunt admittance; Analysis of distribution systems: radial system – ring system.

**EE 343 Power Systems Analysis (3 h)**

Per unit system; Power system matrices: bus admittance matrix – bus impedance matrix;

Load flow analysis: Gauss-seidel method – Newton-Raphson method; Economic operation of generators: neglecting transmission line losses – including transmission line losses; Symmetrical faults: Thevenin's method – bus impedance matrix method; Unsymmetrical faults: symmetrical components – Thevenin's method – bus impedance matrix method; Stability analysis: steady state stability – transient stability – equal area criterion.

**EE 344 Power Systems Laboratory (1 h)**

Transmission line characteristics; Reactive power compensation; Symmetrical and unsymmetrical fault analysis; Load-flow simulation; Transient stability simulation; Active and reactive power generator control; Characteristics of isolated and interconnected systems; Characteristics and coordination of protective relays

**EE 351 Principles of Control Systems (3 h)**

Review of mathematical background (complex variables, Laplace, Diff. Equations); System representation (block diagram, transfer functions, signal flow graph) Modeling of electric and mechanical systems; State variable analysis; Stability; Time domain analysis; Root locus; Frequency domain analysis; Introduction to PID control.

**EE 354 Microprocessors and Interface Circuits**

**(3 h)**

Introduction to Microprocessor Systems, including: microcomputer architecture, data, address and control buses, memory access and interrupts. Architecture of 80x86 Microprocessors, including 16-bit, 32 bit microprocessors, Pentium and Core2 microprocessors. Memory Organization & Segmentation, including memory segmentation and address generation (20-bit and 32-bit addresses). Instruction Set of 80x86 Microprocessors, including addressing modes, data-transfer instructions, logic and mathematic instructions, flow control, subroutines and interrupts, program control instructions, instruction decoding. Assembly Language and Programming of Intel microprocessors, including, DEBUG and Macro-assembler, Procedures and subroutines. Memory Interface Circuits. Interface Circuits for Input/Output Devices, programmable I/O (8255 PIO), examples, handshaking and microprocessor communications.

**EE 400 Graduation Project (3 h)**

The student is assigned, among a team of students and one or more faculty professors, the design of an applied project which simulates the real working condition to which the student will be exposed after graduation. The project should be comprehensive and includes all the necessary preliminary field studies, feasibility studies, final design drawings, bill of quantities, and the total operating cost of the project. The graduation project shall continue for one semester. At the end of the semester, there will be a seminar held for the working team of students to present the details of the project. The working team will be orally examined and evaluated based on the presentation as well as the oral discussion.

**EE 401 Electrical Standard Specifications (3 h)**

Introduction; harmonized standards; CE marking and conformity assessment of electric products; underwriter laboratories (UL) mark: mission of UL, types of UL marks; IEC standard marking (nameplate data & terminal marking) of electric products, motor marking, contactor marking, fuse marking, circuit breaker marking; safety of low voltage equipment (LVD), safety classification, IP code, electrical hazards; IEC standard sites and electric operating conditions for motors, HVF, imbalance factor, motor derating, standard motor testing, electromagnetic compatibility (EMC): emission; immunity, harmonic currents, third harmonic emission limits, flicker; standard classification of hazardous areas; types and standard marking of motors and electric equipment suitable for use in potentially explosive atmospheres.

**EE 405 ICs Technology and Applications (3 h)**

Introduction to IC Technology, including: crystalline silicon preparation, oxidation, impurity diffusion, ion implantation, die separation, pad contacts, Heat sinking, BJT and CMOS technology. Linear IC's and their Applications, including: operational amplifiers (OpAmps), the 741 IC, and operational trans-conductance amplifiers (OTA). Digital IC's and their Applications, including: Combinational logic MSI circuits, sequential logic IC's, VLSI circuits and memory IC's. Mixed IC's and their Applications, including: analog-to-digital converters (ADC) and digital-to-analog-converters (DAC), Timers and multi-vibrator IC's (555/556/557) and their applications in communications. Switched-mode power supplies (SMPS) IC's, PWM and DC-DC converter IC's.

**EE 406 Integrated Circuits Laboratory (3 h)**

Electronic Design Automation. Linear IC Measurements and Testing, Digital IC and their Testing, Mixed-Signal IC's measurement and Testing. Switched-mode Power Supply IC's.

**EE 411 Programmable Logic Controllers (3 h)**

Introduction (What's PLC?), PLC Architecture; including PLC building blocks (I/O ports, internal relays, timers, counters, serial ports, high-speed counters), PLC operation, scan cycle, PLC response time, case study: Siemens S7 PLC's, PLC's Memory Organization; including: input memory, output memory, S-memory, variable memory, config memory, external EEPROM, PLC Programming; including: PLC programming Languages (LAD, functional and STL), LAD and STL basic instructions, programming devices and compilers (STEP-7), program editing, designing and editing a PLC project, compiling, downloading, testing (simulation) and running, PLC Wiring; including: DC inputs, AC inputs, transistor and relay outputs, analog and digital Inputs, analog and digital outputs, PLC Communications; including: PLC communication busses, Fieldbus, Profibus, industrial Ethernet, Examples; including miscellaneous industrial applications.

**EE 412 Industrial Electronics (3 h)**

Power Devices, including: Power diodes, power BJT, thyristors, phase control, thyristor protection circuits. Stabilized Power Supplies, including: DC power supplies, stabilization using zener diodes, series regulators, shunt regulators, IC regulators, switch mode power supplies (SMPS). Energy Conversion, including: static converters, commutation circuits (natural and forced). Inverter Circuits, including: inverter circuits, push-pull and bridge inverters, commutation of inverters, sinewave inverters. Converters Circuits, including: DC-DC converters, Flyback DC converters, push-pull DC converters, bridge converters, DC-up and Dc-down converters. Transducers, including: strain gauges, temperature sensors, pressure and force measurements, optoelectronic sensors, proximity sensors. Operational Amplifiers Industrial Applications, including: Instrumentation Amplifiers, Bridge amplifiers. Assembly, Testing & Troubleshooting of Electronic Circuits, including: electronic circuits assembly, automatic test equipment, computer-aided assembly (pick and place) and manufacturing (CAM) systems.

**EE 413 Power Electronics (3 h)**

Power semiconductor devices: terminal characteristics; Power converters: ac-ac converters, rectifiers, inverters, dc-dc converters and resonant converters; Applications in power systems

**EE 417 Communication Electronics (3 h)**

Introduction to Analog and Digital Transceivers, including: Wireless and Cable systems, Heterodyne and Homodyne (Zero-IF) Radio Receivers, all-digital transceivers. Design and Synthesis of analog RF Transceiver, including: Functional block diagram, Design of LNA, Mixers, VCO, Phase-locked loops (PLL), Frequency synthesizers, IF amplifiers, AM detectors, and FM discriminators. Design and Synthesis of Digital/Mixed-signal RF Transceiver, including: QPSK modulator/demodulator (modem), Timing and Clock recovery circuits, FSK circuits, GMSK modems, ASK and QAM circuits. Line Coding and Pulse Modulation Circuits, including: PCM modulators, Δ-⍰ modulators and their variants. TV Receivers, including: Functional blocks of Monochrome TV, Video Transmission Standards (PAL, SECAM, NTSC) and Camera systems, Design of video amplifiers, SAW-IF amplifiers, sync separators, horizontal and vertical oscillators and AFC. Functional block diagram of Color TV receivers, Color signal representation and processing, Digital Video Broadcasting (DVB) and High-definition TV (HDTV).

**EE 418 Design of Analog and Digital Filters (3 h)**

Introduction to Theory of N-port networks, including: Transfer functions of linear and discrete systems and their representation in the frequency domain and using Z-Transform, Poles and Zeros. Filter Design, including: Types of filters in the frequency domain low-pass, high-pass, band-pass and stop-band filters, Types of Filters according to their Approximate characteristics, like Butterworth, Tchebychev, Elliptic (Cauer) and Gaussian filters. Analog Filter Synthesis (implementation), including: Sallen-Key general structure using Op-Amps, Quad filters, Negative-impedance converters (NIC) and Gyrators, Leapfrog filters, and gm-C filters (using OTA). Applications, including: RF, IF filters in cellular phones and radio transceivers, equalization of telephone cables and CATV. Digital Filters, including: Finite impulse response (FIR) and Infinite impulse response (IIR) filters. Fast Fourier Transform and Digital Signal Processors (DSP). Applications, including: voice and image processing and remote sensing.

**EE 419 Selected Topics in Electronics (3 h)**

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student

**EE 420 Information Theory and Coding (3 h)**

Basic definitions: Information, entropy for zero-memory (memoryless) sources. Variable length codes: Huffman code, Shannon_Fano code and code efficiency. Markov (memory) information sources. Rate distortion theory. Channel coding and channel capacity. Error detecting and error correction codes.

**EE 421 Telephone Systems and Traffic Analysis (3 h)**

The public telephone network hierarchy. PABX and Centrex. Transmission system: two-wire and four-wire, pair-gain systems. Transmission impairments: cross-talk, hybrid circuit, echo suppressor and echo canceller. Conventional and common channel signaling. Space and time division digital switching and blocking probability. Data and integrated services digital networks (ISDN) and packet switching.

Traffic analysis: loss system and delay system. Network blocking probability.

**EE 423 Wave Propagation and Antennas (3 h)**

Introduction to antennas and propagation; Basic propagation mnodels and antenna parameters; Ground wave propagation; Sky wave propagation; Space wave propagation; Statistical models and diversity principles; Propagation models in mobile radio systems; Antenna engineering in LF, MF, VHF and UHF systems; antenna a linear and planar arrays

**EE 424 Optical Communication Networks (3 h)**

Optical Fiber waveguides: light propagation in fiber, step-index and graded index fibers, optical fiber transmission modes and optical fiber fabrication and connections standard. Photonic semiconductor materials: spontaneous emission and lasing (stimulated) emission. Optical sources: LED and laser diodes. Photodetectors: PIN photodiode and APD avalanche photodiode. Optical amplifier and Erbium-Doped Fiber Amplifier (EDFA). Wavelength division multiplexing (WDM) and optical networking.

**EE 425 Computer Network Security (3 h)**

Introduction to cryptography and cryptanalysis; Basic definitions: Security services, attacks and mechanisms; conventional encryption algorithms : DES, IDEA, RC5 and Blowfish, key distribution; introduction to number theory, public key encryption algorithm : RSA ; message authentication code; hash function; digital signature and authentication protocols

**EE 427 Design of Microwave Systems (3 h)**

Different types of waveguides. Limitations of low-frequency components. Microwave materials (semiconductors, ferrites, etc.). Microwave tubes and solid-state devices: klystrons, magnetron, Gunn diodes, Impatt diodes, etc. Microwave circuit design. Directional couplers. Power dividers, equalizers, phase shifters. Microwave integrated circuit design: filters and amplifiers. Applications of microwaves.

**EE 428 Satellite Communications (3 h)**

Overview of satellite systems. Orbits and launching methods. The geostationary orbit. Modulations schemes and satellite multiple access (FDMA, TDMA, and CDMA). Space link analysis: Uplink, downlink and system noises. Satellite antennas: Antenna polarization and radiation pattern. Applications of satellites: Asynchronous transfer mode (ATM) over satellite networks, the internet, Direct broadcast satellite (DBS) television and satellite mobile services.

**EE 429 Selected Topics in Communications (3 h)**

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student

**EE 432 Power Electronics (3 h)**

Power semiconductor devices: terminal characteristics; Power converters: ac-ac converters, rectifiers, inverters, dc-dc converters and resonant converters; Applications in power systems

**EE 433 Special Electrical Machines (3 h)**

reluctance motor, stepper motor, eddy current motors, hysteresis motors, ac commutator motors, universal motor, two phase servo motor, linear induction motor, linear d.c motor

**EE 434 Selection and Installation of Motors (3 h)**

Motor duty types; motor mounting arrangement: IM code, cable selection, cable layout (power cable, control cable); motor methods of cooling: IC code, motor auxiliaries, impeded temperature detectors (ETD), requirements of motors thermal protection; short circuit protection: selection and sizing of load break switch, fuse and circuit breaker; selection and sizing of motor automatic starter: DOL, star/delta (open& closed transition) starter, auto transformer starter, SRIM starter, DC motor starter, Automatic starting of synchronous motor; selection of motor overload protection; selection and sizing of motor power factor correction capacitors; selection and sizing of motor controller.

**EE 435 Electric Drive Systems (3 h)**

Drive system components, D.C motor drive systems, D.C motors fed from single-phase rectifier circuits, D.C motors fed from three-phase rectifier circuits, chopper-fed D.C motors, induction motor drive systems, induction motors fed from A.C voltage controller, inverter-fed induction motors.

**EE 436 Advanced Topics in Power Electronics**

**(3 h)**

Advanced rectifier converters (star-double star with inter-phase reactor, 12 pulse rectifiers), rectifier converter operation (overlap, regulation, and power factor), frequency converters, analysis of three-phase ac voltage controllers, thyristor triggering circuits, thyristor commutation techniques, applications of power electronics.

**EE 438 Selected Topics in Electrical Machines**

**(3 h)**

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student

**EE 441 Electric Energy Utilization (3 h)**

Illumination: types of lamps, illumination schemes, calculation of illumination, requirements of proper lighting. Electric Heating: advantages of electrical heating, heating methods, design of resistance heating element. Electric Welding: advantages of electric welding, welding methods, comparison between AC and DC arc welding, welding control circuits. Electrolytic Processes: laws of electrolysis, process of electro-deposition, factors affecting electro-deposition, manufacturing of chemicals by electrolysis process. Refrigeration and Air Conditioning: principle of air conditioning, refrigeration cycle, eco-friendly refrigerants, electrical circuits used in refrigerator and air-conditioner. Electric Traction: advantages of electric traction, systems of electric traction, types of motors used for electric traction, starting and braking of traction motors.

**EE 443 Control and Operation of Power Systems (3 h)**

Concepts of power system operation; Network topology and incidence matrices; Formation of bus impedance matrix; Unit commitment; Optimal power flow; Automatic generation control (AGC); Energy management systems (EMS) and control centers operation; State estimation (SE); Dynamic security assessment (DSA).

**EE 444 Planning and Design of Power Systems**

**(3 h)**

Introduction to Power System Planning: Definitions, objectives, procedures, requirements; Load Characteristics: Definitions, types, load curves; Load Forecasting: Definitions, objectives, types, methodologies (time series); Introduction to Power System Reliability: Introduction, terms and definitions, reliability indices, reliability evaluation, service interruption, failure mode, outages; System Cost Assessment: Present worth value, investment and fixed costs, operating costs, case study (generation cost assessment); Transmission Line Planning and Design: Introduction, Kelvins law, Tollgem Theory, case study (design of a TL planning); Distribution System Planning and Design: Introduction, distribution system components, distribution substation site location, substation rating, substation service area with many primary feeders, percentage voltage drop, design of primary system, design of secondary system, case study (design of distribution system).

**EE 445 Industrial Power Systems Design (3 h)**

Construction of site Plans, site plan interpreting , unit substation , feeders and bus systems, Panel boards , using wire tables for determining conductor sizes , motor installation calculations , system protection and include: circuit barkers , fuses , over current protection devices , short circuit protection devices and their time- current characteristic charts.), lighting protection , installation in hazardous locations

**EE 446 High Voltage Engineering (3 h)**

Effect of Impulse voltage on the Circuit Breaker performance during short circuit interruption. Effect of Lightning on the high voltage network. Surge Over Voltage Protection ( Switching – Lightning ). Methods of Earthing ( Protective – Systems). Electrical Insulators ( Solid – Liquid – Gases ). High Voltage Test techniques. High Voltage Generation ( DC – AC – Impulse ).

**EE 447 Computer Applications in Power Systems (3 h)**

Computer applications in power system planning, Computer applications in power flow solution and control, Computer applications in power system fault analysis, Computer applications in power system dynamics and control, Computer applications in power system economic operation.

**EE 448 Selected Topics in Power Systems (3 h)**

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student

**EE 449 Power System Protection (3 h)**

Protection system principles and components; Short circuit calculations; Protective instrument transformers: VT- CVT- CT; Protective relays: electromechanical- static- digital- numerical; Circuit breakers: air blast- oil- vacuum- SF6; Over-current protection; Distance protection systems; Power frequency and carrier systems; Protection of generators- motors- transformers- busbars- reactors- capacitors; Protection of distribution systems; Station layout and configuration; Disturbance monitoring.

**EE 450 Industrial Instrumentation (3 h)**

Instrumentation and control. Signal and data acquisition and processing. Interfacing techniques. Physio-chemical principles of instrumentation. Force, torque, and pressure measurements. Temperature, flow, moisture, and humidity sensors. Digital transducers. Calibration techniques. Errors in measurements. Introduction to actuators. Norms and standardization. Introduction to intelligent instrumentation.

**GE 104 Basics of Engineering Drawing (3h)**

Geometrical construction and basics of lettering, Sketching, Orthographic projection, Sectional and auxiliary views, Dimensioning, Introduction to computer graphics.

**GE 105 Basics of Engineering Technology(2h)**

Introduction; Function and planning of workshop; Properties of materials and their applications; Non-ferrous Metals - Ferrous Alloys Production of Iron and Steel, Plain Carbon and Alloy Steels - Tool Steels and the Iron-Carbon Diagram - Heat Treatments of Steels: Heating, Quenching, Tempering, Annealing, Aging, and Surface Hardening, Destructive and Nondestructive Testing of Metals. Workshop metrology; Basic bench work operations; Machining operations; Tools, equipment and machinery used in basic workshop processes: turning, milling, grinding, forging, sheet metal-work; Welding processes: gas welding, arc welding, spot welding. Casting processes: sand casting, die casting; Industrial safety

**GE 201 Statics (3h)**

Force systems; vector analysis of forces, moments and couples in 2 and 3 dimensions.

Equilibrium of force systems. Analysis of structures; plane trusses and frames. Distributed force system; centroids and composite bodies. Area moments of inertia. . Friction

**GE 202 Dynamics (3h)**

Kinematics of a particle: curvilinear motion, and relative motion; Kinetics of particles: Newton's law, work and energy, impulse and momentum, and impact; Kinematics of a rigid body in plane motion: relative velocity and acceleration, and rotating axes; Kinetics of a rigid body in plane motion: translation, fixed axis rotation, general equation of motion, work and energy, and impulse and momentum..

**GE 211 Introduction to Engineering Design-I (3h)**

Engineering design or how engineers approach and solve problems; process and product design; quality principles; working in teams; presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

**GE 213 Introduction to Engineering Design-2 (2h)**

Computer or mathematical modeling of process and product, continuation of quality principles, working in teams, presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self-regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

**GE 401 Engineering Economy (3h)**

**Introduction to engineering economy. Interest formulas and equivalence. Bases for comparison of alternatives. Decision making among alternatives. Evaluating replacement alternatives. Break-even and minimum cost analysis. Cost accounting. Depreciation. Economic analysis of operations. Economic analysis of public projects.**

**GE 402 Project Management (3h)**

Basic Management Process approach, Defining Project, Project life cycle, Balancing competing demands with triple constraints, Strategies and planning, methods, Project planning and scheduling, integrated project planning, Quality management, Bar-charts and Gantt Chart, critical path methods, PERT method, resource leveling and allocation, time-cost trade off. Construction and organizational approaches, leadership elements, and decision making. Time and cost control, Project Closing. computer applications

**GE 405 Cooperative Training (9h)**

The student starts the Cooperation Training during the summer that precedes his final year of study and continues to the end of the next semester in either the Governmental or Private sectors. At the end of training, student must prepare a detailed report which will be orally examined by a special committee of faculty professors.

## Civil Engineering Department

**Vision:**

The civil engineering department aims to be recognized locally, regionally and internationally as a leading department providing high quality programs and services in civil engineering fields.

**Mission:**

The civil engineering department seeks to meet the needs of the Saudi society and the region with outstanding civil engineering programs in education, research, and community service

**About:**

The oldest and most elegant branch of engineering profession in engineering colleges all over the world and that is due to the fact that civil engineering is related to almost all aspects of civilization. Many of the important things in our lives that we take for granted are the product of civil engineering. Civil engineer deals with a wide variety of engineering aspects such as designing, construction, and maintenance of different structure (buildings, embankments, storage tanks, dams, roads, water and wastewater networks, irrigation and drainage networks, etc…..), solving execution problems, managing engineering and construction projects, and it just does not end there. Civil engineer also has a significant role in planning and managing transportation systems, terrific safety, conservation and development of water resources, treatment and reuse of wastewater, and the list extends.

**Objectives:**

1- Preparation of the graduates to have a successful career as civil engineers in governmental and private sectors.

2- Preparation of the graduates to pursue their professional development through self-learning and advanced degrees.

3- Preparation of the graduates to advance to positions of leadership in their profession.

4- Preparation of the graduates to effectively participate in the sustainable development of the Saudi Society.

## Degrees:

- **Bachelor**

## Faculty Members (Civil Engineering):

| | |
|---|---|
| Ibrahim Saleh Al-Salamah | Professor |
| Sayed A. Habib | Professor |
| Ahmed A. Mohamed El-Sonbaty | Professor |
| Sherif ElKholy | Associate Prof. |
| Tarek Elmitwalli | Associate Prof. |
| Mostafa A. Mostafa Saad | Associate Prof. |
| Tomáš-Taher Ganiron | Associate Prof. |
| Yousry Mahmoud Ghazaw | Associate Prof. |
| Jumah Ahmad Amayreh | Associate Prof. |
| Ramadan Hassan Abdelmajeed | Associate Prof. |
| Abdul N. Lashari | Assistant Prof. |
| Hussam ALZEIN | Assistant Prof. |
| Kafeel Ahmed | Assistant Prof. |
| Ahmed Fouad Elragi | Assistant Prof. |
| El-Said Abd-Allah Bayoumi | Lecturer |
| Alsir Altayeb Mohamed Alamin | TA |
| Omar Mohammed Al-Awwad | TA |
| Mohammed Saleh Alfawzan | TA |
| Saud Ayed Eid Alotaibi | TA |

## Programs:

B.Sc. Degree Program in Civil Engineering

## Study Plan (Civil Engineering):

**Level 3**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **IC 101** | Introduction to Islamic | 2 | 2 | - | - | - | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | culture | | | | | | |
| **ARB 101** | Linguistic skills | 2 | 2 | - | - | - | - |
| **Phys 104** | General Physics | 4 | 3 | 2 | - | - | - |
| **GE 104** | Basics of Engineering Drawing | 3 | 1 | 4 | - | - | - |
| **Math 105** | Differential Calculus | 3 | 3 | - | 1 | - | - |
| **Chem 111** | General Chemistry | 4 | 3 | 2 | - | - | - |
| **Total credit hours 18** | | | | | | | |

**Level 4**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **IC 102** | Islam and Community Building | 2 | 2 | - | - | - | - |
| **GE 105** | Basics of Engineering Technology | 2 | 1 | 2 | - | GE 104 | - |
| **Math 106** | Integral Calculus | 3 | 3 | - | 1 | Math 105 | - |
| **CE 285** | Introduction to Geotechnical Engineering | 2 | 2 | - | 1 | - | - |
| **GE 201** | Statics | 3 | 3 | - | 1 | - | - |
| **CSC 209** | Computer Programming | 3 | 2 | 2 | - | - | - |
| **Math 107** | Linear & Analytic Geometry | 3 | 3 | - | 1 | - | - |
| **Total credit hours 18** | | | | | | | |

**Level 5**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **IC 103** | Economic System in Islam | 2 | 2 | - | - | - | - |
| **ARB 103** | Arabic Writing | 2 | 2 | - | - | - | - |
| **GE 202** | Dynamics | 3 | 3 | - | 1 | GE 201 | - |
| **CE 202** | Mechanics of Materials | 3 | 3 | - | 1 | Math 203, GE201 | - |
| **Math 203** | Differential and Integral Calculus | 3 | 3 | - | 1 | Math 106 | - |
| **GE 211** | Introduction to Engineering Design-I | 3 | 2 | 4 | - | - | - |
| **CE 112** | Survey Basics | 2 | 1 | 2 | - | Math 107 | - |
| **Total credit hours 18** | | | | | | | |

**Level 6**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **CE 203** | Structural Materials | 3 | 2 | 2 | - | CE 202 | - |
| **Math h** | Differential | 3 | 3 | - | 1 | Math 203 | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 208 | equations | | | | | | |
| GE 213 | Introduction to Engineering Design-2 | 2 | 2 | 2 | - | GE 211 | - |
| ME 229 | Thermodynamics and Heat transfer | 3 | 3 | - | 1 | Phys 104 | - |
| CE 230 | Fluid Mechanics | 3 | 3 | - | 1 | Math 203, GE202 | - |
| CE 231 | Fluid Mechanics Laboratory | 1 | - | 2 | - | - | CE 230 |
| Math +++ | Elective Mathematics-1 | 3 | 3 | - | 1 | - | - |
| **Total credit hours 18** | | | | | | | |

**Level 7**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IS 104 | Political System in Islam | 2 | 2 | - | - | - | - |
| CE 304 | Properties and Testing of Concrete | 3 | 2 | 2 | - | CE 203 | - |
| CE 305 | Structural Analysis | 3 | 3 | - | 1 | CE 202 | - |
| CE 320 | Construction Engineering | 3 | 3 | - | 1 | - | - |
| CE 353 | Geotechnical Engineering | 3 | 3 | - | 1 | CE 203, CE 285 | - |
| CE 354 | Geotechnical Engineering Laboratory | 1 | - | 2 | - | - | CE 353 |
| Math +++ | Elective Mathematics | 3 | 3 | - | 1 | - | - |
| +++ | Free Course | 2 | - | - | - | - | - |
| **Total credit hours 20** | | | | | | | |

**Level 8**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| CE 315 | Reinforced Concrete | 3 | 3 | - | 1 | CE 304, CE 305 | - |
| CE 370 | Water and Wastewater Engineering | 4 | 3 | - | 2 | CE 230 | - |
| CE 331 | Hydrology | 3 | 3 | - | 1 | CE 230 | - |
| CE 341 | Transportation and Traffic Engineering | 4 | 3 | - | 2 | Math 254 | - |
| +++ | Free Course | 3 | - | - | 1 | - | - |
| CE 375 | Steel Structures Design | 3 | 3 | - | 1 | CE 305 | - |
| **Total credit hours 20** | | | | | | | |

**Level 9**

| Course | Course Title | CR | LT | LB | TU | Pre- | Co- |
|---|---|---|---|---|---|---|---|

| Code | | | | | | Req. | Req. |
|---|---|---|---|---|---|---|---|
| GE 405 | Cooperative Training | 9 | - | - | - | - | - |
| **Total credit hours 9** | | | | | | | |

**Level 10**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| GE 401 | Engineering Economy | 3 | 3 | - | 1 | - | - |
| GE 402 | Project Management | 3 | 3 | - | 1 | - | - |
| CE 4xx | Elective Course – 1 | 3 | - | - | - | - | - |
| CE 4xx | Elective Course – 2 | 3 | - | - | - | - | - |
| CE 363 | Foundation Engineering | 3 | 3 | - | 1 | CE 353, CE 315 | - |
| CE 400 | Graduation Project | 3 | - | - | - | GE 405 | - |
| **Total credit hours 18** | | | | | | | |

**The Elective Courses**

In the 10th semester the student should select some elective courses not less than 6 hours

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| CE 317 | Computer Applications | 3 | 2 | 1 | 1 | CE 353 | CE 315 |
| CE 403 | Advanced Reinforced Concrete | 3 | 3 | - | 1 | CE 315 | - |
| CE 406 | Advanced Structural Analysis | 3 | 3 | - | 1 | CE 305 | - |
| CE 412 | Advanced Steel Design | 3 | 3 | - | 1 | CE 375 | - |
| CE 453 | Advanced Geotechnical Engineering | 3 | 3 | - | 1 | CE 353 | - |
| CE 401 | Concrete Technology | 3 | 3 | - | 1 | CE 203 | - |
| CE 443 | Design of Pavement | 3 | 3 | - | 1 | CE 203 | - |
| CE 464 | Project Surveying | 3 | 3 | - | 1 | CE 112 | - |
| CE 454 | Soil Improvement and Earth Structure Design | 3 | 3 | - | 1 | CE 353 | - |
| CE 455 | Highway Planning and Design | 3 | 3 | - | 1 | CE 341 | - |
| CE 456 | Hydraulic Engineering | 3 | 3 | - | 1 | CE 230 | - |
| CE 458 | Design of Water Structures | 3 | 3 | - | 1 | CE 230 | - |
| CE 474 | Design and Operation of | 3 | 3 | - | 1 | CE 370 | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Water and Wastewater Treatment Plants | | | | | | |
| **CE 475** | Environmental Engineering | 3 | 3 | - | 1 | - | - |
| **CE 490** | Selected Topics in Civil Engineering | 3 | 3 | - | 1 | - | - |

**Civil Engineering Program ( Plan C )**

The pre-requisite for acceptance in the program is the completion of the foundation program with grade not less than 3.5 from 5.00

**3rd semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **IC 101** | Introduction to Islamic culture | 2 | 2 | - | - | - | - |
| **ARB 101** | Linguistic skills | 2 | 2 | - | - | - | - |
| **Phys 104** | General Physics | 4 | 3 | 2 | - | - | - |
| **GE 104** | Basics of Engineering Drawing | 3 | 1 | 4 | - | - | - |
| **Math 105** | Differential Calculus | 3 | 3 | - | 1 | - | - |
| **Chem 111** | General Chemistry | 4 | 3 | 2 | - | - | - |

**Total credit hours 18**

**4th semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **IC 102** | Islam and Community Building | 2 | 2 | - | - | - | - |
| **GE 105** | Basics of Engineering Technology | 2 | 1 | 2 | - | GE 104 | - |
| **Math 106** | Integral Calculus | 3 | 3 | - | 1 | Math 105 | - |
| **CE 285** | Introduction to Geotechnical Engineering | 2 | 2 | - | 1 | - | - |
| **GE 201** | Statics | 3 | 3 | - | 1 | - | - |
| **CSC209** | Computer Programming | 3 | 2 | 2 | - | - | - |
| **Math 107** | Linear Algebra & Analytic Geometry | 3 | 3 | - | 1 | - | - |
| **Total credit hours 18** | | | | | | | |

**5th semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **IC 103** | Economic System | 2 | 2 | - | - | - | - |

**College of Engineering**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | in Islam | | | | | | |
| **ARB 103** | Arabic Writing | 2 | 2 | - | - | - | - |
| **GE 202** | Dynamics | 3 | 3 | - | 1 | GE 201 | - |
| **CE 202** | Mechanics of Materials | 3 | 3 | - | 1 | GE201 | Math 203 |
| **Math 203** | Differential and Integral Calculus | 3 | 3 | - | 1 | Math 106 | - |
| **GE 211** | Introduction to Engineering Design-I | 3 | 2 | 4 | - | - | - |
| **CE 112** | Survey Basics | 2 | 1 | 2 | - | Math 107 | - |
| **Total credit hours 18** | | | | | | | |

**6th semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **CE 203** | Structural Materials | 3 | 2 | 2 | - | CE 202 | - |
| **Math 208** | Differential equations | 3 | 3 | - | 1 | Math 203 | - |
| **GE 213** | Introduction to Engineering Design-2 | 2 | 2 | 2 | - | GE 211 | - |
| **ME 229** | Thermodynamics and Heat transfer | 3 | 3 | - | 1 | Phys 104 | - |
| **CE 230** | Fluid Mechanics | 3 | 3 | - | 1 | Math 203, GE202 | - |
| **CE 231** | Fluid Mechanics Laboratory | 1 | - | 2 | - | - | CE 230 |
| **Math +++** | Elective Mathematics – 1 | 3 | 3 | - | 1 | - | - |
| **Total credit hours 18** | | | | | | | |

**7th semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **IC 104** | Political System in Islam | 2 | 2 | - | - | - | - |
| **CE 304** | Properties and Testing of Concrete | 3 | 2 | 2 | - | CE 203 | - |
| **CE 305** | Structural Analysis | 3 | 3 | - | 1 | CE 202 | - |
| **CE 320** | Construction Engineering | 3 | 3 | - | 1 | - | - |
| **CE 353** | Geotechnical Engineering | 3 | 3 | - | 1 | CE 203, CE 285 | - |
| **CE 354** | Geotechnical Engineering Laboratory | 1 | - | 2 | - | - | CE 353 |
| **Math +++** | Elective Mathematics - 2 | 3 | 3 | - | 1 | - | - |
| **+++** | Free Course | 2 | - | - | - | - | - |
| **Total credit hours 20** | | | | | | | |

**8th semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| CE 315 | Reinforced Concrete | 3 | 3 | - | 1 | CE 304, CE 305 | - |
| CE 370 | Water and Wastewater Engineering | 4 | 3 | - | 2 | CE 230 | - |
| CE 331 | Hydrology | 3 | 3 | - | 1 | CE 230 | - |
| CE 341 | Transportation and Traffic Engineering | 4 | 3 | - | 2 | Math 254 | - |
| +++ | Free Course | 3 | - | - | - | - | - |
| CE 375 | Steel Structures Design | 3 | 3 | - | 1 | CE 305 | - |
| **Total credit hours 20** | | | | | | | |

**9th semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| GE 405 | Cooperative Training | 9 | - | - | - | - | - |
| **Total credit hours 9** | | | | | | | |

**10th semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| GE 401 | Engineering Economy | 3 | 3 | - | 1 | - | - |
| GE 402 | Project Management | 3 | 3 | - | 1 | - | - |
| CE 4xx | Elective Course – 1 | 3 | - | - | - | - | - |
| CE 4xx | Elective Course – 2 | 3 | - | - | - | - | - |
| CE 363 | Foundation Engineering | 3 | 3 | - | 1 | CE 353, CE315 | - |
| CE 400 | Graduation Project | 3 | - | - | - | GE 405 | - |
| **Total credit hours 18** | | | | | | | |

**The Elective Courses**

In the 10th semester the student should select some elective courses not less than 6 hours

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| CE 317 | Computer Applications | 3 | 2 | 1 | 1 | CE 353 | CE 315 |
| CE 403 | Advanced Reinforced Concrete | 3 | 3 | - | 1 | CE 315 | - |
| CE 406 | Advanced Structural Analysis | 3 | 3 | - | 1 | CE 305 | - |
| CE 412 | Advanced Steel Design | 3 | 3 | - | 1 | CE 375 | - |
| CE 453 | Advanced Geotechnical Engineering | 3 | 3 | - | 1 | CE 353 | - |
| CE 401 | Concrete Technology | 3 | 3 | - | 1 | CE 203 | - |
| CE 443 | Design of Pavement | 3 | 3 | - | 1 | CE 203 | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CE 464** | Project Surveying | 3 | 3 | - | 1 | CE 112 | - |
| **CE 454** | Soil Improvement and Earth Structure Design | 3 | 3 | - | 1 | CE 353 | - |
| **CE 455** | Highway Planning and Design | 3 | 3 | - | 1 | CE 341 | - |
| **CE 456** | Hydraulic Engineering | 3 | 3 | - | 1 | CE 230 | - |
| **CE 458** | Design of Water Structures | 3 | 3 | - | 1 | CE 230 | - |
| **CE 474** | Design and Operation of Water and Wastewater Treatment Plants | 3 | 3 | - | 1 | CE 370 | - |
| **CE 475** | Environmental Engineering | 3 | 3 | - | 1 | - | - |
| **CE 490** | Selected Topics in Civil Engineering | 3 | 3 | - | 1 | - | - |

## Course Description (Civil Engineering):

### CE 112 Survey Basics (2h)

Definitions and concepts in land surveying, divisions and importance of surveying, units of measurements, introduction to theory of measurements and errors, linear measurements, angular measurements, directions, leveling and contouring; computer applications.

### CE 202 Mechanics of Materials (3h)

**Stress, strain; Hook's law. Moduli of elasticity and rigidity, and Poisson's ratio. Statical determination of axial force, shear force, bending moment and torque in bars, beams and circular shafts. Load-shear-moment relationship in beams. Section kinematics; strain and stress distribution and their resultants. Normal and shear stress distributions in beams of different shapes and the shear flow.Transformation of stress and strain, Mohr's circle. Spherical and cylindrical pressure vessels. Elastic buckling of columns.**

### CE 203 Structural Materials (3h)

**Engineering materials: properties, testing, specifications, statistical evaluation; bricks, lime, gypsum, timber, wood, metals, plastics, ceramics, glasses. Testing machines. Measuring devices Tests: tension, compression, bending, shear, hardness, impact. Non destructive tests.**

### CE 230 Fluid Mechanics (3h)

**Fluid properties. Fluid statics. Kinematics. Dynamics of an ideal fluid. Flow of real fluids. Viscous effect and fluid resistance. Pumps. Fluid measurements.**

### CE 231 Fluid Mechanics Laboratory (1h)

Laboratory experiments covering Fluid measurements, flow through pipes, open channel, centrifugal pump. Measurement of temperature, atmospheric pressure, coefficient of viscosity for liquids, Hydrostatic pressure, Orifice flow, coefficient of velocity, and coefficient of discharge, Flow over weirs, Reynolds Number, Bernoulli's theorem, Pizometric tubes, Pitot tube, Fluid friction and coefficient of friction in pipes, Pump characteristics

**CE 285 Introduction to Geotechnical Engineering (2h)**

Types and classification of rocks based on origin and strength. Weathering process. Classification of soil based on formation. Index and engineering classification of soil. Clay minerals and soil structure.

**CE 304 Properties and Testing of Concrete (3h)**

Cement: manufacture, properties, types of cement, tests. Aggregates: types, properties, grading, tests. Mixing water, Concrete: proportions, mixing, handling, placing, fresh and hardened properties, tests, curing.

**CE 305 Structural Analysis (3h)**

**Types of structures, supports and loads. Idealization of structures and loads. Geometric stability and determinacy. Analysis of determinate trusses, beams, plane frames and arches; reaction computation; axial force, shear force and bending moment diagrams. Internal force releases. Load-shear-moment relationship. Differential equation of elastic curve. Deflections by integration, moment-area, conjugate-beam and virtual work methods. Influence lines of determinate structures.**

**CE 315 Reinforced Concrete (3h)**

Fundamentals and design theories based on ultimate strength design and elastic concept. ACI Code requirements. Load factors. Analysis and design of reinforced concrete members subject to flexure, and shear forces using ultimate design method. Development length of reinforcement. Design of one-way and two-way solid slabs. Design of non-sway columns. Design of staircases.

**CE 317 Computer Applications (3h)**

Problem formulation. Preparing problem model. Constitutive modeling of different engineering materials. Using FEM-based software packages in design and solving engineering problems. Results verification and interpretation. The used software packages will vary depending on job market requirements. Examples of packages include, but not limited to, SAP 2000, PLAXIS, Geo-Slope Suit, ANSAS, STAD Pro, Mud Flow, Pipe Net,….etc.

**CE 320 Construction Engineering (3h)**

Overview of the construction industry, earthmoving machinery and properties, excavation and lifting, loading and hauling, compaction and finishing, concrete construction, concrete form design, concrete economics, construction economics, contract construction.

**CE 331 Hydrology (3h)**

The hydrologic cycle. Fundamentals of meteorology, temperature, humidity, wind, precipitation, evaporation. Stream-flow and run-off, Groundwater flow and aquifers, wells, and intrusion in coastal aquifers. Stream-flow hydrographs. Unit hydrographs for various durations and its applications. Introduction to Water Resources management and its demand, Water Resources management in arid and semi-arid regions and its application in Saudi Arabia.

**CE 341 Transportation and Traffic Engineering (4h)**

**The transportation systems and its characteristics. Transportation and society. Components of transportation systems. Vehicle motion, flow, and performance. Continues flow. Terminals. Introduction to transportation demand. Components of traffic system. Traffic stream characteristics. Traffic engineering studies. Traffic safety. Capacity of urban streets and intersections. Congestion management.**

**CE 353 Geotechnical Engineering (3h)**

Flow of water in soil, soil compaction, Consolidation of soils. Settlement of structures. Shear strength of soils. Introduction to Stability of slopes. Site investigation.

**CE 354 Geotechnical Engineering Laboratory (1h)**

Moisture density relationships. Soil indices. Classifications and identification of soils. Permeability properties of soil. Soil compaction. Unconfined strength. Soil consolidation. Shear strength properties of soil.

**CE 363 Foundation Engineering (3h)**

Types of foundation. Bearing capacity of shallow foundation. Bearing capacity of deep foundations. Pile foundations and caissons. Sheet piling.

**CE 370 Water and Wastewater Engineering (4h)**

Analysis of water distribution and wastewater collection systems, computer modeling of network systems; water treatment including coagulation, flocculation, softening, sedimentation, filtration, desalination and disinfection; water treatment, principles of biological treatment systems including activated sludge, extended aeration, aerated lagoons, and stabilization ponds.

**CE 375 Steel Structures Design (3h)**

Analysis and design of roof trusses. Design of tension and compression members, columns under eccentric loadings, column bases and footings. Design of beams. Welded and bolted connections. Design of building frames. Introduction to plastic analysis. Industrial building project. All according to AISC specifications.

**CE 400 Graduation Project (3h)**

The student is assigned, among a team of students and one or more faculty professors, the design of an applied project which simulates the real working condition to which the student will be exposed after graduation. The project should be comprehensive and includes all the necessary preliminary field studies, vesability studies, final design drawings, bill of quantities, and the total operating cost of the project. The graduation project shall continue for one semester. At the end of the semester, there will be a seminar held for the working team of students to present the details of the project. The working team will be orally examined and evaluated based on the presentation as well as the oral discussion

**CE 401 Concrete Technology (3h)**

In-depth study of composition, characteristics and hydration of cements; structure and properties of hardened cement paste; local aggregates; workability, strength, volume changes and permeability of concrete; failure mechanisms of plain concrete; production, handling and quality control of concrete; mix design; special concretes such as fiber reinforced concrete, ferrocement and polymer impregnated; durability problems of concrete in the Gulf environment; preventive measures, specifications and construction techniques for local conditions

**CE 403 Advanced Reinforced Concrete (3h)**

Design of floor systems: ribbed and flat slabs. Design of beams for torsion, combined shear and torsion by the strength method. Design of short and long columns under eccentric loadings. Study of different structural systems for covering large dimensions halls. Analysis and design of reinforced concrete water tanks. Introduction to the design of prestressed concrete members.

**CE 406 Advanced Structural Analysis (3h)**

Analysis of indeterminate structures; trusses, beams, plane frames and arches. Method of consistent deformation; flexibility matrix formulation; prestrain, temperature change and support movement effects. Slope deflection method. Matrix analysis of beams and plane frame using the stiffness method. Moment distribution; sway consideration.

**CE 412 Advanced Steel Design (3h)**

Introduction to elastic-plastic material behavior, plastic analysis and design of continuous beams and simple frames using load resistance factor design (LRFD); design of built-up beams and plate girders, optimum proportioning of I-beam, design of composite section analysis and design for torsion, design of semi-rigid and rigid connections, computer application and usage in design of rigid frames and steel buildings

**CE 443 Design of Pavement (3h)**

Pavement types and loading, behavior of pavements under dynamic loads, stresses in flexible and rigid pavements, pavement components, pavement design factors, flexible highway and airport pavement design, rigid highway and airport pavement design; overlay design and computer applications; practical pavement design project of a road and airport

**CE 453 Advanced Geotechnical Engineering (3h)**

Fundamental relations of elasticity and plasticity in soil masses; unsaturated soils behavior; deformation properties of cohesionless and cohesive soils; advanced strength concepts in soils and stress path; advanced slope stability analysis; introduction to soil dynamics.

**CE 454 Soil Improvement and Design of Earth Structures (3h)**

General survey of soil types and their behavior and the available techniques for improvement; modifications by admixtures and grouting; the use of geo-synthetic material in filtration, seepage control, and reinforcement; design and analysis of variance retaining walls, anchored sheet piles and braced excavations.

**CE 455 Highway Planning and Design (3h)**

Highway planning in rural and urban areas; highway location studies; engineering and aesthetic considerations; geometric design, structural design, highway materials; drainage, highway construction, highway safety engineering; discussion of AASHTO and Saudi highway design manuals; complete geometric design of a two-lane highway; introduction to computer softwares for geometric design.

**CE 456 Hydraulic Engineering (3h)**

Steady flow in closed conduits and open channels. Pumps. Networks of pipes. Dimensional analysis and similitude. Laboratory experiments covering fluid measurements, flow through pipes, open channel, centrifugal pump.

**CE 458 Design of Water Structures (3h)**

Design of inlet and outlet structures for irrigation canals. Cross structures; culverts, siphons and aqueducts. Energy dissipation downstream hydraulic structures. Design of Spillways, syphon spillways and dams.

**CE 464 Project Surveying (3h)**

Laser systems and alignment, electronic distance measurement with high precision, total station, land subdivision and legal aspects; route surveying, hydrographic surveying, mine surveying, construction surveying, ruin surveying, industrial surveying, structure deformation measurement and monitoring, earth crustal deformation measurement

**CE 474 Design and Operation of Water and Wastewater Treatment Plants (3h)**

Theory and practice in sanitary engineering including the concepts of processing, design, economic evaluation and computer analysis; using practical considerations in the design and operation of treatment units and the combining of unit processing in water and wastewater treatment plants; field trips will be organized to visit various types of treatment plants in operation.

**CE 475 Environmental Engineering (3h)**

**Introduction to pollution problems and impact of development on the environment. Liquid waste disposal: overland, in streams, lake and sea. Solid wastes: management, characteristics, storage, collection, disposal, and recycling. Air pollution: sources, pollutants, effects and control. Noise pollution: sources, effect and control.**

**CE 490 Selected Topics in Civil Engineering (3h)**

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student

**Chem 111 General Chemistry (4 h )**

Stoichiometry: SI Units, chemical formulas, the mole, methods of expressing concentration, Calculations based on chemical equations
Gases: laws, kinetic theory, deviation and van der Waals equation
Thermochemistry: Types of enthalpy changes, Hess Law and its applications,, first law of thermodynamics
Solutions: Type of solutions and laws related , colligative properties
Chemical kinetics: Law of reaction rate, reaction order, factors affecting the rates
Chemical Equilibrium : Relation between Kc & Kp, Le Chatelier's principle and factor affecting equilibrium. Ionic equilibrium: Acid and base concepts, pH calculations of acid, base and buffer solutions
Atomic Structure: emission spectrum, Bohr's theory de Broglre's hypothesis, quantum numbers , electronic configuration of elements, consequences of the periodic table
In practical part, the student should do at least 14 experiments

**CSC 209 Computer Programming (3h)**

Introduction to computers and computing fundamentals in JAVA, Data Types, Variables, Operators, Control Structures, Simple input/output statement, Classes & Objects, Methods, Relational and logical expressions, IF-ELSE control structure , The WHILE statement , The FOR statement and looping structure, Introduction to Swing & graphical user interfaces, Arrays Matrix Methods, Vectors , String , Engineering Applications.

**GE 104 Basics of Engineering Drawing (3h)**

Geometrical construction and basics of lettering, Sketching, Orthographic projection, Sectional and auxiliary views, Dimensioning, Introduction to computer graphics.

**GE 105 Basics of Engineering Technology(2h)**

Introduction; Function and planning of workshop; Properties of materials and their applications; Non-ferrous Metals - Ferrous Alloys Production of Iron and Steel, Plain Carbon and Alloy Steels - Tool Steels and the Iron-Carbon Diagram - Heat Treatments of Steels: Heating, Quenching, Tempering, Annealing, Aging, and Surface Hardening, Destructive and Nondestructive Testing of Metals. Workshop metrology; Basic bench work operations; Machining operations; Tools, equipment and machinery used in basic workshop processes: turning, milling, grinding, forging, sheet metal-work; Welding processes: gas welding, arc welding, spot welding. Casting processes: sand casting, die casting; Industrial safety

**GE 201 Statics (3h)**

Force systems; vector analysis of forces, moments and couples in 2 and 3 dimensions. Equilibrium of force systems. Analysis of structures; plane trusses and frames. Distributed force system; centroids and composite bodies. Area moments of inertia. . Friction

**GE 202 Dynamics (3h)**

Kinematics of a particle: curvilinear motion, and relative motion; Kinetics of particles: Newton's law, work and energy, impulse and momentum, and impact; Kinematics of a rigid body in plane motion: relative velocity and acceleration, and rotating axes; Kinetics of a rigid body in plane motion: translation, fixed axis rotation, general equation of motion, work and energy, and impulse and momentum..

**GE 211 Introduction to Engineering Design-I (3h)**

Engineering design or how engineers approach and solve problems; process and product design; quality principles; working in teams; presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

**GE 213 Introduction to Engineering Design-2 (2h)**

Computer or mathematical modeling of process and product, continuation of quality principles, working in teams, presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self-regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

**GE 401 Engineering Economy (3h)**

**Introduction to engineering economy. Interest formulas and equivalence. Bases for comparison of alternatives. Decision making among alternatives. Evaluating replacement alternatives. Break-even and minimum cost analysis. Cost accounting. Depreciation. Economic analysis of operations. Economic analysis of public projects.**

**GE 402 Project Management (3h)**

Basic Management Process approach, Defining Project, Project life cycle, Balancing competing demands with triple constraints, Strategies and planning, methods, Project planning and scheduling, integrated project planning, Quality management, Bar-charts and Gantt Chart, critical path methods, PERT method, resource leveling and allocation, time-cost trade off. Construction and organizational approaches, leadership elements, and decision making. Time and cost control, Project Closing. computer applications

**GE 405 Cooperative Training (9h)**

The student starts the Cooperation Training during the summer that precedes his final year of study and continues to the end of the next semester in either the Governmental or Private sectors. At the end of training, student must prepare a detailed report which will be orally examined by a special committee of faculty professors.

**ME 229 Thermodynamics and Heat transfer (3h)**

First and second law of thermodynamics; Properties of ideal gases and vapors; Air standard cycles; Vapor power and reversed cycles; Conduction and convection heat transfer

## Mechanical Engineering Department

## Vision:

The mechanical engineering department aims to be recognized locally, regionally and internationally as a leading department providing high quality programs and services in mechanical engineering fields.

## Mission:

The mechanical engineering department seeks to meet the needs of the Saudi society and the region with outstanding mechanical engineering programs in education, research, and community service.

## About:

Mechanical engineers are essential to almost every industry. It is in fact difficult to imagine a modern industry without the services of Mechanical engineers. Mechanical engineering has been and continues to be a corner stone in every new technical development

The job of Mechanical engineers usually involves design, feasibility studies, cost analysis studies, installation, operation, and maintenance of plants, processes, or equipment. The focusing of the Mechanical engineering department is on teaching, community service, and research. The department faculty recognizes the need to provide the graduating engineer with the appropriate background in order to meet the challenges and large demands of a fast growing country such as Kingdom.

## Objectives:

1- Preparation of the graduates to have a successful career as Mechanical engineers in governmental and private sectors.

2- Preparation of the graduates to pursue their professional development through self-learning and advanced degrees.

3- Preparation of the graduates to advance to positions of leadership in their profession.

4- Preparation of the graduates to effectively participate in the sustainable development of the Saudi Society.

## Degrees:

- **Bachelor**

## Faculty (Mechanical Engineering):

| | |
|---|---|
| Sulaiman Al-Alyahya | Professor |
| Ahmad Al-Shooshan | Professor |
| Gamal M. Attia Ismail | Professor |
| Mohamed Bentrcia | Professor |
| Hany Ali Sherif | Professor |
| Mohammad Abdulaziz Irfan | Professor |
| Gamal Ibrahim Sultan | Professor |
| Saad Benmansour | Professor |
| Radawn Almasri | Professor |
| Irfan Ullah | Professor |
| Albadrawy A. Abo El-Nasr | Associate Prof. |
| A.R. Emad | Associate Prof. |
| Elamir Samy Gadelmawla | Associate Prof. |
| Mirza Jahanzaib | Associate Prof. |
| Fahad Al-Mufadi | Assistant Prof. |
| Abdullah S. Alsuwaiyan | Assistant Prof. |
| Abdulaziz S. Al-Aboodi | Assistant Prof. |
| Ismail M. Yousef | Assistant Prof. |
| Khaled Khodary Esmaeil | Assistant Prof. |
| Mohamed E H Eltaib | Assistant Prof. |
| Hanafy Mohamed Omar | Assistant Prof. |

Mohammad Sajid Assistant Prof.

Syed Shakaib Irfan Assistant Prof.

Saad M. Mukras Assistant Prof.

Osama Erfan Assistant Prof.

Mohamed alshitawi Assistant Prof.

Bashar Alani Lecturer

Abdulrahman Mohamed Alkhraiji TA

Anas Mohammed Al-Watban TA

Mohammed Alharbi TA

## Program:

B.Sc Degree Program in Mechanical Engineering

## Study Plan (Mechanical Engineering):

**Mechanical Engineering Program [ Plan B ]**

The pre-requisite for acceptance in the program is the completion of the foundation program with grade not less than 3.25 from 5.00

**Level 3**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 101 | Introduction to Islamic culture | 2 | 2 | - | - | - | - |
| ARB 101 | Linguistic skills | 2 | 2 | - | - | - | - |
| Phys 104 | General Physics | 4 | 3 | 2 | - | - | - |
| GE 104 | Basics of Engineering Drawing | 3 | 1 | 4 | - | - | - |
| Math 105 | Differential Calculus | 3 | 3 | - | 1 | - | - |
| Chem 111 | General Chemistry | 4 | 3 | 2 | - | - | - |
| **Total credit hours 18** | | | | | | | |

**Level 4**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 102 | Islam and Community Building | 2 | 2 | - | - | - | - |
| GE 105 | Basics of Engineering Technology | 2 | 1 | 2 | - | GE 104 | - |
| Math 106 | Integral Calculus | 3 | 3 | - | 1 | Math 105 | - |
| ME 251 | Materials Engineering | 3 | 3 | - | 1 | Phys 104 | - |
| GE 201 | Statics | 3 | 3 | - | 1 | - | - |
| CSC 209 | Computer Programming | 3 | 2 | 2 | - | - | - |
| Math 107 | Linear Algebra & Analytic Geometry | 3 | 3 | - | 1 | - | - |
| **Total credit hours 19** | | | | | | | |

**Level 5**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| GE 202 | Dynamics | 3 | 3 | - | 1 | GE 201 | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Math 203** | Differential and Integral Calculus | 3 | 3 | - | 1 | Math 106 | - |
| **GE 211** | Introduction to Engineering Design-I | 3 | 2 | 4 | - | - | - |
| **ME 241** | Mechanical Drawing | 3 | 2 | 2 | - | GE 104 | - |
| **ME 351** | Mechanics of Materials | 4 | 3 | - | 2 | GE 201 | - |
| **ME 352** | Mechanics of Materials Laboratory | 1 | - | 2 | - | - | ME 351 |
| **+++** | Free Course | 2 | - | - | - | - | - |
| **Total credit hours 19** | | | | | | | |
| | | | | | | | |

**Level 6**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **Math 208** | Differential equations | 3 | 3 | - | 1 | Math 203 | - |
| **GE 213** | Introduction to Engineering Design-2 | 2 | 2 | 2 | - | GE 211 | - |
| **EE 318** | Fundamentals of Electric circuits | 3 | 3 | - | 1 | Phys 104 | - |
| **ME 330** | Manufacturing Processes | 4 | 2 | 2 | 1 | ME241, ME 251, ME 351 | - |
| **ME 360** | Mechanics of Machinery | 3 | 3 | - | 1 | GE 202, GE 209 | - |
| **ME 363** | Mechanics of Machinery Lab. | 1 | - | 2 | - | - | ME 360 |
| **ME 371** | Thermodynamics -1 | 3 | 3 | - | 1 | Phys 104 | - |
| **Total credit hours 19** | | | | | | | |

**Level 7**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **IC 103** | Economic System in Islam | 2 | 2 | - | - | - | - |
| **Math +++** | Elective Mathematics - 1 | 3 | 3 | - | 1 | Math 106, Math107 | - |
| **EE 339** | Electrical Machines | 2 | 2 | - | 1 | EE 318 | - |
| **ME 340** | Mechanical Design -1 | 3 | 1 | 2 | 1 | ME 330, ME 360 | - |
| **ME 372** | Thermodynamics – 2 | 3 | 3 | - | 1 | ME 371 | - |
| **ME 380** | Fluid Mechanics | 4 | 3 | - | 2 | ME 371, GE 202 | -- |
| **ME 383** | Thermo-fluid Laboratory -1 | 1 | - | 2 | - | - | ME 380, ME 372 |
| **Total credit hours 18** | | | | | | | |

### Level 8

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| ARB 103 | Arabic Writing | 2 | 2 | - | - | - | - |
| IC 104 | Political System in Islam | 2 | 2 | - | - | - | - |
| ME 343 | Measurements and Instrumentation | 2 | 2 | - | 1 | ME 380 | - |
| ME 374 | Heat and Mass Transfer | 4 | 3 | - | 2 | ME 380 | - |
| ME 384 | Thermo-fluid Laboratory -2 | 1 | - | 2 | - | - | ME 374 |
| Math +++ | Elective Mathematics – 2 | 3 | 3 | - | 1 | - | - |
| ME 467 | System Dynamics and Automatic Control | 4 | 3 | - | 2 | MTH 208, GE209 | - |
| ME 468 | System Dynamics and Automatic Control Laboratory | 1 | - | 2 | - | - | ME 467 |
| **Total credit hours 19** | | | | | | | |

### Level 9

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| GE 405 | Cooperative Training | 9 | - | - | - | - | - |
| **Total credit hours 9** | | | | | | | |

### 10th semester

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| GE 401 | Engineering Economy | 3 | 3 | - | 1 | - | - |
| GE 402 | Project Management | 3 | 3 | - | 1 | - | - |
| ME 4xx | Elective Course - 1 | 3 | - | - | - | - | - |
| ME 4xx | Elective Course - 2 | 3 | - | - | - | - | - |
| +++ | Free Course | 3 | - | - | - | - | - |
| ME 400 | Graduation Project | 3 | - | - | - | GE 405 | - |
| **Total credit hours 18** | | | | | | | |

### The Elective Courses

In the 10th semester the student should select some elective courses not less than 6 hours

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| ME 423 | Renewable Energy | 3 | 3 | - | 1 | ME 372, ME 374 | - |
| ME 425 | Solar Energy | 3 | 3 | - | 1 | ME 374 | - |
| ME 431 | Tool Manufacturing | 3 | 3 | - | 1 | ME 330 | - |
| ME 441 | Mechanical Design -2 | 3 | 1 | 2 | 1 | ME 340 | - |
| ME 453 | Modern Engineering | 3 | 3 | - | 1 | ME 351 | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Materials | | | | | | |
| **ME 455** | Corrosion Engineering | 3 | 3 | - | 1 | ME 451 | - |
| **ME 462** | Mechatronics | 3 | 3 | - | 1 | ME 367 | - |
| **ME 463** | Mechanical vibrations | 3 | 3 | - | 1 | ME 460 | - |
| **ME 466** | Robotics | 3 | 3 | - | 1 | ME 367 | - |
| **ME 470** | Thermal Power Plants | 3 | 3 | - | 1 | ME 374, ME 372 | - |
| **ME 474** | Refrigeration Engineering | 3 | 3 | - | 1 | ME 374, ME 372 | - |
| **ME 475** | Air Conditioning | 3 | 3 | - | 1 | ME 374, ME 372 | - |
| **ME 480** | Turbo Machinery | 3 | 3 | - | 1 | ME 380, ME 372 | - |
| **ME 482** | Compressible Fluids | 3 | 3 | - | 1 | ME 380 | - |
| **ME 483** | Pumping Machinery | 3 | 3 | - | 1 | ME 380 | |
| **ME 490** | Selected Topics In Mechanical Engineering | 3 | 3 | - | 1 | ME 380 | |

## Course Description (Mechanical Engineering):

### Chem 111 General Chemistry (4 h )

**Stoichiometry:** SI Units, chemical formulas, the mole, methods of expressing concentration, Calculations based on chemical equations

**Gases:** laws, kinetic theory, deviation and van der Waals equation

**Thermochemistry:** Types of enthalpy changes, Hess Law and its applications,, first law of thermodynamics

**Solutions:** Type of solutions and laws related , colligative properties

**Chemical kinetics:** Law of reaction rate, reaction order, factors affecting the rates

**Chemical Equilibrium:** Relation between Kc & Kp, Le Chatelier's principle and factor affecting equilibrium. Ionic equilibrium: Acid and base concepts, pH calculations of acid, base and buffer solutions

**Atomic Structure:** emission spectrum, Bohr's theory de Broglre's hypothesis, quantum numbers , electronic configuration of elements, consequences of the periodic table

In practical part, the student should do at least 14 experiments

### CSC 209 Computer Programming (3h)

Introduction to computers and computing fundamentals in JAVA, Data Types, Variables, Operators, Control Structures, Simple input/output statement, Classes & Objects, Methods, Relational and logical expressions, IF-ELSE control structure , The WHILE statement , The FOR statement and looping structure, Introduction to Swing & graphical user interfaces, Arrays Matrix Methods, Vectors , String , Engineering Applications.

**EE 318 Fundamentals of Electric circuits (3h)**

Circuit elements and laws, Network theorem, Nonlinear networks-AC Circuits : Phasors, Circuit analysis, Frequency response, Resonance - Ideal Amplifiers, Ideal diodes, Rectifiers, Waveshaping circuits – Junction diodes – FETs and BJTs transistors- Logic circuits – Small signal models of Diodes, FETs, and BJTs – RC-Coupled Amplifiers.

**EE 339 Electrical Machines (2h)**

Transformers (construction, types, operation, equivalent circuit); Synchronous machines (construction, generator performance, motor characteristics, starting); induction machines (construction, three phase motor: types, operation, equivalent circuit, starting speed control); Introduction to DC machines.

**GE 104 Basics of Engineering Drawing (3h)**

Geometrical construction and basics of lettering, Sketching, Orthographic projection, Sectional and auxiliary views, Dimensioning, Introduction to computer graphics.

**GE 105 Basics of Engineering Technology(2h)**

Introduction; Function and planning of workshop; Properties of materials and their applications; Non-ferrous Metals - Ferrous Alloys Production of Iron and Steel, Plain Carbon and Alloy Steels - Tool Steels and the Iron-Carbon Diagram - Heat Treatments of Steels: Heating, Quenching, Tempering, Annealing, Aging, and Surface Hardening, Destructive and Nondestructive Testing of Metals. Workshop metrology; Basic bench work operations; Machining operations; Tools, equipment and machinery used in basic workshop processes: turning, milling, grinding, forging, sheet metal-work; Welding processes: gas welding, arc welding, spot welding. Casting processes: sand casting, die casting; Industrial safety

**GE 201 Statics (3h)**

Force systems; vector analysis of forces, moments and couples in 2 and 3 dimensions. Equilibrium of force systems. Analysis of structures; plane trusses and frames. Distributed force system; centroids and composite bodies. Area moments of inertia. . Friction

**GE 202 Dynamics (3h)**

Kinematics of a particle: curvilinear motion, and relative motion; Kinetics of particles: Newton's law, work and energy, impulse and momentum, and impact; Kinematics of a rigid body in plane motion: relative velocity and acceleration, and rotating axes; Kinetics of a rigid body in plane motion: translation, fixed axis rotation, general equation of motion, work and energy, and impulse and momentum..

**GE 211 Introduction to Engineering Design-I (3h)**

Engineering design or how engineers approach and solve problems; process and product design; quality principles; working in teams; presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

**GE 213 Introduction to Engineering Design-2 (2h)**

Computer or mathematical modeling of process and product, continuation of quality principles, working in teams, presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self-regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

**GE 401 Engineering Economy (3h)**

Introduction to engineering economy. Interest formulas and equivalence. Bases for comparison of alternatives. Decision making among alternatives. Evaluating replacement alternatives. Break-even and minimum cost analysis. Cost accounting. Depreciation. Economic analysis of operations. Economic analysis of public projects.

**GE 402 Project Management (3h)**

Basic Management Process approach, Defining Project, Project life cycle, Balancing competing demands with triple constraints, Strategies and planning, methods, Project planning and scheduling, integrated project planning, Quality management, Bar-charts and Gantt Chart, critical path methods, PERT method, resource leveling and allocation, time-cost trade off. Construction and organizational approaches, leadership elements, and decision making. Time and cost control, Project Closing. computer applications

**GE 405 Cooperative Training (9h)**

The student starts the Cooperation Training during the summer that precedes his final year of study and continues to the end of the next semester in either the Governmental or Private sectors. At the end of training, student must prepare a detailed report which will be orally examined by a special committee of faculty professors.

**ME 241 Mechanical Drawing (3h)**

1- Using Solid Works software: Introduction to 3D modeling, 2D drawings (sketching), reference geometry, 3D drawings (features), drawing and editing mechanical parts, assembly drawings. 2- Standard Mechanical Parts: Screw threads, fasteners and springs. 3- Fits and Tolerances: fundamentals, types, symbols. 4- Detailed Drawings: orthographic views, auxiliary views, sectional views, detailed views and dimensioning. 5- Manufacturing Symbols: Geometrical tolerance, surface finish, and weld symbols.

**ME 251 Materials Engineering (3h)**

Introduction to materials engineering; Structure and characteristics of metals; polymers and ceramics; Equilibrium-phase diagrams; Microstructures of alloys; Imperfections; Diffusion; Mechanical properties of metals, polymers, ceramics; Heat treatment of plain-carbon steels, cast irons and precipitation hardening.

**ME 330 Manufacturing Processes (4h)**

Basic structure of materials processes, Classification of manufacturing processes, Basic material processes, Manufacturing properties of materials, Liquid state forming processes, casting processes of metals and non metals, Mass-conserving processes of solid state materials, forming of metals. Basics of materials processes, Mass-conserving processes of solid state materials, forming of polymers, and powders, Mass-reducing processes of solid state materials, machining processes, Joining and fabrication processes, welding, brazing, riveting, bonding, etc., Modern manufacturing processes.

**ME 340 Mechanical Design -1 (3h)**

Design process; Origin and identification of engineering design problems; Creativity in engineering design; Technical analysis; Human and legal factors; Problem solving and decision making; Design communication; Failures resulting from static loading; Variable loading and fatigue failure; Material selection for strength and rigidity; Design of mechanical elements: screws, power screws, fasteners and connections, welded, brazed and bonded joints; Rolling contact bearings; Term design project.

**ME 343 Measurements and Instrumentation (2h)**

Measuring concepts; Experimental procedures; Standards and dimensional units of measurement, analyzing, assessing and presenting experimental data, analog measured: time-dependent characteristics, Response of measuring systems, Sensors, Signal conditioning, digital techniques in mechanical measurements, displacement measurements, measurement of motion, measurement of force and torque, measurement of strain and stress, measurement of pressure, measurement of temperature, measurement of flow.

**ME 351 Mechanics of Materials (4h)**

Study of the mechanical behavior of solid bodies (Rods, shafts, beams, etc.) under various types of loading. Mechanical and thermal stresses and strains; Stress-strain relations; Axial deformation; Shear and bending moments in beams; Stresses in beams; Torsion of shafts and thin wall tubes; Combined loadings; Analysis of plane stress and plane strain; Theories of failures; Thick – and thin-wall cylinders; Strain gauges and applications; Deflection of beams; Statically indeterminate problems; Energy methods; Stability of axially loaded beams (columns).

**ME 352 Mechanics of Materials Laboratory (1h)**

Strain gauge applications: tension test, torsion test, cantilever beam, pressurized cylindrical vessel; Deflection of beams; Buckling of columns

**ME 360 Mechanics of Machinery (3h)**

Topological characteristics of planar mechanisms; Degree-of-freedom; Position, velocity and acceleration analysis of linkages: graphical and analytical methods; Static and dynamic force analysis of machinery: graphical and analytical methods; Flywheels; Cam mechanisms; Law of gearing; Simple and planetary gear trains; Term project.

**ME 363 Mechanics of Machinery Lab (1h)**

Introduction to the mechanics of machinery, study of various type of mechanisms like slider crank, four – bar, quick return mechanism, Hooke’s coupling and different kinds of gear trains through working models. Drawing the displacement profiles for various combinations of cam and follower. Balancing of rotating and reciprocating masses. Verification of gyroscopic torque equation etc.

**ME 371 Thermodynamics -1 (3h)**

Basics and definitions of thermodynamics; properties of pure substances First law of thermodynamics; Second law of thermodynamics; Entropy; Carnot and reversed Carnot cycles; simple and modified Rankine cycle; Gas power cycles; Refrigeration and heat pump cycles.

**ME 372 Thermodynamics – 2 (3h)**

Thermodynamic relations;Availability; Ideal gas mixtures; Gas-vapor mixtures; Thermodynamics of reciprocating gas compressors; Combustion; Introduction to internal combustion engines.

**ME 374 Heat and Mass Transfer (4h)**

Steady and unsteady heat conduction; Free and forced convection for external and internal flows; Heat exchangers; Properties and process of radiation, radiation exchange between surfaces. Mass transfer, Diffusion

**ME 380 Fluid Mechanics (4h)**

Dimensions and units; Fundamental concepts in fluids; Fluid statics; Control volume; Conservation of mass and momentum equations and its applications ; Energy equation; Differential form of equations; Stream function; Euler's equations; Bernoulli's equation and its applications; Dimensional analysis and model studies; Introduction to turbomachinery., Dynamics of fluid flow, steady and non steady viscous flow in pipes, Navier-Stokes equations; external flow characteristics, Boundary layer characteristics and equations; Blasius flow; Momentum integral equation; drag and lift. Introduction to one dimensional compressible flows; Types of flows; Isentropic flow in variable-area passages, shock waves.

**ME 383 Thermo-fluid Laboratory -1 (1h)**

Temperature and humilities various measurements, Dead weight, Impact of a jet, hammer in pipes, Measuring the hydrostatic forces on the submerged surfaces, Performance test for a multi-stage reciprocating air compressor; Measurement of heating value of a gaseous fuel; Exhaust-gas analysis; Performance of spark ignition engine; Performance of compression ignition engine; Demonstration of fluid flow (flow visualization).

**ME 384 Thermo-fluid Laboratory -2 (1h)**

Visualization of potential flow fields; Visualization of real flow around streamlined and bluff bodies; Pipe flow, velocity distribution, pressure drop and friction factor; Flow measurements: orifice, venturi and nozzle calibrations; Calibration of thermocouples; Free convection for a lumped capacitance thermal system; determination of thermal conductivities of a new metals; thermal performance of fins (free and forced convection).

**ME 400 Graduation Project (3h)**

The student is assigned, among a team of students and one or more faculty professors, the design of an applied project which simulates the real working condition to which the student will be exposed after graduation. The project should be comprehensive and includes all the necessary preliminary field studies, vesability studies, final design drawings, bill of quantities, and the total operating cost of the project. The graduation project shall continue for one semesters. At the end of the semester, there will be a seminar held for the working team of students to present the details of the project. The working team will be orally examined and evaluated based on the presentation as well as the oral discussion

**ME 423 Renewable Energy (3h)**

Basic and principles of conventional and non-conventional energy, energy conversion, power plant cycles, The distribution, variability and availability of all categories of renewable energy. Principles of renewable energy systems such as solar, wind, geothermal, and Nuclear energy. Environmental aspects of implementation of renewable energy. Topic also covers some practical applications to utilizing the renewable energy such as sea water desalination and power plants.

**ME 425 Solar Energy (3h)**

Thermal aspects of solar energy conversion. Solar radiation measurement and prediction. Selected topics in heat transfer. Flat plate and focusing collector analysis. Solar energy storage. Solar systems including hot water, space heating and cooling, distillation and thermal power conversion.

**ME 431 Tool Manufacturing (3h)**

Principles of cutting tools, jigs, fixtures, fit and tolerances, tool cutting geometry, tool life, cost analysis, economics, and safety in tooling design applications.

**ME 441 Mechanical Design -2 (3h)**

Design of mechanical elements: springs, lubrication and journal bearings, spur, helical, bevel, and worm gears, clutches and brakes, miscellaneous power transmission components; Term design projects.

**ME 453 Modern Engineering materials (3h)**

Electrical, magnetic, optical and thermal properties of materials. Advanced ceramics, composites. Advanced engineering plastics.

High temperature materials. Advanced coatings. Advanced materials processing system. Rapid solidification and powder metallurgy. Selection of modern materials.

**ME 455 Corrosion Engineering (3h)**

Technical and economical aspects of corrosion problems. Types of corrosion: pitting, crevice, intergranular, galvanic, and stress-corrosion cracking. Mechanism and prevention of corrosion failures. Cathodic protection of pipelines and submerged structures. Principles of inhibition of corrosion in process industries. Behavior of iron, copper, aluminum and their alloys in corrosive environments. Metallurgical aspects of corrosion. Design consideration in prevention of corrosion failures.

**ME 462 Mechatronics (3h)**

Mechanical system interfacing and actuation; Operational and power amplifiers; Analog to Digital and digital to analog converters; Digital data acquisition basics; Position/Orientation control; PWM control of DC motors, Sensors and actuators; Microprocessor-, microcontroller- and PC-based control; PLC basics and their programming; C programming (M-code & G-code) of CNC machine tools.

**ME 463 Mechanical vibrations (3h)**

Fundamentals of mechanical vibration, including free and forced vibration of single-, multi-and infinite-degree of freedom systems. Modal analysis and matrix formulation of vibration problems. Approximate solution techniques. Vibration and modal analysis of continuous systems: beams, rods, and strings. Approximate analytical as well as numerical solutions using suitable software such as MATLAB. Numerous examples and applications of vibration measurement and analysis, including vibration isolation and dynamic absorbers and rotating machinery. Laboratory experimentation for justifying the above topics.

**ME 466 Robotics (3h)**

Introduction to robotics and their applications, spatial descriptions and transformation, manipulator forward kinematics, manipulator inverse kinematics, trajectory generation Jacobians: velocities and static forces, manipulator dynamics, control of manipulators, robot programming, robot sensors and vision.

**ME 467 System Dynamics and Automatic Control (4h)**

Laplace transformation methods; Modeling of mechanical , electrical , hydraulic, pneumatic and thermal systems; Analogies; Mixed systems; Representation of control system components; Transfer functions and block diagrams; Time response of feedback control systems; Routh stability criterion, Root locus technique; Frequency response methods; Compensation; Term project.

**ME 468 System Dynamics and Automatic Control Laboratory (1h)**

Experiments in support of control system theory including : servo control of electrical motors, control of linear and torsional vibrations, control of gyroscopic motion, control of pendulum motion, hydro-mechanical liquid level control, pressure control, pneumatic servomechanism, vibration control; digital simulation of linear systems using a software package (MATLAB).

**ME 470 Thermal Power Plants (3h)**

Forms of energy, oil, gas and coal. Combustion processes, energy cycles. Steam generators and their component design. Turbines. Load curves. Field trips to power plants and other energy installations.

**ME 474 Refrigeration Engineering (3h)**

Mechanical vapor compression refrigeration cycles (single-stage and multi-stage); refrigerant compressors; refrigerants; absorption refrigeration systems; thermoelectric cooling; flash cooling; gas cycle refrigeration; ultra-low-temperature refrigeration (cryogenics); food refrigeration; transport refrigeration. Laboratory will be utilized to carry out experiments on refrigeration equipment and in problem solving sessions.

**ME 475 Air Conditioning (3h)**

Thermodynamics of moist air; construction of the psychrometric chart; psychrometric processes; psychrometric systems; industrial processes, air conditioning systems; duct design and air distribution methods; cooling towers. Experiments utilizing air conditioning equipment will be conducted for air conditioning systems will be practiced through a practical project in tutorial sessions.

**ME 480 Turbo Machinery (3h)**

Thermo-fluid dynamics aspects of fluid flow, efficiencies of turbomachines. Two dimensional cascades: turbine and compressor cascade correlations and performance. Axial turbines (two-dimensional analysis), axial flow compressors and fans (two-dimensional analysis), centrifugal compressors and fans, radial flow turbines.

**ME 482 Compressible Fluids (3h)**

Fundamentals of compressible fluid flow (gas dynamics) in relation to effects of area change (nozzles and diffusers), friction and heat interaction (Fanno, Rayleigh line and isothermal flow), combustion waves normal and oblique shock waves and their effects on flow properties (extended diffusers and supersonic airfoils). Applications to flow through pipelines, subsonic, sonic and supersonic flights, turbomachinery and combustion.

**ME 483 Pumping Machinery (3h)**

Terminology and description of typical pump machinery. Momentum and energy transfer between fluid and rotor. Performance characteristics of centrifugal and axial flow fans, compressors, and pumps. Various types of losses. Positive displacement pumps. Cavitation and water hammer problems in pump systems. Special problems in pump design and applications. Laboratory experiments will include performance evaluation of various types of pumps and problem-solving sessions.

**ME 490 Selected Topics In Mechanical Engineering (3h)**

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student

**Phys 104 General Physics (4h)**

Electromagnetism: Coulomb's law in the electric fields, Gauss law, Electric potential, Energy stored, Capacitance and dielectrics, Current and resistance, Electric energy and power, Direct current circuits, Kirchhoff "s Rules, Magnetic fields, Motion of a charged particle in a magnetic field, Sources of the Magnetic fields, Ampere's law, Faraday 's law, in the inductance, Mutual inductance, Alternative current circuits, rms values, Impedance, Resonance, Power in RLC circuits.

Nuclear Physics:Photoelectric effect, Atomic spectrum, Bohr model, Nuclear structure, Radioactivity Decay, Half life, Radioactive Decay.

# College of Engineering in Unaizah

## Vision:

A locally and regionally recognized college in the engineering education and scientific research, and supporting the sustained development in Qassim region and Kingdom.

## Mission:

College of Engineering in Unaizah at Qassim University seeks to offer a developed and accredited engineering education to satisfy the needs of the job market, and to offer society and research services which support the sustained development in the Kingdom and participate in the knowledge economy.

## Aims:

**I-College Educational Objectives**

1- Preparation of the graduates to have a successful career as engineers in the governmental and private sectors.

2- Preparation of the graduates to pursue their professional development through self learning and advanced degrees.

3- Preparation of the graduates to advance to positions of leadership in their profession.

4- Preparation of the graduates to effectively participate in the sustainable development of the Saudi Society.

**II-Research Objectives:**

1. To establish research links with the industry, energy and construction organizations to help develop and promote these organizations.

2. To establish research centres which participate in developing the scientific research and supporting the academic staff and post-graduate students from inside and outside the university.

3. To offer post-graduate programs which focus on research subjects those serve the Saudi society.

**III-Community–Service Objectives**

1. To contribute and support the different university committees such as committee of missions and training, demonstrators committee and the scientific council, etc.

2. To participate, in cooperation with the university community service deanship, in the promotion of the engineering profession through offering training courses and workshops for engineers and technicians in different engineering fields.

3. To conduct engineering studies and field surveys, and to present technical consultations for solving the society problems.

4. To conduct standard tests on constructions, engineering systems, equipment, machines, devices and materials.

## About:

College of Engineering at Unizah is a new college which is affiliated to Qassim University. It follows the same curriculum as that of the College of Engineering in the main campus.

## Degrees:

- Bachelor
- Master

## Programs:

The Engineering College offers four B.Sc. programs:

1. Electric Power Engineering Program
2. Electronics and Communication Engineering Program
3. Civil Engineering Program
4. Mechanical Engineering Program

Admission conditions

Students completed the preparatory year program (**PYP**) with GPA not less than 3.5 out of 5.0 points may be accepted for admission to the engineering college.

List of the university course requirements

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req | Co-Req |
|---|---|---|---|---|---|---|---|
| **ARB 101** | Linguistic skills | 2 | 2 | - | - | - | - |
| **ARB 103** | Arabic Writing | 2 | 2 | - | - | - | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **IS 101** | Introduction to Islamic culture | 2 | 2 | - | - | - | - |
| **IS 102** | Islam and Community Building | 2 | 2 | - | - | - | - |
| **IS 103** | Economic System in Islam | 2 | 2 | - | - | - | - |
| **IS 104** | Political System in Islam | 2 | 2 | - | - | - | - |
| **Total Credit Hours: 12** | | | | | | | |

**List of the College course requirements:**

| S. No. | Course Code | Course Title | CR | LT | LB | TU | Pre-Req | Co-Req |
|---|---|---|---|---|---|---|---|---|
| **1** | Phys 104 | General Physics | 4 | 3 | 2 | - | - | - |
| **2** | Chem 111 | General Chemistry | 4 | 3 | 1 | - | - | - |
| **3** | Math 105 | Differential Calculus | 3 | 3 | - | 1 | - | - |
| **4** | Math 106 | Integral Calculus | 3 | 3 | - | 1 | Math 105 | - |
| **5** | Math 107 | Linear Algebra & Analytic Geometry | 3 | 3 | - | 1 | - | - |
| **6** | Math 203 | Differential and Integral Calculus | 3 | 3 | - | 1 | Math 106 | - |
| **7** | Math 208 | Differential equations | 3 | 3 | - | 1 | Math 203 | - |
| **8** | Math xx1 | **Elective - Math 1** | 3 | 3 | - | 1 | | |
| **9** | Math xx2 | **Elective - Math 2** | 3 | 3 | - | 1 | | |
| **10** | GE 104 | Basics of Engineering Drawing | 3 | 1 | 4 | - | - | - |
| **11** | GE 10 | Basics of Engineering | 2 | 1 | 2 | - | GE 104 | - |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 5 | Technology | | | | | | |
| **12** | CSC 209 | Computer Programming | 3 | 2 | 2 | - | - | - |
| **13** | GE 211 | Introduction to Engineering Design-I | 3 | 2 | 4 | - | - | - |
| **14** | GE 213 | Introduction to Engineering Design-2 | 2 | 2 | 2 | - | GE 211 | - |
| **15** | GE 401 | Engineering Economy | 3 | 3 | - | 1 | - | - |
| **16** | GE 405 | Cooperative Training | 9 | - | - | - | - | - |
| **Total credit-hours 54** | | | | | | | | |

**The two math elective courses may be selected from the following courses:**

| S. No. | Course Code | Course Title | CR | LT | LB | TU | Pre-Req | Co-Req |
|---|---|---|---|---|---|---|---|---|
| **1** | STAT 324 | Probability and statistics | 3 | 3 | | 1 | - | - |
| **2** | Math 244 | Linear algebra | 3 | 3 | | 1 | Math 107 | |
| **3** | Math 254 | Numerical Methods | 3 | 3 | | 1 | Math 106 & 107 | - |
| **4** | Math 322 | Partial differential equations | 3 | 3 | | 1 | Math 203 & 208 | |
| **5** | Math 328 | Applied operational researches | 3 | 3 | | 1 | Math 107 | |

## The descriptions of the courses required for different programs offered by QEC are given next:

### Phys 104 - General Physics (4 h)

Electromagnetism: Coulomb's law in the electric fields, Gauss law, Electric potential, Energy stored, Capacitance and dielectrics, Current and resistance, Electric energy and power, Direct current circuits, Kirchhoff "s Rules, Magnetic fields, Motion of a charged particle in a magnetic field, Sources of the Magnetic fields, Ampere's law, Faraday 's law, in the inductance, Mutual inductance, Alternative current circuits, RMS values, Impedance, Resonance, Power in RLC circuits. **Nuclear Physics:** Photoelectric effect, Atomic spectrum, Bohr model, Nuclear structure, Radioactivity Decay, Half life, Radioactive Decay.

**CHEM 111 - General Chemistry (4 h)**

Stoichiometry: SI Units, chemical formulas, the mole, methods of expressing concentration, Calculations based on chemical equations

Gases: laws, kinetic theory, deviation and van der Waals equation

Thermochemistry: Types of enthalpy changes, Hess Law and its applications,, first law of thermodynamics

Solutions: Type of solutions and laws related, colligative properties

Chemical kinetics: Law of reaction rate, reaction order, factors affecting the rates

Chemical Equilibrium: Relation between Kc & Kp, Le Chatelier's principle and factor affecting equilibrium. Ionic equilibrium: Acid and base concepts, pH calculations of acid, base and buffer solutions

Atomic Structure: emission spectrum, Bohr's theory de Broglre's hypothesis, quantum numbers, electronic configuration of elements, consequences of the periodic table

**Math 105 - Differential Calculus (3 h)**

Real numbers, Functions, Limits, Continuity. Derivatives, Differentials, Chain Rule, Implicit Differentiation. Higher Order Derivatives, Local Extrema, Concavity, Horizontal and Vertical Asymptotes, Applications of Extrema, related rates. Rolle's Theorem, Mean Value Theorem, Inverse Trigonometric Functions

**Math 106 - Integral Calculus (3 h)**

**Fundamental theorem of calculus, the definite and indefinite integral, numerical integration. Area, volume of revolution, work, arc length. Differentiation and integration of inverse trigonometric functions. The logarithmic, exponential, hyperbolic and inverse hyperbolic functions. Techniques of integration: substitution, by parts, trigonometric substitutions, partial fractions, miscellaneous substitutions. Indeterminate forms, improper integrals. Polar coordinates.**

**Math 107 - Linear Algebra & Analytic Geometry (3 h)**

Introduction to the conic sections, The parabola; translation of coordinate axes, The ellipse, The Hyperbola, Rotation of axes; second degree equation. Systems of linear equations and matrices: Introduction, Gaussian elimination, Matrices and matrix operations, Inverses; Rules of matrix arithmetic, Elementary matrices and a method for finding $A^{-1}$, Further results on systems of equations and inevitability, Diagonal, Triangular and symmetric Matrices. Determinants: Determinants by cofactor expansion, Evaluating determinants by row reduction, Properties of the determinant function, A combinatorial approach to determinants Vectors in 2-space and 3-space: Introduction to vectors, Norms of a vector; vector arithmetic, Dot product, Lines and planes in 3-space.

**Math 203- Differential and Integral Calculus (3 h)**

**Infinite series, convergence and divergence of infinite series, integral test, ratio test, root test and comparison test. Conditional convergence and absolute convergence, alternating series test. Power series. Taylor and Maclaurin series. Functions in two or three variables, their limits, continuity and differentiability, The chain rule, Directional derivatives; gradient, Tangent planes, Maxima and Minima for**

**function in two or three variables, Lagrange multipliers, Double integral and its applications to area, volume, moments and center of mass. Double integrals in polar coordinates. Triple integral in rectangular, cylindrical and spherical coordinates and applications to volume, moment and center of mass. Vector fields, line integrals, surface integrals, Green's theorem, the divergence theorem. Stoke's theorem.**

**Math 208** - **Differential equations (3 h)**

Different types of first order differential equations and its applications. Linear differential equations of higher order. Linear differential equations with constant coefficients. Reduction of the order. Series solution of ordinary differential equations. Frobenius's method. Fourier series of odd and even functions. Integration of Fourier series

**GE 104 - Basics of Engineering Drawing (3 h)**
Geometrical construction and basics of lettering, Sketching, Orthographic projection, Sectional and auxiliary views, Dimensioning, Introduction to computer graphics.

**GE 105 - Basics of Engineering Technology (2 h)**
Introduction; Function and planning of workshop; Properties of materials and their applications; Non-ferrous Metals - Ferrous Alloys Production of Iron and Steel, Plain Carbon and Alloy Steels - Tool Steels and the Iron-Carbon Diagram - Heat Treatments of Steels: Heating, Quenching, Tempering, Annealing, Aging, and Surface Hardening, Destructive and Nondestructive Testing of Metals. Workshop metrology; Basic bench work operations; Machining operations; Tools, equipment and machinery used in basic workshop processes: turning, milling, grinding, forging, sheet metal-work; Welding processes: gas welding, arc welding, spot welding. Casting processes: sand casting, die casting; Industrial safety

**CSC 209** – **Computer Programming (3 h)**

Introduction to computers and computing fundamentals in JAVA, Data Types, Variables, Operators, Control Structures, Simple input/output statement, Classes & Objects, Methods, Relational and logical expressions, IF-ELSE control structure, The WHILE statement, The FOR statement and looping structure, Introduction to Swing & graphical user interfaces, Arrays Matrix Methods, Vectors, String, Engineering Applications.

**GE 211 - Introduction to Engineering Design-I 3 (2, 4, 0)**

Engineering design or how engineers approach and solve problems; process and product design; quality principles; working in teams; presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

**GE 213-Introduction to Engineering Design-2(2 h)**

Computer or mathematical modeling of process and product, continuation of quality principles, working in teams, presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self-regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

**GE 401** - **Engineering Economy (3 h)**

**Introduction to engineering economy. Interest formulas and equivalence. Bases for comparison of alternatives. Decision making among alternatives. Evaluating replacement alternatives. Break-even and minimum cost analysis. Cost accounting. Depreciation. Economic analysis of operations. Economic analysis of public projects.**

**GE 405** - **Cooperative Training (9 h)**

The student starts the Cooperation Training during the summer that precedes his final year of study and continues to the end of the next semester in either the Governmental or Private sectors. At the end of training, student must prepare a detailed report which will be orally examined by a special committee of faculty professors.

## The elective courses:

**Stat 324 - Probabilities and statistics (3 h)** Some discrete probability distributions (Uniform, binomial, multinomial, hyper-geometric, negative binomial, geometric and Poisson distributions, Mean and variance for these distributions, relationship between Poisson and hyper-geometric with binomial distributions) **Some continuous probability distributions** (Uniform, standard Normal, Normal, Area under the normal curve, Application of the normal distribution, mean and variance, Normal approximation to the binomial) **Fundamental sampling distributions and data descriptions** (Random sampling, some important statistics, Sampling distribution ( central limit theorem), Sampling distribution of mean and difference between two means for large samples (and for small samples taken from normal distribution), t-distribution (its applications) **One- and Two-sample estimation Problems** (Statistical Inferences, Classical method of estimation, Estimating the mean, Standard error of a point estimate, Prediction Interval, Estimating the difference between two means (for known and unknown (equal) variances ), Estimating a Proportion, determination of the sample size at a specified error) **One-and two-sample tests of hypotheses** (Null and Alternative hypotheses, type I error, type II error, one and two tailed tests, P value, tests concerning a single mean, tests on two means (for variance known and unknown), test on a single proportion) **Simple Linear Regression** (Least squares and the fitted model, Properties of the least square estimators, Inferences concerning the regression coefficients, prediction)

**Math 244 – Linear algebra (3 h)**

General review of vectors in space and its engineering applications, Euclidean n–space, linear transformation from n-space to m-space and its properties. General vector in space, subspaces, linear independence, row space, column space, and nullspace. Inner products in space, angle and orthogonality in inner product spaces, best approximation: least squares, orthogonal matrices. Eigenvalues and eigenvectors.

**Math 254 - Numerical Methods (3 h)**

Numerical Solution of non-linear equations and associated errors, convergence rate, solution of system of equations by direct and repeated methods and associated errors, Interpolation and polynomial approximation and associated errors, Numerical differentiation and integration and associated errors, Introduction to numerical solutions for ordinary differential equations

**Math 322 – Partial Differential Equations (3 h)**

Classification the partial differential equations according the order and linearity, Gamma and Beta functions, The Boundary value problem and orthogonal system, Expansion the functions in Bessel and Legendre functions, Solution of the heat equation by separation of the variable, The governing equation of string., Solution of the wave equation by D'almbert method, Solution of Laplace equation in different regions.

**Math 328 – Applied operational researches (3 h)** Introduction to operation research methodology and applications, Building of mathematical models, Linear programming models, The simplex algorithm, Duality and sensitivity analysis, Transportation and assignment models, Network models, Integer programming, Using Optimization Software.

## Electrical Engineering Department

**Vision:**

The electrical engineering department aims to be recognized locally, regionally and internationally as a leading department providing high quality programs and services in electrical engineering fields.

**Mission :**

The electrical engineering department seeks to meet the needs of the Saudi society and the region with outstanding electrical engineering programs in education, research, and community service.

**About:**

Electrical engineers are essential to almost every industry. It is in fact difficult to imagine a modern industry without the services of Electrical engineers. Electrical engineering has been and continues to be a corner stone in every new technical development. The job of Electrical engineers usually involves design, feasibility studies, cost analysis studies, installation, operation, and maintenance of plants, processes, or equipment. The focusing of the Electrical engineering department is on teaching, community service, and research. The department faculty recognize the need to provide the graduating engineer with the appropriate background in order to meet the challenges and large demands of a fast growing country such as the Kingdom. The department of Electrical engineering mission is to provide education of quality, research, and community services that cover a broad spectrum of Electrical engineering areas. These areas include evaluation, design, operation, and maintenance of integrated governmental, industrial, and service systems

**Objectives:**

1- Preparation of the graduates to have a successful career as electrical engineers in governmental and private sectors.

2- Preparation of the graduates to pursue their professional development through self learning and advanced degrees.

3- Preparation of the graduates to advance to positions of leadership in their profession.

4- Preparation of the graduates to effectively participate in the sustainable development of the Saudi Society.

**Degrees:**

- **Bachelor**

**Programs:**

- B.SC Degree Program in Power Engineering
- B.SC Degree Program in Electronics and Communication Engineering

**First Program: B.SC Degree Program in Power Engineering:**

### Study Plan:

**Level 3**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IS 101 | Introduction to Islamic culture | 2 | 2 | - | - | - | - |
| ARB 101 | Linguistic skills | 2 | 2 | - | - | - | - |
| Phys 104 | General Physics | 4 | 3 | 2 | - | - | - |
| GE 104 | Basics of Engineering Drawing | 3 | 1 | 4 | - | - | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Math 105 | Differential Calculus | 3 | 3 | - | 1 | - | - |
| Chem 111 | General Chemistry | 4 | 3 | 2 | - | - | - |
| **Total credit hours 18** | | | | | | | |

**Level 4**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IS 102 | Islam and Community Building | 2 | 2 | - | - | - | - |
| GE 105 | Basics of Engineering Technology | 2 | 1 | 2 | - | GE 104 | - |
| Math 106 | Integral Calculus | 3 | 3 | - | 1 | Math 105 | - |
| EE 201 | Fundamentals of Electric Circuits | 3 | 3 | - | 1 | Phys 104 | - |
| CSC 209 | Computer Programming | 3 | 2 | 2 | - | - | - |
| GE 210 | Engineering Mechanics | 3 | 3 | - | 1 | Math 107 | Math 106 |
| Math 107 | Linear Algebra & Analytic Geometry | 3 | 3 | - | 1 | - | - |
| **Total credit hours 19** | | | | | | | |

**Level 5**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 103 | Economic System in Islam | 2 | 2 | - | - | - | - |
| EE 202 | Electric Circuit Analysis | 3 | 3 | - | 1 | EE 201 | - |
| EE 203 | Electromagnetism | 3 | 3 | - | 1 | Phys 104 | - |
| Math 203 | Differential and Integral Calculus | 3 | 3 | - | 1 | Math 106 | - |
| EE 205 | Electric Circuits Laboratory | 1 | - | 2 | - | - | EE 202 |
| EE 208 | Logic Design | 3 | 3 | - | 1 | - | - |
| EE 210 | Logic Design Laboratory | 1 | - | 2 | - | - | EE 208 |
| GE 211 | Introduction to Engineering Design-I | 3 | 2 | 4 | - | | |
| **Total credit hours 19** | | | | | | | |

**Level 6**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| Math 208 | Differential equations | 3 | 3 | - | 1 | Math 203 | - |
| GE 213 | Introduction to Engineering Design-2 | 2 | 2 | 2 | - | GE 211 | - |
| Math +++ | Elective Mathematics-1 | 3 | 3 | - | 1 | - | - |
| EE 300 | Instruments & | 3 | 2 | 2 | - | EE 20 | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Electrical Measurements | | | | | 5 | |
| **EE 301** | Signals and systems Analysis | 3 | 3 | - | 1 | EE 202 | - |
| **EE 312** | Electronics - 1 | 3 | 3 | - | 1 | EE 202 | - |
| **EE 313** | Electronics Laboratory – 1 | 1 | - | 2 | - | - | EE 312 |
| **Total credit hours 18** | | | | | | | |

Level 7

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **ARB 103** | Arabic Writing | 2 | 2 | - | - | - | - |
| **ME 321** | Mechanical power engineering | 3 | 3 | - | 1 | Phys 104 | - |
| **EE 330** | Electric Machines - 1 | 3 | 3 | - | 1 | EE202, EE203 | - |
| **EE 340** | Fundamentals of Power Systems | 3 | 3 | - | 1 | EE202, EE203 | - |
| **Math +++** | Elective Mathematics 2 | 3 | 3 | - | 1 | - | - |
| **EE 354** | Microprocessors and Interface Circuits | 3 | 2 | 2 | - | EE 301 | - |
| **+++** | Free Course | 2 | - | - | - | - | - |
| **Total credit hours 19** | | | | | | | |

Level 8

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **IS 104** | Political System in Islam | 2 | 2 | - | - | - | - |
| **EE 331** | Electric Machines - 2 | 3 | 3 | - | 1 | EE 330 | - |
| **EE 332** | Electric Machines Laboratory | 1 | - | 2 | - | - | EE 331 |
| **EE 343** | Power Systems Analysis | 3 | 3 | - | 1 | EE 340 | - |
| **EE 344** | Power Systems Laboratory | 1 | - | 2 | - | - | EE 343 |
| **GE 401** | Engineering Economy | 3 | 3 | - | 1 | - | - |
| **EE 432** | Power Electronics | 3 | 3 | 1 | 1 | EE 312 | - |
| **EE 351** | Principles of Control Systems | 3 | 3 | - | 1 | EE 301 | - |
| **Total credit hours 19** | | | | | | | |

Level 9

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **GE 405** | Cooperative Training | 9 | - | - | - | - | - |
| **Total credit hours 9** | | | | | | | |

Level 10

| Cour | Course | C | L | L | T | Pr | Co |
|---|---|---|---|---|---|---|---|

| Course Code | Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **EE 446** | High Voltage Engineering | 3 | 3 | - | 1 | EE 340 | - |
| **EE 482** | Design of Electrical Protection Systems | 3 | 3 | - | 1 | EE 340 | - |
| **EE 4xx** | Elective Course - 1 | 3 | - | - | - | - | - |
| **EE 4xx** | Elective Course - 2 | 3 | - | - | - | - | - |
| **+++** | Free Course | 3 | - | - | - | - | - |
| **EE 400** | Graduation Project | 3 | - | - | - | GE 405 | - |
| **Total credit hours 18** | | | | | | | |

**The Elective Courses**

In the 10th semester the student should select some elective courses not less than 6 hours

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **EE 401** | Electrical Standard Specifications | 3 | 3 | - | 1 | EE343, EE331 | - |
| **EE 411** | Programmable Logic Controllers | 3 | 3 | - | 1 | EE 354 | - |
| **EE 441** | Electric Energy Utilization | 3 | 3 | - | 1 | EE 340 | - |
| **EE 443** | Control and Operation of Power Systems | 3 | 3 | - | 1 | EE 343 | - |
| **EE 444** | Planning and Design of Power Systems | 3 | 3 | - | 1 | EE 343 | - |
| **EE 445** | Industrial Power Systems Design | 3 | 3 | - | 1 | EE 340 | - |
| **EE 447** | Computer Applications in Power Systems | 3 | 3 | - | 1 | EE 343 | - |
| **EE 448** | Selected Topics in Power Systems | 3 | 3 | - | 1 | EE 343 | - |
| **EE 433** | Special Electrical Machines | 3 | 3 | - | 1 | EE 331 | - |
| **EE 434** | Selection and Installation of Motors | 3 | 3 | - | 1 | EE 331 | - |
| **EE 435** | Electric Drive Systems | 3 | 3 | - | 1 | EE432, EE331 | - |
| **EE 436** | Advanced Topics in Power Electronics | 3 | 3 | - | 1 | EE 432 | - |
| **EE 438** | Selected Topics in Electrical Machines | 3 | 3 | - | 1 | EE 331 | - |
| **EE 455** | Applied Control | 3 | 3 | - | 1 | EE 351 | - |
| **EE 456** | Digital Control Systems | 3 | 3 | - | 1 | EE 351 | - |

**Second Program: B.Sc. Degree in Electronics and Communication Engineering:**

### Level 3

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 101 | Introduction to Islamic culture | 2 | 2 | - | - | - | - |
| ARAB 101 | Linguistic skills | 2 | 2 | - | - | - | - |
| Phys 104 | General Physics | 4 | 3 | 2 | - | - | - |
| GE 104 | Basics of Engineering Drawing | 3 | 1 | 4 | - | - | - |
| Math 105 | Differential Calculus | 3 | 3 | - | 1 | - | - |
| Chem 111 | General Chemistry | 4 | 3 | 2 | - | - | - |
| Total credit hours 18 | | | | | | | |

### Level 4

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 102 | Islam and Community Building | 2 | 2 | - | - | - | - |
| GE 105 | Basics of Engineering Technology | 2 | 1 | 2 | - | GE 104 | - |
| Math 106 | Integral Calculus | 3 | 3 | - | 1 | Math 105 | - |
| EE 201 | Fundamentals of Electric Circuits | 3 | 3 | - | 1 | Phys 104 | - |
| CSC 209 | Computer Programming | 3 | 2 | 2 | - | - | - |
| GE 210 | Engineering Mechanics | 3 | 3 | - | 1 | - | Math 106, Math 107 |
| Math 107 | Linear Algebra & Analytic Geometry | 3 | 3 | - | 1 | - | - |
| Total credit hours 19 | | | | | | | |

### Level 5

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 103 | Economic System in Islam | 2 | 2 | - | - | - | - |
| EE 202 | Electric Circuit Analysis | 3 | 3 | - | 1 | EE 201 | - |
| EE 203 | Electromagnetism | 3 | 3 | - | 1 | Phys 104 | - |
| Math 203 | Differential and Integral Calculus | 3 | 3 | - | 1 | Math 106 | - |
| EE 205 | Electric Circuits Laboratory | 1 | - | 2 | - | - | EE 202 |
| EE 208 | Logic Design | 3 | 3 | - | 1 | - | - |
| EE 210 | Logic Design Laboratory | 1 | - | 2 | - | - | EE 208 |
| GE 211 | Introduction to Engineering Design-I | 3 | 2 | 4 | - | | |

**Total credit hours 19**

### Level 6

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| Math 208 | Differential equations | 3 | 3 | - | 1 | Math 203 | - |
| GE 213 | Introduction to Engineering Design-2 | 2 | 2 | 2 | - | GE 211 | - |
| Math +++ | Elective Mathematics - 1 | 3 | 3 | - | 1 | - | - |
| EE 300 | Instruments & Electrical Measurements | 3 | 2 | 2 | - | EE 205 | - |
| EE 301 | Signals and systems Analysis | 3 | 3 | - | 1 | EE 202 | - |
| EE 312 | Electronics - 1 | 3 | 3 | - | 1 | EE 202 | - |
| EE 313 | Electronics Laboratory - 1 | 1 | - | 2 | - | - | EE 312 |
| **Total credit hours 18** | | | | | | | |

### Level 7

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| ARAB 103 | Arabic Writing | 2 | 2 | - | - | - | - |
| EE 317 | Electronics-2 | 3 | 3 | - | 1 | EE 312 | - |
| EE 319 | Electronics Laboratory-2 | 1 | - | 2 | - | - | EE 317 |
| EE 320 | Communications Principles | 3 | 3 | - | 1 | EE 301 | - |
| Math +++ | Elective Mathematics - 2 | 3 | 3 | - | 1 | - | - |
| EE 354 | Microprocessors and Interface Circuits | 3 | 2 | 2 | - | EE 208 | - |
| CEN 355 | Principles of Networks Engineering | 2 | 2 | - | 1 | - | - |
| +++ | Free Course | 2 | - | - | - | - | - |
| **Total credit hours 19** | | | | | | | |

### Level 8

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 104 | Political System in Islam | 2 | 2 | - | - | - | - |
| EE 322 | Digital Communications | 3 | 3 | - | 1 | EE 320 | - |
| EE 326 | Communications Laboratory | 1 | - | 2 | - | EE 320 | EE 322 |
| EE 401 | Engineering Economy | 3 | 3 | - | 1 | - | - |
| EE 351 | Principles of Control Systems | 3 | 3 | - | 1 | EE 301 | - |
| GE 405 | ICs Technology and Applications | 3 | 3 | - | 1 | EE 317 | - |
| EE 406 | Integrated Circuits | 1 | - | 2 | - | - | EE 40 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Laboratory | | | | | | 5 |
| EE 423 | Wave Propagation and Antennas | 3 | 3 | - | 1 | EE 203 | - |
| **Total credit hours 19** | | | | | | | |

**Level 9**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| GE 405 | Cooperative Training | 9 | - | - | - | - | - |
| **Total credit hours 9** | | | | | | | |

**Level 10**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| EE 420 | Information Theory and Coding | 3 | 3 | - | 1 | EE 320 | - |
| EE 463 | Mobile Communications | 3 | 3 | - | 1 | EE 320 | - |
| EE 4xx | Elective Course - 1 | 3 | - | - | - | - | - |
| EE 4xx | Elective Course - 2 | 3 | - | - | - | - | - |
| +++ | Free Course | 3 | - | - | - | - | - |
| EE 400 | Graduation Project | 3 | - | - | - | GE 405 | - |
| **Total credit hours 18** | | | | | | | |

**The Elective Courses**

In the 10th semester the student should select some elective courses not less than 6 hours

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| EE 412 | Industrial Electronics | 3 | 3 | - | 1 | EE 317 | - |
| EE 413 | Power Electronics | 3 | 3 | - | 1 | EE 312 | - |
| EE 411 | Programmable Logic Controllers | 3 | 3 | - | 1 | EE 354 | - |
| EE 417 | Communication Electronics | 3 | 3 | - | 1 | EE 317, EE 320 | EE 322 |
| EE 418 | Analog and Digital Filters | 3 | 3 | - | 1 | EE 317 | - |
| EE 419 | Selected Topics in Electronics | 3 | 3 | - | 1 | EE 317 | - |
| EE 421 | Telephone Systems and Traffic Analysis | 3 | 3 | - | 1 | EE 320 | EE 322 |
| EE 462 | Communication Theory | 3 | 3 | - | 1 | EE 320 | EE 322 |
| EE 424 | Optical Communication Networks | 3 | 3 | - | 1 | EE 317, EE 320 | - |
| EE 425 | Computer Network Security | 3 | 3 | - | 1 | EE 355, EE 320 | - |
| EE 427 | Microwave Engineering | 3 | 3 | - | 1 | EE 320 | EE 322 |
| EE 428 | Satellite Communications | 3 | 3 | - | 1 | EE 320 | EE 322 |
| EE 429 | Selected Topics in Communications | 3 | 3 | - | 1 | EE 320 | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| EE 450 | Industrial Instrumentation | 3 | 3 | - | 1 | EE 208 ,EE 317 , EE 351 | - |
| EE 456 | Digital Control Systems | 3 | 3 | - | 1 | EE 351 | - |
| EE 465 | Network Architecture and Protocols | 3 | 3 | - | 1 | CEN 355 , EE 320 | - |

## Course Description:

**CEN 355 Principles of Network Engineering(2h)**

Introduction to networking principles. Communication channels and their capacity. Multiplexing and switching principles. Packet switching networks. Network structures . High speed networks. Local area networks (LAN's). Ethernet. Wide area networks (WAN's). Switches, Routers and Hubs. Internet, Extranet and Intranet principles. Network standards and OSI model. Network services and their benefits

**Chem 111 General Chemistry (4 h )**

Stoichiometry: SI Units, chemical formulas, the mole, methods of expressing concentration, Calculations based on chemical equations

Gases: laws, kinetic theory, deviation and van der Waals equation

Thermochemistry: Types of enthalpy changes, Hess Law and its applications,, first law of thermodynamics

Solutions: Type of solutions and laws related , colligative properties

Chemical kinetics: Law of reaction rate, reaction order, factors affecting the rates

Chemical Equilibrium : Relation between Kc & Kp, Le Chatelier's principle and factor affecting equilibrium. Ionic equilibrium: Acid and base concepts, pH calculations of acid, base and buffer solutions

Atomic Structure: emission spectrum, Bohr's theory de Broglre's hypothesis, quantum numbers , electronic configuration of elements, consequences of the periodic table

In practical part, the student should do at least 14 experiments.

**CSC 209 Computer Programming (3h)**

Introduction to computers and computing fundamentals in JAVA, Data Types, Variables, Operators, Control Structures, Simple input/output statement, Classes & Objects, Methods, Relational and logical expressions, IF-ELSE control structure , The WHILE statement , The FOR statement and looping structure, Introduction to Swing & graphical user interfaces, Arrays Matrix Methods, Vectors , String , Engineering Applications.

**EE 201 Fundamentals of Electric Circuits (3 h)**

Basic circuit elements and concepts; Basic laws of circuit theory: Ohm's law, Kirchoff's law; Circuit theorems: superposition principle, Thevenin and Norton theorems; maximum power transfer theorem, Techniques of DC circuit analysis: Nodal and mesh analysis; Sinusoidal sources and the concept of phasor in circuit analysis Techniques of AC circuit analysis: Nodal and mesh analysis.

**EE 202 Electric Circuit Analysis (3 h)**

Introduction to concept of active, reactive, complex power and power factor.Three phase circuits; Introduction to Op-Amp: ideal characteristics with simple applications; Frequency response of RLC and resonance; Natural and step response of first and second order circuits; Laplace transform in circuit analysis; Introduction to frequency selective circuits: passive filters, Bode plots; Two-Port networks; Mutual inductance and transformers.

### EE 203 Electromagnetism (3 h)

Review to vector calculus; Electrostatic fields; Gauss's law and divergence; Electric potential; Dielectrics and capacitance; Poisson's and Laplace's equations; Charge images; Current density and conductors; Magnetostatic fields; Biot–Savart and Ampere's laws; Curl and Stoke's theorem; Magnetic materials and circuits; Self and mutual inductances; Energy in static Fields, Introduction to electromagnetic waves.

### EE 205 Electric Circuits Laboratory (1 h)

General introduction to the laboratory Voltage, current, and power in DC circuits using KVL and KCL. Superposition, Thevenin's, and Maximum power transfer theorems in DC circuits; Series and parallel AC circuits; Resonance in series and parallel circuit; Maximum power transfer theorem and power factor improvement in AC circuits; Transients in DC circuits; Magnetically-coupled circuits; Three phase circuits.

### EE 208 Logic Design (3 h)

Introduction to Numbering Systems, including: Binary system, hexadecimal system, Binary codes (Gray and ASCII codes), Logic fates and logic functions, Boolean Algebra, De-Morgan laws, Representation of negative and fractional numbers in binary systems. Combinational Logic Circuits, including: Canonical forms, Simplification using logic algebra and Karnaugh maps (K-maps), Arithmetic logic Units, Half and full Adders, Subtractors, and multipliers. Multiplexers and Demultiplexers, Encoders and decoders, Comparators and Parity generators. Programmable Logic Devices (PLD's) and VHDL, including PAL' PLA's, GAL's, CPLD's and FPGA's, Fundamentals of VHDL. Sequential Logic Devices, including: State machines, Methods of representation, state transition diagrams and tables. Flip-flops (S-R, D, J-K, T, Master-Slave), Gated and clocked flip flops, edge-triggered flip flops. Registers, their types, their operation and applications. Counters, their types, their operation and applications. Introduction to Memory Devices, SRAM and DRAM cells, their operation and organization. Flash memory and its architecture and operation.

### EE 210 Logic Design Laboratory (1 h)

Familiarization with logic circuits laboratory; Introduction to logic gates; Implementation of Boolean functions using AND and OR gates; NAND and NOR implementation; XOR and adderss; Design of combinational circuits; Flip-flops; Design of sequential circuits; Sequential PLA's.

### EE 300 Instruments & Electrical Measurements (3 h)

Measurements fundamentals: units and standards, errors, statistical analysis; DC/AC meters construction; loading effect; insertion loss; Difference and instrumentation amplifiers; Oscilloscope: CRT, amplifiers, triggered sweep circuits, attenuation, specifications; Spectrum analyzer, Transducers and sensors: passive and self-generating transducers; Liquid crystal displays (LCDs), CCDs, and optical fiber sensors; Digital measurements: Data conversion principles; Digital voltmeter.

### EE 301 Signals and systems Analysis (3 h)

Introduction, including: continuous-time and discrete-time signals and systems, analog-to-digital and digital-to-analog conversion. Continuous Signals, including: linear time-invariant (LTI) systems and their properties, Fourier series, Fourier Transform (FT) and its inverse (IFT) and their properties. Convolution and Correlation theory. Discrete Signals, including: linear shift-invariant (LSI) systems and their properties, Discrete Fourier Transform (DFT) and its inverse (IDFT) and their properties. Z-Transform, its inverse and their properties. Mapping Theory, Fast Fourier transform (FFT). Parseval Theory. Sampling Theory, including: Nyquist sampling criterion, signal aliasing and reconstruction. Fundamentals to Signal processing, including: types of filters (LPF, HPF, BPF, SBF).

**EE 312 Electronics – 1 (3 h)**

Introduction to Semiconductors, including: Crystal lattice, bonds and energy bands in solids. P-N Junction including: Junction formation, I-V characteristics, forward and reverse bias, breakdown voltage. Applications of P-N Junction including Rectification, Zener diode, solar cells and light emitting diode (LED). Bipolar Junction Transistor (BJT), including: BJT types and operation, and its currents and current amplification factor. BJT modes of operation and biasing configurations. BJT current equations and Ebers Moll model. Operating point and bias stability. BJT small signal models and BJT operation as an amplifier. Metal-Oxide-Semiconductor Field Effect Transistor (MOSFET), including: MOSFET types and theory of operation. Channel formation in Enhancement-mode MOSFET and its I-V characteristics in linear and saturation modes. MOSFET biasing configurations. MOSFET small signal models and MOSFET operation as an amplifier.

**EE 313 Electronics Laboratory – 1 (1 h)**

Introduction to the lab tools. I-V characteristics of diode. Clipping circuits using diodes. Rectification using diodes. Zener diode and regulators. BJT dc biasing. CE BJT amplifier. MOSFET dc biasing. CS MOSFET amplifier. Simple AM receiver circuit, MOS digital circuits.

**EE 317 Electronics – 2 (3 h)**

Introduction to Semiconductors, including: Introduction, including basic electronic device and their theory of operation. Multi-stage amplifier, including: RC-Coupled Amplifiers, their frequency response and Bode plots. Feedback and Oscillators, including: Negative and positive feedback, Voltage and current feedback circuits, Stability of feedback amplifiers, Bode contours and Nyquist stability Criteria. Parkhausen criterion. Feedback oscillators (Phase-shift, Wien bridge, Hartley, Colpitts and Clapp oscillators), Negative resistance oscillators, Voltage-controlled oscillator (VCO) and phase-locked loops (PLL). Operational Amplifiers and their Applications, including: Opamp building blocks, linear and non-linear applications, Analog-to-digtal and digital-to-analog converters (ADC and DAC), Multivibrators. Digital Circuits, including: Transistor (BJT and MOSFET) as a switch, Swithching parameters, like fan-out, noise margins and propagation delay. Transistor-transistor logic (TTL) circuits and CMOS logic.

**EE 319 Electronics Laboratory – 2 (1 h)**

PSPICE simulation of electronic circuits. Linear applications of op-amp. Wein-bridge oscillator. Active filters: LPF, and HPF. Schmitt trigger and unstable multi-vibrator. Differential amplifier using BJT. Design and implementation of digital circuits using VHDL. CMOS inverter characteristics. TTL inverter characteristics.

**EE 320 Communications Principles (3 h)**

Basic Elements of a Communication System, including: types of communication systems and their building blocks, receiver, transmitter and channel. Wireless communication systems, Superheterodyne transceivers (TRX). Basic Modulation Techniques, including: Amplitude modulation (AM), Frequency modulation (FM), and phase modulation (PM). Pulse modulation Techniques, including: PAM, PWM and PPM, Pulse Code Modulation (PCM), Differential PCM (DPCM), Delta Modulation (DM). Signal Multiplexing, including: time division multiplexing (TDM), and frequency-division multiplexing (FDM). Introduction to Digital Modulation (Shift Keying), including amplitude-shift keying (ASK), frequency-shift keying (FSK) and phase-shift keying (PSK).

**EE 322 Digital Communications (3 h)**

Introduction to Digital Communications, including: random variables and probability distributions, signal-to-noise (S/N) ratio, probability of error. Coherent Digital Modulation Techniques, including amplitude-shift keying (ASK), frequency-shift keying (FSK) and phase-shift keying (PSK), quadratic PSK (QPSK), Minimum-shift keying (MSK), Gaussian MSK (GMSK). Orthogonal Digital Modulation Techniques. Orthogonal FDM (OFDM). Comparison between Digital Modulation Techniques, including bandwidth, power spectrum and probability of error. Introduction to Information Theory, including: Channel Capacity, source coding, channel coding, inter-symbol interference, error correcting coding techniques.

**EE 326 Communications Laboratory (1 h)**

Basic Modulation & modulation Techniques, including: Amplitude modulation (AM), Frequency modulation (FM). Signal Multiplexing, including: time division multiplexing (TDM), and frequency-division multiplexing (FDM). Superheterodyne radio receiver (RX), measurement of sensitivity, selectivity and fidelity, Pulse modulation Techniques, including: PAM, PWM and PPM, Pulse Code Modulation (PCM), Differential PCM (DPCM), Delta Modulation (DM). Digital Modulation (Shift Keying), including amplitude-shift keying (ASK), frequency-shift keying (FSK) and phase-shift keying (PSK: BPSK, QPSK, M-ary PSK, GMSK). Coding, including: Source Coding, Channel Coding and Error Correcting Codes.

**EE 330 Electric Machines – 1 (3 h)**

Transformers (construction, operation of single-phase transformers, equivalent circuit, voltage regulation and efficiency, auto-transformers, three-phase transformers), AC machinery fundamentals, Synchronous machines (components, internal voltage, equivalent circuit, phasor diagram, performance of turbo-alternator, generator operating alone, parallel operation of alternators, synchronous motors, steady-state operation, motor starting), synchronous machine dynamics: the swing equation, steady state and transient stability.

**EE 331 Electric Machines – 2 (3 h)**

Three-phase induction machines (construction, operation, equivalent circuit, performance characteristics, starting of induction motors, speed control), single-phase induction motors, fundamentals of d.c machines, DC machines (components, classification, performance, motor characteristics, starting of d.c motors, speed control of d.c motors).

**EE 332 Electric Machines Laboratory (1 h)**

Equivalent circuit of transformers; Three-phase connections and harmonic problems; Equivalent circuit of three-phase and single-phase induction motors; Load testing of induction motors; Starting of single-phase induction motors; Equivalent circuit of synchronous machine: Performance of synchronous motors; Terminal characteristics of dc machines

EE 340 Fundamentals of Power Systems (3 h)

Power system components and elements: generation – transmission - distribution; Generation of electrical energy: main sources – alternative sources; Transmission line conductors; Electric insulators: types – parameters; Transmission line parameters: series impedance, shunt admittance; Analysis of transmission lines: short line – medium line – long line; Power cables parameters: series impedance, shunt admittance; Analysis of distribution systems: radial system – ring system.

**EE 343 Power Systems Analysis (3 h)**

Per unit system; Power system matrices: bus admittance matrix – bus impedance matrix; Load flow analysis: Gauss-seidel method – Newton-Raphson method; Economic operation of generators: neglecting transmission line losses – including transmission line losses;

Symmetrical faults: Thevenin's method – bus impedance matrix method; Unsymmetrical faults: symmetrical components – Thevenin's method – bus impedance matrix method; Stability analysis: steady state stability – transient stability – equal area criterion.

**EE 344 Power Systems Laboratory (1 h)**

Transmission line characteristics; Reactive power compensation; Symmetrical and unsymmetrical fault analysis; Load-flow simulation; Transient stability simulation; Active and reactive power generator control; Characteristics of isolated and interconnected systems; Characteristics and coordination of protective relays

**EE 351 Principles of Control Systems (3 h)**

Review of mathematical background (complex variables, Laplace, Diff. Equations); System representation (block diagram, transfer functions, signal flow graph) Modeling of electric and mechanical systems; State variable analysis; Stability; Time domain analysis; Root locus; Frequency domain analysis; Introduction to PID control.

**EE 354 Microprocessors and Interface Circuits**

**(3 h)**

Introduction to Microprocessor Systems, including: microcomputer architecture, data, address and control buses, memory access and interrupts. Architecture of 80x86 Microprocessors, including 16-bit, 32 bit microprocessors, Pentium and Core2 microprocessors. Memory Organization & Segmentation, including memory segmentation and address generation (20-bit and 32-bit addresses). Instruction Set of 80x86 Microprocessors, including addressing modes, data-transfer instructions, logic and mathematic instructions, flow control, subroutines and interrupts, program control instructions, instruction decoding. Assembly Language and Programming of Intel microprocessors, including, DEBUG and Macro-assembler, Procedures and subroutines. Memory Interface Circuits. Interface Circuits for Input/Output Devices, programmable I/O (8255 PIO), examples, handshaking and microprocessor communications.

**EE 400 Graduation Project (3 h)**

The student is assigned, among a team of students and one or more faculty professors, the design of an applied project which simulates the real working condition to which the student will be exposed after graduation. The project should be comprehensive and includes all the necessary preliminary field studies, feasibility studies, final design drawings, bill of quantities, and the total operating cost of the project. The graduation project shall continue for one semester. At the end of the semester, there will be a seminar held for the working team of students to present the details of the project. The working team will be orally examined and evaluated based on the presentation as well as the oral discussion.

**EE 401 Electrical Standard Specifications (3 h)**

Introduction; harmonized standards; CE marking and conformity assessment of electric products; underwriter laboratories (UL) mark: mission of UL, types of UL marks; IEC standard marking (nameplate data & terminal marking) of electric products, motor marking, contactor marking, fuse marking, circuit breaker marking; safety of low voltage equipment (LVD), safety classification, IP code, electrical hazards; IEC standard sites and electric operating conditions for motors, HVF, imbalance factor, motor derating, standard motor testing, electromagnetic compatibility (EMC): emission; immunity, harmonic currents, third harmonic emission limits, flicker; standard classification of hazardous areas; types and standard marking of motors and electric equipment suitable for use in potentially explosive atmospheres.

**EE 405 ICs Technology and Applications (3 h)**

Introduction to IC Technology, including: crystalline silicon preparation, oxidation, impurity diffusion, ion implantation, die separation, pad contacts, Heat sinking, BJT and CMOS technology. Linear IC's and their Applications, including: operational amplifiers (OpAmps), the 741 IC, and operational trans-conductance amplifiers (OTA). Digital IC's and their Applications, including: Combinational logic MSI circuits, sequential logic IC's, VLSI circuits and memory IC's. Mixed IC's and their Applications, including: analog-to-digital converters (ADC) and digital-to-analog-converters (DAC), Timers and multi-vibrator IC's (555/556/557) and their applications in communications. Switched-mode power supplies (SMPS) IC's, PWM and DC-DC converter IC's.

**EE 406 Integrated Circuits Laboratory (3 h)**

Electronic Design Automation. Linear IC Measurements and Testing, Digital IC and their Testing, Mixed-Signal IC's measurement and Testing. Switched-mode Power Supply IC's.

**EE 411 Programmable Logic Controllers (3 h)**

Introduction (What's PLC?), PLC Architecture; including PLC building blocks (I/O ports, internal relays, timers, counters, serial ports, high-speed counters), PLC operation, scan cycle, PLC response time, case study: Siemens S7 PLC's, PLC's Memory Organization; including: input memory, output memory, S-memory, variable memory, config memory, external EEPROM, PLC Programming; including: PLC programming Languages (LAD, functional and STL), LAD and STL basic instructions, programming devices and compilers (STEP-7), program editing, designing and editing a PLC project, compiling, downloading, testing (simulation) and running, PLC Wiring; including: DC inputs, AC inputs, transistor and relay outputs, analog and digital Inputs, analog and digital outputs, PLC Communications; including: PLC communication busses, Fieldbus, Profibus, industrial Ethernet, Examples; including miscellaneous industrial applications.

**EE 412 Industrial Electronics (3 h)**

Power Devices, including: Power diodes, power BJT, thyristors, phase control, thyristor protection circuits. Stabilized Power Supplies, including: DC power supplies, stabilization using zener diodes, series regulators, shunt regulators, IC regulators, switch mode power supplies (SMPS). Energy Conversion, including: static converters, commutation circuits (natural and forced). Inverter Circuits, including: inverter circuits, push-pull and bridge inverters, commutation of inverters, sinewave inverters. Converters Circuits, including: DC-DC converters, Flyback DC converters, push-pull DC converters, bridge converters, DC-up and Dc-down converters. Transducers, including: strain gauges, temperature sensors, pressure and force measurements, optoelectronic sensors, proximity sensors. Operational Amplifiers Industrial Applications, including: Instrumentation Amplifiers, Bridge amplifiers. Assembly, Testing & Troubleshooting of Electronic Circuits, including: electronic circuits assembly, automatic test equipment, computer-aided assembly (pick and place) and manufacturing (CAM) systems.

**EE 413 Power Electronics (3 h)**

Power semiconductor devices: terminal characteristics; Power converters: ac-ac converters, rectifiers, inverters, dc-dc converters and resonant converters; Applications in power systems

**EE 417 Communication Electronics (3 h)**

Introduction to Analog and Digital Transceivers, including: Wireless and Cable systems, Heterodyne and Homodyne (Zero-IF) Radio Receivers, all-digital transceivers. Design and Synthesis of analog RF Transceiver, including:

Functional block diagram, Design of LNA, Mixers, VCO, Phase-locked loops (PLL), Frequency synthesizers, IF amplifiers, AM detectors, and FM discriminators. Design and Synthesis of Digital/Mixed-signal RF Transceiver, including: QPSK modulator/demodulator (modem), Timing and Clock recovery circuits, FSK circuits, GMSK modems, ASK and QAM circuits. Line Coding and Pulse Modulation Circuits, including: PCM modulators, Δ-� modulators and their variants. TV Receivers, including: Functional blocks of Monochrome TV, Video Transmission Standards (PAL, SECAM, NTSC) and Camera systems, Design of video amplifiers, SAW-IF amplifiers, sync separators, horizontal and vertical oscillators and AFC. Functional block diagram of Color TV receivers, Color signal representation and processing, Digital Video Broadcasting (DVB) and High-definition TV (HDTV).

**EE 418 Design of Analog and Digital Filters (3 h)**

Introduction to Theory of N-port networks, including: Transfer functions of linear and discrete systems and their representation in the frequency domain and using Z-Transform, Poles and Zeros. Filter Design, including: Types of filters in the frequency domain low-pass, high-pass, band-pass and stop-band filters, Types of Filters according to their Approximate characteristics, like Butterworth, Tchebychev, Elliptic (Cauer) and Gaussian filters. Analog Filter Synthesis (implementation), including: Sallen-Key general structure using Op-Amps, Quad filters, Negative-impedance converters (NIC) and Gyrators, Leapfrog filters, and gm-C filters (using OTA). Applications, including: RF, IF filters in cellular phones and radio transceivers, equalization of telephone cables and CATV. Digital Filters, including: Finite impulse response (FIR) and Infinite impulse response (IIR) filters. Fast Fourier Transform and Digital Signal Processors (DSP). Applications, including: voice and image processing and remote sensing.

**EE 419 Selected Topics in Electronics (3 h)**

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student

**EE 420 Information Theory and Coding (3 h)**

Basic definitions: Information, entropy for zero-memory (memoryless) sources. Variable length codes: Huffman code, Shannon_Fano code and code efficiency. Markov (memory) information sources. Rate distortion theory. Channel coding and channel capacity. Error detecting and error correction codes.

**EE 421 Telephone Systems and Traffic Analysis (3 h)**

The public telephone network hierarchy. PABX and Centrex. Transmission system: two-wire and four-wire, pair-gain systems. Transmission impairments: cross-talk, hybrid circuit, echo suppressor and echo canceller. Conventional and common channel signaling. Space and time division digital switching and blocking probability. Data and integrated services digital networks (ISDN) and packet switching.

Traffic analysis: loss system and delay system. Network blocking probability.

**EE 423 Wave Propagation and Antennas (3 h)**

Introduction to antennas and propagation; Basic propagation mnodels and antenna parameters; Ground wave propagation; Sky wave propagation; Space wave propagation; Statistical models and diversity principles; Propagation models in mobile radio systems; Antenna engineering in LF, MF, VHF and UHF systems; antenna a linear and planar arrays

**EE 424 Optical Communication Networks (3 h)**

Optical Fiber waveguides: light propagation in fiber, step-index and graded index fibers, optical fiber transmission modes and optical fiber fabrication and connections standard. Photonic semiconductor materials: spontaneous emission and lasing (stimulated) emission. Optical sources: LED and laser diodes. Photodetectors: PIN photodiode and APD avalanche photodiode. Optical amplifier and Erbium-Doped Fiber Amplifier (EDFA). Wavelength division multiplexing (WDM) and optical networking.

**EE 425 Computer Network Security (3 h)**

Introduction to cryptography and cryptanalysis; Basic definitions: Security services, attacks and mechanisms; conventional encryption algorithms : DES, IDEA, RC5 and Blowfish, key distribution; introduction to number theory, public key encryption algorithm : RSA ; message authentication code; hash function; digital signature and authentication protocols

**EE 427 Design of Microwave Systems (3 h)**

Different types of waveguides. Limitations of low-frequency components. Microwave materials (semiconductors, ferrites, etc.). Microwave tubes and solid-state devices: klystrons, magnetron, Gunn diodes, Impatt diodes, etc. Microwave circuit design. Directional couplers. Power dividers, equalizers, phase shifters. Microwave integrated circuit design: filters and amplifiers. Applications of microwaves.

**EE 428 Satellite Communications (3 h)**

Overview of satellite systems. Orbits and launching methods. The geostationary orbit. Modulations schemes and satellite multiple access (FDMA, TDMA, and CDMA). Space link analysis: Uplink, downlink and system noises. Satellite antennas: Antenna polarization and radiation pattern. Applications of satellites: Asynchronous transfer mode (ATM) over satellite networks, the internet, Direct broadcast satellite (DBS) television and satellite mobile services.

**EE 429 Selected Topics in Communications (3 h)**

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student

**EE 432 Power Electronics (3 h)**

Power semiconductor devices: terminal characteristics; Power converters: ac-ac converters, rectifiers, inverters, dc-dc converters and resonant converters; Applications in power systems

**EE 433 Special Electrical Machines (3 h)**

reluctance motor, stepper motor, eddy current motors, hysteresis motors, ac commutator motors, universal motor, two phase servo motor, linear induction motor, linear d.c motor

**EE 434 Selection and Installation of Motors (3 h)**

Motor duty types; motor mounting arrangement: IM code, cable selection, cable layout (power cable, control cable); motor methods of cooling: IC code, motor auxiliaries, impeded temperature detectors (ETD), requirements of motors thermal protection; short circuit protection: selection and sizing of load break switch, fuse and circuit breaker; selection and sizing of motor automatic starter: DOL, star/delta (open& closed transition) starter, auto transformer starter, SRIM starter, DC motor starter, Automatic starting of synchronous motor; selection of motor overload protection; selection and sizing of motor power factor correction capacitors; selection and sizing of motor controller.

**EE 435 Electric Drive Systems (3 h)**

Drive system components, D.C motor drive systems, D.C motors fed from single-phase rectifier circuits, D.C motors fed from three-phase rectifier circuits, chopper-fed D.C motors, induction motor drive systems, induction motors fed from A.C voltage controller, inverter-fed induction motors.

**EE 436 Advanced Topics in Power Electronics**

**(3 h)**

Advanced rectifier converters (star-double star with inter-phase reactor, 12 pulse rectifiers), rectifier converter operation (overlap, regulation, and power factor), frequency converters, analysis of three-phase ac voltage controllers, thyristor triggering circuits, thyristor commutation techniques, applications of power electronics.

**EE 438 Selected Topics in Electrical Machines**

**(3 h)**

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student

**EE 441 Electric Energy Utilization (3 h)**

Illumination: types of lamps, illumination schemes, calculation of illumination, requirements of proper lighting. Electric Heating: advantages of electrical heating, heating methods, design of resistance heating element. Electric Welding: advantages of electric welding, welding methods, comparison between AC and DC arc welding, welding control circuits. Electrolytic Processes: laws of electrolysis, process of electro-deposition, factors affecting electro-deposition, manufacturing of chemicals by electrolysis process. Refrigeration and Air Conditioning: principle of air conditioning, refrigeration cycle, eco-friendly refrigerants, electrical circuits used in refrigerator and air-conditioner. Electric Traction: advantages of electric traction, systems of electric traction, types of motors used for electric traction, starting and braking of traction motors.

**EE 443 Control and Operation of Power Systems (3 h)**

Concepts of power system operation; Network topology and incidence matrices; Formation of bus impedance matrix; Unit commitment; Optimal power flow; Automatic generation control (AGC); Energy management systems (EMS) and control centers operation; State estimation (SE); Dynamic security assessment (DSA).

**EE 444 Planning and Design of Power Systems**

**(3 h)**

Introduction to Power System Planning: Definitions, objectives, procedures, requirements; Load Characteristics: Definitions, types, load curves; Load Forecasting: Definitions, objectives, types, methodologies (time series); Introduction to Power System Reliability: Introduction, terms and definitions, reliability indices, reliability evaluation, service interruption, failure mode, outages; System Cost Assessment: Present worth value, investment and fixed costs, operating costs, case study (generation cost assessment); Transmission Line Planning and Design: Introduction, Kelvins law, Tollgem Theory, case study (design of a TL planning); Distribution System Planning and Design: Introduction, distribution system components, distribution substation site location, substation rating, substation service area with many primary feeders, percentage voltage drop, design of primary system, design of secondary system, case study (design of distribution system).

**EE 445 Industrial Power Systems Design (3 h)**

Construction of site Plans, site plan interpreting , unit substation , feeders and bus systems, Panel boards , using wire tables for determining conductor sizes , motor installation calculations , system protection and include: circuit barkers , fuses , over current protection devices , short circuit protection devices and their time- current characteristic charts.), lighting protection , installation in hazardous locations

**EE 446 High Voltage Engineering (3 h)**

Effect of Impulse voltage on the Circuit Breaker performance during short circuit interruption. Effect of Lightning on the high voltage network. Surge Over Voltage Protection ( Switching – Lightning ). Methods of Earthing ( Protective – Systems). Electrical Insulators ( Solid – Liquid – Gases ). High Voltage Test techniques. High Voltage Generation ( DC – AC – Impulse ).

**EE 447 Computer Applications in Power Systems (3 h)**

Computer applications in power system planning, Computer applications in power flow solution and control, Computer applications in power system fault analysis, Computer applications in power system dynamics and control, Computer applications in power system economic operation.

**EE 448 Selected Topics in Power Systems (3 h)**

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student

**EE 449 Power System Protection (3 h)**

Protection system principles and components; Short circuit calculations; Protective instrument transformers: VT- CVT- CT; Protective relays: electromechanical- static- digital- numerical; Circuit breakers: air blast- oil- vacuum- SF6; Over-current protection; Distance protection systems; Power frequency and carrier systems; Protection of generators- motors- transformers- busbars- reactors- capacitors; Protection of distribution systems; Station layout and configuration; Disturbance monitoring.

**EE 450 Industrial Instrumentation (3 h)**

Instrumentation and control. Signal and data acquisition and processing. Interfacing techniques. Physio-chemical principles of instrumentation. Force, torque, and pressure measurements. Temperature, flow, moisture, and humidity sensors. Digital transducers. Calibration techniques. Errors in measurements. Introduction to actuators. Norms and standardization. Introduction to intelligent instrumentation.

**GE 104 Basics of Engineering Drawing (3h)**
Geometrical construction and basics of lettering, Sketching, Orthographic projection, Sectional and auxiliary views, Dimensioning, Introduction to computer graphics.

**GE 105 Basics of Engineering Technology(2h)**

Introduction; Function and planning of workshop; Properties of materials and their applications; Non-ferrous Metals - Ferrous Alloys Production of Iron and Steel, Plain Carbon and Alloy Steels - Tool Steels and the Iron-Carbon Diagram - Heat Treatments of Steels: Heating, Quenching, Tempering, Annealing, Aging, and Surface Hardening, Destructive and Nondestructive Testing of Metals. Workshop metrology; Basic bench work operations; Machining operations; Tools, equipment and machinery used in basic workshop processes: turning, milling, grinding, forging, sheet metal-work; Welding processes: gas welding, arc welding, spot welding. Casting processes: sand casting, die casting; Industrial safety

**GE 201 Statics (3h)**

Force systems; vector analysis of forces, moments and couples in 2 and 3 dimensions. Equilibrium of force systems. Analysis of structures; plane trusses and frames. Distributed force system; centroids and composite bodies. Area moments of inertia. . Friction

**GE 202 Dynamics (3h)**

Kinematics of a particle: curvilinear motion, and relative motion; Kinetics of particles: Newton's law, work and energy, impulse and momentum, and impact; Kinematics of a rigid body in plane motion: relative velocity and acceleration, and rotating axes; Kinetics of a rigid body in plane motion: translation, fixed axis rotation, general equation of motion, work and energy, and impulse and momentum..

**GE 211 Introduction to Engineering Design-I (3h)**

Engineering design or how engineers approach and solve problems; process and product design; quality principles; working in teams; presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

**GE 213 Introduction to Engineering Design-2 (2h)**

Computer or mathematical modeling of process and product, continuation of quality principles, working in teams, presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self-regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

**GE 401 Engineering Economy (3h)**

**Introduction to engineering economy. Interest formulas and equivalence. Bases for comparison of alternatives. Decision making among alternatives. Evaluating replacement alternatives. Break-even and minimum cost analysis. Cost accounting. Depreciation. Economic analysis of operations. Economic analysis of public projects.**

**GE 402 Project Management (3h)**

Basic Management Process approach, Defining Project, Project life cycle, Balancing competing demands with triple constraints, Strategies and planning, methods, Project planning and scheduling, integrated project planning, Quality management, Bar-charts and Gantt Chart, critical path methods, PERT method, resource leveling and allocation, time-cost trade off. Construction and organizational approaches, leadership elements, and decision making. Time and cost control, Project Closing. computer applications

**GE 405 Cooperative Training (9h)**

The student starts the Cooperation Training during the summer that precedes his final year of study and continues to the end of the next semester in either the Governmental or Private sectors. At the end of training, student must prepare a detailed report which will be orally examined by a special committee of faculty professors.

## Civil Engineering Department

**Vision:**

The civil engineering department aims to be recognized locally, regionally and internationally as a leading department providing high quality programs and services in civil engineering fields.

**Mission:**

The civil engineering department seeks to meet the needs of the Saudi society and the region with outstanding civil engineering programs in education, research, and community service

**About:**

The oldest and most elegant branch of engineering profession in engineering colleges all over the world and that is due to the fact that civil engineering is related to almost all aspects of civilization. Many of the important things in our lives that we take for granted are the product of civil engineering. Civil engineer deals with a wide variety of engineering aspects such as designing, construction, and maintenance of different structure (buildings, embankments, storage tanks, dams, roads, water and wastewater networks, irrigation and drainage networks, etc…..), solving execution problems, managing engineering and construction projects, and it just does not end there. Civil engineer also has a significant role in planning and managing transportation systems, terrific safety, conservation and development of water resources, treatment and reuse of wastewater, and the list extends.

**Objectives:**

1- Preparation of the graduates to have a successful career as civil engineers in governmental and private sectors.

2- Preparation of the graduates to pursue their professional development through self-learning and advanced degrees.

3- Preparation of the graduates to advance to positions of leadership in their profession.

4- Preparation of the graduates to effectively participate in the sustainable development of the Saudi Society.

**Degrees:**

- **Bachelor**

**Programs:**

B.Sc. Degree Program in Civil Engineering

## Study Plan (Civil Engineering):

**Level 3**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 101 | Introduction to Islamic culture | 2 | 2 | - | - | - | - |
| ARB 101 | Linguistic skills | 2 | 2 | - | - | - | - |
| Phys 104 | General Physics | 4 | 3 | 2 | - | - | - |
| GE 104 | Basics of Engineering Drawing | 3 | 1 | 4 | - | - | - |
| Math 105 | Differential Calculus | 3 | 3 | - | 1 | - | - |
| Chem 111 | General Chemistry | 4 | 3 | 2 | - | - | - |
| **Total credit hours 18** | | | | | | | |

**Level 4**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 102 | Islam and Community Building | 2 | 2 | - | - | - | - |
| GE 105 | Basics of Engineering Technology | 2 | 1 | 2 | - | GE 104 | - |
| Math 106 | Integral Calculus | 3 | 3 | - | 1 | Math 105 | - |
| CE 285 | Introduction to Geotech | 2 | 2 | - | 1 | - | - |

College of Engineering in Unaizah

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | nical Engineering | | | | | | |
| GE 201 | Statics | 3 | 3 | - | 1 | - | - |
| CSC 209 | Computer Programming | 3 | 2 | 2 | - | - | - |
| Math 107 | Linear Algebra & Analytic Geometry | 3 | 3 | - | 1 | - | - |
| **Total credit hours 18** | | | | | | | |

**Level 5**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 103 | Economic System in Islam | 2 | 2 | - | - | - | - |
| ARB 103 | Arabic Writing | 2 | 2 | - | - | - | - |
| GE 202 | Dynamics | 3 | 3 | - | 1 | GE 201 | - |
| CE 202 | Mechanics of Materials | 3 | 3 | - | 1 | Math 203, GE201 | - |
| Math 203 | Differential and Integral Calculus | 3 | 3 | - | 1 | Math 106 | - |
| GE 211 | Introduction to Engineering Design-I | 3 | 2 | 4 | - | - | - |
| CE 112 | Survey Basics | 2 | 1 | 2 | - | Math 107 | - |
| **Total credit hours 18** | | | | | | | |

**Level 6**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| CE 203 | Structural Materials | 3 | 2 | 2 | - | CE 202 | - |
| Math 208 | Differential equations | 3 | 3 | - | 1 | Math 203 | - |
| GE 213 | Introduction to Engineering Design-2 | 2 | 2 | 2 | - | GE 211 | - |
| ME 229 | Thermodynamics and Heat transfer | 3 | 3 | - | 1 | Phys 104 | - |
| CE 230 | Fluid Mechanics | 3 | 3 | - | 1 | Math 203, GE202 | - |
| CE 231 | Fluid Mechanics Laboratory | 1 | - | 2 | - | - | CE 230 |
| Math +++ | Elective Mathematics-1 | 3 | 3 | - | 1 | - | - |
| **Total credit hours 18** | | | | | | | |

**Level 7**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IS 104 | Political System in Islam | 2 | 2 | - | - | - | - |
| CE 304 | Properties and Testing of Concrete | 3 | 2 | 2 | - | CE 203 | - |
| CE 305 | Structural | 3 | 3 | - | 1 | CE 20 | - |

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|---|---|---|---|---|---|---|---|
| | Analysis | | | | | 2 | |
| **CE 320** | Construction Engineering | 3 | 3 | - | 1 | - | - |
| **CE 353** | Geotechnical Engineering | 3 | 3 | - | 1 | CE 203, CE 285 | - |
| **CE 354** | Geotechnical Engineering Laboratory | 1 | - | 2 | - | - | CE 353 |
| **Math +++** | Elective Mathematics | 3 | 3 | - | 1 | - | - |
| **+++** | Free Course | 2 | - | - | - | - | - |
| **Total credit hours 20** | | | | | | | |

**Level 8**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **CE 315** | Reinforced Concrete | 3 | 3 | - | 1 | CE 304, CE 305 | - |
| **CE 370** | Water and Wastewater Engineering | 4 | 3 | - | 2 | CE 230 | - |
| **CE 331** | Hydrology | 3 | 3 | - | 1 | CE 230 | - |
| **CE 341** | Transportation and Traffic Engineering | 4 | 3 | - | 2 | Math 254 | - |
| **+++** | Free Course | 3 | - | - | 1 | - | - |
| **CE 375** | Steel Structures Design | 3 | 3 | - | 1 | CE 305 | - |
| **Total credit hours 20** | | | | | | | |

**Level 9**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **GE 405** | Cooperative Training | 9 | - | - | - | - | - |
| **Total credit hours 9** | | | | | | | |

**Level 10**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **GE 401** | Engineering Economy | 3 | 3 | - | 1 | - | - |
| **GE 402** | Project Management | 3 | 3 | - | 1 | - | - |
| **CE 4xx** | Elective Course – 1 | 3 | - | - | - | - | - |
| **CE 4xx** | Elective Course – 2 | 3 | - | - | - | - | - |
| **CE 363** | Foundation Engineering | 3 | 3 | - | 1 | CE 353, CE 315 | - |
| **CE 400** | Graduation Project | 3 | - | - | - | GE 405 | - |
| **Total credit hours 18** | | | | | | | |

**The Elective Courses**

In the 10th semester the student should select some elective courses not less than 6 hours

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **CE 317** | Computer Applications | 3 | 2 | 1 | 1 | CE 353 | CE 315 |
| **CE 403** | Advanced Reinforced Concrete | 3 | 3 | - | 1 | CE 315 | - |
| **CE 406** | Advanced Structural Analysis | 3 | 3 | - | 1 | CE 305 | - |
| **CE 412** | Advanced Steel Design | 3 | 3 | - | 1 | CE 375 | - |
| **CE 453** | Advanced Geotechnical Engineering | 3 | 3 | - | 1 | CE 353 | - |
| **CE 401** | Concrete Technology | 3 | 3 | - | 1 | CE 203 | - |
| **CE 443** | Design of Pavement | 3 | 3 | - | 1 | CE 203 | - |
| **CE 464** | Project Surveying | 3 | 3 | - | 1 | CE 112 | - |
| **CE 454** | Soil Improvement and Earth Structure Design | 3 | 3 | - | 1 | CE 353 | - |
| **CE 455** | Highway Planning and Design | 3 | 3 | - | 1 | CE 341 | - |
| **CE 456** | Hydraulic Engineering | 3 | 3 | - | 1 | CE 230 | - |
| **CE 458** | Design of Water Structures | 3 | 3 | - | 1 | CE 230 | - |
| **CE 474** | Design and Operation of Water and Wastewater Treatment Plants | 3 | 3 | - | 1 | CE 370 | - |
| **CE 475** | Environmental Engineering | 3 | 3 | - | 1 | - | - |
| **CE 490** | Selected Topics in Civil Engineering | 3 | 3 | - | 1 | - | - |

**Civil Engineering Program ( Plan C )**

The pre-requisite for acceptance in the program is the completion of the foundation program with grade not less than 3.5 from 5.00

**3rd semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **IC 101** | Introduction to Islamic culture | 2 | 2 | - | - | - | - |
| **ARB 101** | Linguistic skills | 2 | 2 | - | - | - | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Phys 104** | General Physics | 4 | 3 | 2 | - | - | - |
| **GE 104** | Basics of Engineering Drawing | 3 | 1 | 4 | - | - | - |
| **Math 105** | Differential Calculus | 3 | 3 | - | 1 | - | - |
| **Chem 111** | General Chemistry | 4 | 3 | 2 | - | - | - |
| **Total credit hours 18** | | | | | | | |

**4th semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **IC 102** | Islam and Community Building | 2 | 2 | - | - | - | - |
| **GE 105** | Basics of Engineering Technology | 2 | 1 | 2 | - | GE 104 | - |
| **Math 106** | Integral Calculus | 3 | 3 | - | 1 | Math 105 | - |
| **CE 285** | Introduction to Geotechnical Engineering | 2 | 2 | - | 1 | - | - |
| **GE 201** | Statics | 3 | 3 | - | 1 | - | - |
| **CSC209** | Computer Programming | 3 | 2 | 2 | - | - | - |
| **Math 107** | Linear Algebra & Analytic Geometry | 3 | 3 | - | 1 | - | - |
| **Total credit hours 18** | | | | | | | |

**5th semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **IC 103** | Economic System in Islam | 2 | 2 | - | - | - | - |
| **ARB 103** | Arabic Writing | 2 | 2 | - | - | - | - |
| **GE 202** | Dynamics | 3 | 3 | - | 1 | GE 201 | - |
| **CE 202** | Mechanics of Materials | 3 | 3 | - | 1 | GE201 | Math 203 |
| **Math 203** | Differential and Integral Calculus | 3 | 3 | - | 1 | Math 106 | - |
| **GE 211** | Introduction to Engineering Design-I | 3 | 2 | 4 | - | - | - |
| **CE 112** | Survey Basics | 2 | 1 | 2 | - | Math 107 | - |
| **Total credit hours 18** | | | | | | | |

**6th semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **CE 203** | Structural Materials | 3 | 2 | 2 | - | CE 202 | - |
| **Math 208** | Differential equations | 3 | 3 | - | 1 | Math 203 | - |
| **GE** | Introducti | 2 | 2 | 2 | - | GE | - |

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|---|---|---|---|---|---|---|---|
| **213** | on to Engineering Design-2 | | | | | 211 | |
| **ME 229** | Thermodynamics and Heat transfer | 3 | 3 | - | 1 | Phys 104 | - |
| **CE 230** | Fluid Mechanics | 3 | 3 | - | 1 | Math 203, GE202 | - |
| **CE 231** | Fluid Mechanics Laboratory | 1 | - | 2 | - | - | CE 230 |
| **Math +++** | Elective Mathematics – 1 | 3 | 3 | - | 1 | - | - |
| **Total credit hours 18** | | | | | | | |

**7th semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **IC 104** | Political System in Islam | 2 | 2 | - | - | - | - |
| **CE 304** | Properties and Testing of Concrete | 3 | 2 | 2 | - | CE 203 | - |
| **CE 305** | Structural Analysis | 3 | 3 | - | 1 | CE 202 | - |
| **CE 320** | Construction Engineering | 3 | 3 | - | 1 | - | - |
| **CE 353** | Geotechnical Engineering | 3 | 3 | - | 1 | CE 203, CE 285 | - |
| **CE 354** | Geotechnical Engineering Laboratory | 1 | - | 2 | - | - | CE 353 |
| **Math +++** | Elective Mathematics - 2 | 3 | 3 | - | 1 | - | - |
| **+++** | Free Course | 2 | - | - | - | - | - |
| **Total credit hours 20** | | | | | | | |

**8th semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **CE 315** | Reinforced Concrete | 3 | 3 | - | 1 | CE 304, CE 305 | - |
| **CE 370** | Water and Wastewater Engineering | 4 | 3 | - | 2 | CE 230 | - |
| **CE 331** | Hydrology | 3 | 3 | - | 1 | CE 230 | - |
| **CE 341** | Transportation and Traffic Engineering | 4 | 3 | - | 2 | Math 254 | - |
| **+++** | Free Course | 3 | - | - | - | - | - |
| **CE 375** | Steel Structures Design | 3 | 3 | - | 1 | CE 305 | - |
| **Total credit hours 20** | | | | | | | |

**9th semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **GE 405** | Cooperative Training | 9 | - | - | - | - | - |

| Total credit hours 9 |
|---|

**10th semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| GE 401 | Engineering Economy | 3 | 3 | - | 1 | - | - |
| GE 402 | Project Management | 3 | 3 | - | 1 | - | - |
| CE 4xx | Elective Course – 1 | 3 | - | - | - | - | - |
| CE 4xx | Elective Course – 2 | 3 | - | - | - | - | - |
| CE 363 | Foundation Engineering | 3 | 3 | - | 1 | CE 353, CE315 | - |
| CE 400 | Graduation Project | 3 | - | - | - | GE 405 | - |
| **Total credit hours 18** | | | | | | | |

**The Elective Courses**

In the 10th semester the student should select some elective courses not less than 6 hours

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| CE 317 | Computer Applications | 3 | 2 | 1 | 1 | CE 353 | CE 315 |
| CE 403 | Advanced Reinforced Concrete | 3 | 3 | - | 1 | CE 315 | - |
| CE 406 | Advanced Structural Analysis | 3 | 3 | - | 1 | CE 305 | - |
| CE 412 | Advanced Steel Design | 3 | 3 | - | 1 | CE 375 | - |
| CE 453 | Advanced Geotechnical Engineering | 3 | 3 | - | 1 | CE 353 | - |
| CE 401 | Concrete Technology | 3 | 3 | - | 1 | CE 203 | - |
| CE 443 | Design of Pavement | 3 | 3 | - | 1 | CE 203 | - |
| CE 464 | Project Surveying | 3 | 3 | - | 1 | CE 112 | - |
| CE 454 | Soil Improvement and Earth Structure Design | 3 | 3 | - | 1 | CE 353 | - |
| CE 455 | Highway Planning and Design | 3 | 3 | - | 1 | CE 341 | - |
| CE 456 | Hydraulic Engineering | 3 | 3 | - | 1 | CE 230 | - |
| CE 458 | Design of Water Structures | 3 | 3 | - | 1 | CE 230 | - |
| CE 474 | Design and Operation of Water and Wastewater Treatment Plants | 3 | 3 | - | 1 | CE 370 | - |
| CE 475 | Environmental Engineering | 3 | 3 | - | 1 | - | - |
| CE 490 | Selected Topics in Civil Engineering | 3 | 3 | - | 1 | - | - |

## Course Description (Civil Engineering):

**CE 112 Survey Basics (2h)**

Definitions and concepts in land surveying, divisions and importance of surveying, units of measurements, introduction to theory of measurements and errors, linear measurements, angular measurements, directions, leveling and contouring; computer applications.

**CE 202 Mechanics of Materials (3h)**

**Stress, strain; Hook's law. Moduli of elasticity and rigidity, and Poisson's ratio. Statical determination of axial force, shear force, bending moment and torque in bars, beams and circular shafts. Load-shear-moment relationship in beams. Section kinematics; strain and stress distribution and their resultants. Normal and shear stress distributions in beams of different shapes and the shear flow.Transformation of stress and strain, Mohr's circle. Spherical and cylindrical pressure vessels. Elastic buckling of columns.**

**CE 203 Structural Materials (3h)**

**Engineering materials: properties, testing, specifications, statistical evaluation; bricks, lime, gypsum, timber, wood, metals, plastics, ceramics, glasses. Testing machines. Measuring devices Tests: tension, compression, bending, shear, hardness, impact. Non destructive tests.**

**CE 230 Fluid Mechanics (3h)**

**Fluid properties. Fluid statics. Kinematics. Dynamics of an ideal fluid. Flow of real fluids. Viscous effect and fluid resistance. Pumps. Fluid measurements.**

**CE 231 Fluid Mechanics Laboratory (1h)**

Laboratory experiments covering Fluid measurements, flow through pipes, open channel, centrifugal pump. Measurement of temperature, atmospheric pressure, coefficient of viscosity for liquids, Hydrostatic pressure, Orifice flow, coefficient of velocity, and coefficient of discharge, Flow over weirs, Reynolds Number, Bernoulli's theorem, Pizometric tubes, Pitot tube, Fluid friction and coefficient of friction in pipes, Pump characteristics

**CE 285 Introduction to Geotechnical Engineering (2h)**

Types and classification of rocks based on origin and strength. Weathering process. Classification of soil based on formation. Index and engineering classification of soil. Clay minerals and soil structure.

**CE 304 Properties and Testing of Concrete (3h)**

Cement: manufacture, properties, types of cement, tests. Aggregates: types, properties, grading, tests. Mixing water, Concrete: proportions, mixing, handling, placing, fresh and hardened properties, tests, curing.

**CE 305 Structural Analysis (3h)**

**Types of structures, supports and loads. Idealization of structures and loads. Geometric stability and determinacy. Analysis of determinate trusses, beams, plane frames and arches; reaction computation; axial force, shear force and bending moment diagrams. Internal force releases. Load-shear-moment relationship. Differential equation of elastic curve. Deflections by integration, moment-area, conjugate-beam and virtual work methods. Influence lines of determinate structures.**

**CE 315 Reinforced Concrete (3h)**

Fundamentals and design theories based on ultimate strength design and elastic concept.

ACI Code requirements. Load factors. Analysis and design of reinforced concrete members subject to flexure, and shear forces using ultimate design method. Development length of reinforcement. Design of one-way and two-way solid slabs. Design of non-sway columns. Design of staircases.

**CE 317 Computer Applications (3h)**

Problem formulation. Preparing problem model. Constitutive modeling of different engineering materials. Using FEM-based software packages in design and solving engineering problems. Results verification and interpretation. The used software packages will vary depending on job market requirements. Examples of packages include, but not limited to, SAP 2000, PLAXIS, Geo-Slope Suit, ANSAS, STAD Pro, Mud Flow, Pipe Net,….etc.

**CE 320 Construction Engineering (3h)**

Overview of the construction industry, earthmoving machinery and properties, excavation and lifting, loading and hauling, compaction and finishing, concrete construction, concrete form design, concrete economics, construction economics, contract construction.

**CE 331 Hydrology (3h)**

The hydrologic cycle. Fundamentals of meteorology, temperature, humidity, wind, precipitation, evaporation. Stream-flow and run-off, Groundwater flow and aquifers, wells, and intrusion in coastal aquifers. Stream-flow hydrographs. Unit hydrographs for various durations and its applications. Introduction to Water Resources management and its demand, Water Resources management in arid and semi-arid regions and its application in Saudi Arabia.

**CE 341 Transportation and Traffic Engineering (4h)**

**The transportation systems and its characteristics. Transportation and society. Components of transportation systems. Vehicle motion, flow, and performance. Continues flow. Terminals. Introduction to transportation demand. Components of traffic system. Traffic stream characteristics. Traffic engineering studies. Traffic safety. Capacity of urban streets and intersections. Congestion management.**

**CE 353 Geotechnical Engineering (3h)**

Flow of water in soil, soil compaction, Consolidation of soils. Settlement of structures. Shear strength of soils. Introduction to Stability of slopes. Site investigation.

**CE 354 Geotechnical Engineering Laboratory (1h)**

Moisture density relationships. Soil indices. Classifications and identification of soils. Permeability properties of soil. Soil compaction. Unconfined strength. Soil consolidation. Shear strength properties of soil.

**CE 363 Foundation Engineering (3h)**

Types of foundation. Bearing capacity of shallow foundation. Bearing capacity of deep foundations. Pile foundations and caissons. Sheet piling.

**CE 370 Water and Wastewater Engineering (4h)**

Analysis of water distribution and wastewater collection systems, computer modeling of network systems; water treatment including coagulation, flocculation, softening, sedimentation, filtration, desalination and disinfection; water treatment, principles of biological treatment systems including activated sludge, extended aeration, aerated lagoons, and stabilization ponds.

**CE 375 Steel Structures Design (3h)**

Analysis and design of roof trusses. Design of tension and compression members, columns under eccentric loadings, column bases and footings. Design of beams. Welded and bolted connections. Design of building frames. Introduction to plastic analysis. Industrial building project. All according to AISC specifications.

**CE 400 Graduation Project (3h)**

The student is assigned, among a team of students and one or more faculty professors, the design of an applied project which simulates the real working condition to which the student will be exposed after graduation. The project should be comprehensive and includes all the necessary preliminary field studies, vesability studies, final design drawings, bill of quantities, and the total operating cost of the project. The graduation project shall continue for one semester. At the end of the semester, there will be a seminar held for the working team of students to present the details of the project. The working team will be orally examined and evaluated based on the presentation as well as the oral discussion

**CE 401 Concrete Technology (3h)**

In-depth study of composition, characteristics and hydration of cements; structure and properties of hardened cement paste; local aggregates; workability, strength, volume changes and permeability of concrete; failure mechanisms of plain concrete; production, handling and quality control of concrete; mix design; special concretes such as fiber reinforced concrete, ferrocement and polymer impregnated; durability problems of concrete in the Gulf environment; preventive measures, specifications and construction techniques for local conditions

**CE 403 Advanced Reinforced Concrete (3h)**

Design of floor systems: ribbed and flat slabs. Design of beams for torsion, combined shear and torsion by the strength method. Design of short and long columns under eccentric loadings. Study of different structural systems for covering large dimensions halls. Analysis and design of reinforced concrete water tanks. Introduction to the design of prestressed concrete members.

**CE 406 Advanced Structural Analysis (3h)**

Analysis of indeterminate structures; trusses, beams, plane frames and arches. Method of consistent deformation; flexibility matrix formulation; prestrain, temperature change and support movement effects. Slope deflection method. Matrix analysis of beams and plane frame using the stiffness method. Moment distribution; sway consideration.

**CE 412 Advanced Steel Design (3h)**

Introduction to elastic-plastic material behavior, plastic analysis and design of continuous beams and simple frames using load resistance factor design (LRFD); design of built-up beams and plate girders, optimum proportioning of I-beam, design of composite section analysis and design for torsion, design of semi-rigid and rigid connections, computer application and usage in design of rigid frames and steel buildings

**CE 443 Design of Pavement (3h)**

Pavement types and loading, behavior of pavements under dynamic loads, stresses in flexible and rigid pavements, pavement components, pavement design factors, flexible highway and airport pavement design, rigid highway and airport pavement design; overlay design and computer applications; practical pavement design project of a road and airport

**CE 453 Advanced Geotechnical Engineering (3h)**

Fundamental relations of elasticity and plasticity in soil masses; unsaturated soils behavior; deformation properties of cohesionless and cohesive soils; advanced strength concepts in soils and stress path; advanced slope stability analysis; introduction to soil dynamics.

**CE 454 Soil Improvement and Design of Earth Structures (3h)**

General survey of soil types and their behavior and the available techniques for improvement; modifications by admixtures and grouting; the use of geo-synthetic material in filtration, seepage control, and reinforcement; design and analysis of variance retaining walls, anchored sheet piles and braced excavations.

**CE 455 Highway Planning and Design (3h)**

Highway planning in rural and urban areas; highway location studies; engineering and aesthetic considerations; geometric design, structural design, highway materials; drainage, highway construction, highway safety engineering; discussion of AASHTO and Saudi highway design manuals; complete geometric design of a two-lane highway; introduction to computer softwares for geometric design.

**CE 456 Hydraulic Engineering (3h)**

Steady flow in closed conduits and open channels. Pumps. Networks of pipes. Dimensional analysis and similitude. Laboratory experiments covering fluid measurements, flow through pipes, open channel, centrifugal pump.

**CE 458 Design of Water Structures (3h)**

Design of inlet and outlet structures for irrigation canals. Cross structures; culverts, siphons and aqueducts. Energy dissipation downstream hydraulic structures. Design of Spillways, syphon spillways and dams.

**CE 464 Project Surveying (3h)**

Laser systems and alignment, electronic distance measurement with high precision, total station, land subdivision and legal aspects; route surveying, hydrographic surveying, mine surveying, construction surveying, ruin surveying, industrial surveying, structure deformation measurement and monitoring, earth crustal deformation measurement

**CE 474 Design and Operation of Water and Wastewater Treatment Plants (3h)**

Theory and practice in sanitary engineering including the concepts of processing, design, economic evaluation and computer analysis; using practical considerations in the design and operation of treatment units and the combining of unit processing in water and wastewater treatment plants; field trips will be organized to visit various types of treatment plants in operation.

**CE 475 Environmental Engineering (3h)**

**Introduction to pollution problems and impact of development on the environment. Liquid waste disposal: overland, in streams, lake and sea. Solid wastes: management, characteristics, storage, collection, disposal, and recycling. Air pollution: sources, pollutants, effects and control. Noise pollution: sources, effect and control.**

**CE 490 Selected Topics in Civil Engineering (3h)**

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student

**Chem 111 General Chemistry (4 h )**

Stoichiometry: SI Units, chemical formulas, the mole, methods of expressing concentration, Calculations based on chemical equations
Gases: laws, kinetic theory, deviation and van der Waals equation

Thermochemistry: Types of enthalpy changes, Hess Law and its applications,, first law of thermodynamics

Solutions: Type of solutions and laws related , colligative properties

Chemical kinetics: Law of reaction rate, reaction order, factors affecting the rates

Chemical Equilibrium : Relation between Kc & Kp, Le Chatelier's principle and factor affecting equilibrium. Ionic equilibrium: Acid and base concepts, pH calculations of acid, base and buffer solutions

Atomic Structure: emission spectrum, Bohr's theory de Broglre's hypothesis, quantum numbers , electronic configuration of elements, consequences of the periodic table

In practical part, the student should do at least 14 experiments

**CSC 209 Computer Programming (3h)**

Introduction to computers and computing fundamentals in JAVA, Data Types, Variables, Operators, Control Structures, Simple input/output statement, Classes & Objects, Methods, Relational and logical expressions, IF-ELSE control structure , The WHILE statement , The FOR statement and looping structure, Introduction to Swing & graphical user interfaces, Arrays Matrix Methods, Vectors , String , Engineering Applications.

**GE 104 Basics of Engineering Drawing (3h)**

Geometrical construction and basics of lettering, Sketching, Orthographic projection, Sectional and auxiliary views, Dimensioning, Introduction to computer graphics.

**GE 105 Basics of Engineering Technology(2h)**

Introduction; Function and planning of workshop; Properties of materials and their applications; Non-ferrous Metals - Ferrous Alloys Production of Iron and Steel, Plain Carbon and Alloy Steels - Tool Steels and the Iron-Carbon Diagram - Heat Treatments of Steels: Heating, Quenching, Tempering, Annealing, Aging, and Surface Hardening, Destructive and Nondestructive Testing of Metals. Workshop metrology; Basic bench work operations; Machining operations; Tools, equipment and machinery used in basic workshop processes: turning, milling, grinding, forging, sheet metal-work; Welding processes: gas welding, arc welding, spot welding. Casting processes: sand casting, die casting; Industrial safety

**GE 201 Statics (3h)**

Force systems; vector analysis of forces, moments and couples in 2 and 3 dimensions. Equilibrium of force systems. Analysis of structures; plane trusses and frames. Distributed force system; centroids and composite bodies. Area moments of inertia. . Friction

**GE 202 Dynamics (3h)**

Kinematics of a particle: curvilinear motion, and relative motion; Kinetics of particles: Newton's law, work and energy, impulse and momentum, and impact; Kinematics of a rigid body in plane motion: relative velocity and acceleration, and rotating axes; Kinetics of a rigid body in plane motion: translation, fixed axis rotation, general equation of motion, work and energy, and impulse and momentum..

**GE 211 Introduction to Engineering Design-I (3h)**

Engineering design or how engineers approach and solve problems; process and product design; quality principles; working in teams; presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

**GE 213 Introduction to Engineering Design-2 (2h)**

Computer or mathematical modeling of process and product, continuation of quality principles, working in teams, presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self-regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

**GE 401 Engineering Economy (3h)**

**Introduction to engineering economy. Interest formulas and equivalence. Bases for comparison of alternatives. Decision making among alternatives. Evaluating replacement alternatives. Break-even and minimum cost analysis. Cost accounting. Depreciation. Economic analysis of operations. Economic analysis of public projects.**

**GE 402 Project Management (3h)**

Basic Management Process approach, Defining Project, Project life cycle, Balancing competing demands with triple constraints, Strategies and planning, methods, Project planning and scheduling, integrated project planning, Quality management, Bar-charts and Gantt Chart, critical path methods, PERT method, resource leveling and allocation, time-cost trade off. Construction and organizational approaches, leadership elements, and decision making. Time and cost control, Project Closing. computer applications

**GE 405 Cooperative Training (9h)**

The student starts the Cooperation Training during the summer that precedes his final year of study and continues to the end of the next semester in either the Governmental or Private sectors. At the end of training, student must prepare a detailed report which will be orally examined by a special committee of faculty professors.

**ME 229 Thermodynamics and Heat transfer (3h)**

First and second law of thermodynamics; Properties of ideal gases and vapors; Air standard cycles; Vapor power and reversed cycles; Conduction and convection heat transfer

## Mechanical Engineering Department

### Vision:

The mechanical engineering department aims to be recognized locally, regionally and internationally as a leading department providing high quality programs and services in mechanical engineering fields.

### Mission:

The mechanical engineering department seeks to meet the needs of the Saudi society and the region with outstanding mechanical engineering programs in education, research, and community service.

### About:

Mechanical engineers are essential to almost every industry. It is in fact difficult to imagine a modern industry without the services of Mechanical engineers. Mechanical engineering has been and continues to be a corner stone in every new technical development

The job of Mechanical engineers usually involves design, feasibility studies, cost analysis studies, installation, operation, and maintenance of plants, processes, or equipment. The focusing of the Mechanical engineering department is on teaching, community service, and research. The department faculty recognizes the need to provide the graduating engineer with the appropriate background in order to meet the challenges and large demands of a fast growing country such as Kingdom.

### Objectives:

1- Preparation of the graduates to have a successful career as Mechanical engineers in governmental and private sectors.

2- Preparation of the graduates to pursue their professional development through self-learning and advanced degrees.

3- Preparation of the graduates to advance to positions of leadership in their profession.

4- Preparation of the graduates to effectively participate in the sustainable development of the Saudi Society.

## Degrees:

- **Bachelor**

## Program:

B.Sc Degree Program in Mechanical Engineering

## Study Plan (Mechanical Engineering):

**Mechanical Engineering Program [ Plan B ]**

The pre-requisite for acceptance in the program is the completion of the foundation program with grade not less than 3.25 from 5.00

**Level 3**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 101 | Introduction to Islamic culture | 2 | 2 | - | - | - | - |
| ARB 101 | Linguistic skills | 2 | 2 | - | - | - | - |
| Phys 104 | General Physics | 4 | 3 | 2 | - | - | - |
| GE 104 | Basics of Engineering Drawing | 3 | 1 | 4 | - | - | - |
| Math 105 | Differential Calculus | 3 | 3 | - | 1 | - | - |
| Chem 111 | General Chemistry | 4 | 3 | 2 | - | - | - |
| Total credit hours 18 | | | | | | | |

**Level 4**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 102 | Islam and Community Building | 2 | 2 | - | - | - | - |
| GE 105 | Basics of Engineering Technology | 2 | 1 | 2 | - | GE 104 | - |
| Math 106 | Integral Calculus | 3 | 3 | - | 1 | Math 105 | - |
| ME 251 | Materials Engineering | 3 | 3 | - | 1 | Phys 104 | - |
| GE 201 | Statics | 3 | 3 | - | 1 | - | - |
| CSC 209 | Computer Programming | 3 | 2 | 2 | - | - | - |
| Math 107 | Linear Algebra & Analytic Geometry | 3 | 3 | - | 1 | - | - |
| Total credit hours 19 | | | | | | | |

**Level 5**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Re | Co-Re |
|---|---|---|---|---|---|---|---|

College of Engineering in Unaizah

| Course Code | | | | | | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| GE 202 | Dynamics | 3 | 3 | - | 1 | GE 201 | - |
| Math 203 | Differential and Integral Calculus | 3 | 3 | - | 1 | Math 106 | - |
| GE 211 | Introduction to Engineering Design-I | 3 | 2 | 4 | - | - | - |
| ME 241 | Mechanical Drawing | 3 | 2 | 2 | - | GE 104 | - |
| ME 351 | Mechanics of Materials | 4 | 3 | - | 2 | GE 201 | - |
| ME 352 | Mechanics of Materials Laboratory | 1 | - | 2 | - | - | ME 351 |
| +++ | Free Course | 2 | - | - | - | - | - |
| **Total credit hours 19** | | | | | | | |
| | | | | | | | |

**Level 6**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| Math 208 | Differential equations | 3 | 3 | - | 1 | Math 203 | - |
| GE 213 | Introduction to Engineering Design-2 | 2 | 2 | 2 | - | GE 211 | - |
| EE 318 | Fundamentals of Electric circuits | 3 | 3 | - | 1 | Phys 104 | - |
| ME 330 | Manufacturing Processes | 4 | 2 | 2 | 1 | ME241, ME 251, ME 351 | - |
| ME 360 | Mechanics of Machinery | 3 | 3 | - | 1 | GE 202, GE 209 | - |
| ME 363 | Mechanics of Machinery Lab. | 1 | - | 2 | - | - | ME 360 |
| ME 371 | Thermodynamics -1 | 3 | 3 | - | 1 | Phys 104 | - |
| **Total credit hours 19** | | | | | | | |

**Level 7**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| IC 103 | Economic System in Islam | 2 | 2 | - | - | - | - |
| Math +++ | Elective Mathematics - 1 | 3 | 3 | - | 1 | Math 106, Math107 | - |
| EE 339 | Electrical Machines | 2 | 2 | - | 1 | EE 318 | - |
| ME 340 | Mechanical Design -1 | 3 | 1 | 2 | 1 | ME 330, ME 360 | - |
| ME 372 | Thermodynamics – 2 | 3 | 3 | - | 1 | ME 371 | - |
| ME 380 | Fluid Mechanics | 4 | 3 | - | 2 | ME 371, GE 202 | -- |
| ME 383 | Thermo-fluid Laboratory -1 | 1 | - | 2 | - | - | ME 380, ME 37 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | 2 |
| **Total credit hours 18** | | | | | | | |

**Level 8**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **ARB 103** | Arabic Writing | 2 | 2 | - | - | - | - |
| **IC 104** | Political System in Islam | 2 | 2 | - | - | - | - |
| **ME 343** | Measurements and Instrumentation | 2 | 2 | - | 1 | ME 380 | - |
| **ME 374** | Heat and Mass Transfer | 4 | 3 | - | 2 | ME 380 | - |
| **ME 384** | Thermo-fluid Laboratory -2 | 1 | - | 2 | - | - | ME 374 |
| **Math +++** | Elective Mathematics – 2 | 3 | 3 | - | 1 | - | - |
| **ME 467** | System Dynamics and Automatic Control | 4 | 3 | - | 2 | MTH 208, GE209 | - |
| **ME 468** | System Dynamics and Automatic Control Laboratory | 1 | - | 2 | - | - | ME 467 |
| **Total credit hours 19** | | | | | | | |

**Level 9**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **GE 405** | Cooperative Training | 9 | - | - | - | - | - |
| **Total credit hours 9** | | | | | | | |

**10th semester**

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **GE 401** | Engineering Economy | 3 | 3 | - | 1 | - | - |
| **GE 402** | Project Management | 3 | 3 | - | 1 | - | - |
| **ME 4xx** | Elective Course - 1 | 3 | - | - | - | - | - |
| **ME 4xx** | Elective Course - 2 | 3 | - | - | - | - | - |
| **+++** | Free Course | 3 | - | - | - | - | - |
| **ME 400** | Graduation Project | 3 | - | - | - | GE 405 | - |
| **Total credit hours 18** | | | | | | | |

**The Elective Courses**

In the 10th semester the student should select some elective courses not less than 6 hours

| Course Code | Course Title | CR | LT | LB | TU | Pre-Req. | Co-Req. |
|---|---|---|---|---|---|---|---|
| **ME 423** | Renewable Energy | 3 | 3 | - | 1 | ME 372, ME 374 | - |
| **ME 425** | Solar Energy | 3 | 3 | - | 1 | ME 374 | - |
| **ME 431** | Tool Manufacturing | 3 | 3 | - | 1 | ME 330 | - |
| **ME 441** | Mechanical Design | 3 | 1 | 2 | 1 | ME 34 | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | -2 | | | | | 0 | |
| **ME 453** | Modern Engineering Materials | 3 | 3 | - | 1 | ME 351 | - |
| **ME 455** | Corrosion Engineering | 3 | 3 | - | 1 | ME 451 | - |
| **ME 462** | Mechatronics | 3 | 3 | - | 1 | ME 367 | - |
| **ME 463** | Mechanical vibrations | 3 | 3 | - | 1 | ME 460 | - |
| **ME 466** | Robotics | 3 | 3 | - | 1 | ME 367 | - |
| **ME 470** | Thermal Power Plants | 3 | 3 | - | 1 | ME 374, ME 372 | - |
| **ME 474** | Refrigeration Engineering | 3 | 3 | - | 1 | ME 374, ME 372 | - |
| **ME 475** | Air Conditioning | 3 | 3 | - | 1 | ME 374, ME 372 | - |
| **ME 480** | Turbo Machinery | 3 | 3 | - | 1 | ME 380, ME 372 | - |
| **ME 482** | Compressible Fluids | 3 | 3 | - | 1 | ME 380 | - |
| **ME 483** | Pumping Machinery | 3 | 3 | - | 1 | ME 380 | |
| **ME 490** | Selected Topics In Mechanical | 3 | 3 | - | 1 | ME 380 | |
| | Engineering | | | | | | |

## Course Description (Mechanical Engineering):

**Chem 111 General Chemistry (4 h )**

**Stoichiometry:** SI Units, chemical formulas, the mole, methods of expressing concentration, Calculations based on chemical equations

**Gases:** laws, kinetic theory, deviation and van der Waals equation

**Thermochemistry:** Types of enthalpy changes, Hess Law and its applications,, first law of thermodynamics

**Solutions:** Type of solutions and laws related , colligative properties

**Chemical kinetics:** Law of reaction rate, reaction order, factors affecting the rates

**Chemical Equilibrium:** Relation between Kc & Kp, Le Chatelier's principle and factor affecting equilibrium. Ionic equilibrium: Acid and base concepts, pH calculations of acid, base and buffer solutions

**Atomic Structure:** emission spectrum, Bohr's theory de Broglre's hypothesis, quantum numbers , electronic configuration of elements, consequences of the periodic table

In practical part, the student should do at least 14 experiments

**CSC 209 Computer Programming (3h)**

Introduction to computers and computing fundamentals in JAVA, Data Types, Variables, Operators, Control Structures, Simple input/output statement, Classes & Objects, Methods, Relational and logical expressions, IF-

ELSE control structure , The WHILE statement , The FOR statement and looping structure, Introduction to Swing & graphical user interfaces, Arrays Matrix Methods, Vectors , String , Engineering Applications.

**EE 318 Fundamentals of Electric circuits (3h)**

Circuit elements and laws, Network theorem, Nonlinear networks-AC Circuits : Phasors, Circuit analysis, Frequency response, Resonance - Ideal Amplifiers, Ideal diodes, Rectifiers, Waveshaping circuits – Junction diodes – FETs and BJTs transistors- Logic circuits – Small signal models of Diodes, FETs, and BJTs – RC-Coupled Amplifiers.

**EE 339 Electrical Machines (2h)**

Transformers (construction, types, operation, equivalent circuit); Synchronous machines (construction, generator performance, motor characteristics, starting); induction machines (construction, three phase motor: types, operation, equivalent circuit, starting speed control); Introduction to DC machines.

**GE 104 Basics of Engineering Drawing (3h)**

Geometrical construction and basics of lettering, Sketching, Orthographic projection, Sectional and auxiliary views, Dimensioning, Introduction to computer graphics.

**GE 105 Basics of Engineering Technology(2h)**

Introduction; Function and planning of workshop; Properties of materials and their applications; Non-ferrous Metals - Ferrous Alloys Production of Iron and Steel, Plain Carbon and Alloy Steels - Tool Steels and the Iron-Carbon Diagram - Heat Treatments of Steels: Heating, Quenching, Tempering, Annealing, Aging, and Surface Hardening, Destructive and Nondestructive Testing of Metals. Workshop metrology; Basic bench work operations; Machining operations; Tools, equipment and machinery used in basic workshop processes: turning, milling, grinding, forging, sheet metal-work; Welding processes: gas welding, arc welding, spot welding. Casting processes: sand casting, die casting; Industrial safety

**GE 201 Statics (3h)**

Force systems; vector analysis of forces, moments and couples in 2 and 3 dimensions. Equilibrium of force systems. Analysis of structures; plane trusses and frames. Distributed force system; centroids and composite bodies. Area moments of inertia. . Friction

**GE 202 Dynamics (3h)**

Kinematics of a particle: curvilinear motion, and relative motion; Kinetics of particles: Newton's law, work and energy, impulse and momentum, and impact; Kinematics of a rigid body in plane motion: relative velocity and acceleration, and rotating axes; Kinetics of a rigid body in plane motion: translation, fixed axis rotation, general equation of motion, work and energy, and impulse and momentum..

**GE 211 Introduction to Engineering Design-I (3h)**

Engineering design or how engineers approach and solve problems; process and product design; quality principles; working in teams; presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

**GE 213 Introduction to Engineering Design-2 (2h)**

Computer or mathematical modeling of process and product, continuation of quality principles, working in teams, presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self-regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

**GE 401 Engineering Economy (3h)**

Introduction to engineering economy. Interest formulas and equivalence. Bases for comparison of alternatives. Decision making among alternatives. Evaluating replacement alternatives. Break-even and minimum cost analysis. Cost accounting. Depreciation. Economic analysis of operations. Economic analysis of public projects.

**GE 402 Project Management (3h)**

Basic Management Process approach, Defining Project, Project life cycle, Balancing competing demands with triple constraints, Strategies and planning, methods, Project planning and scheduling, integrated project planning, Quality management, Bar-charts and Gantt Chart, critical path methods, PERT method, resource leveling and allocation, time-cost trade off. Construction and organizational approaches, leadership elements, and decision making. Time and cost control, Project Closing. computer applications

**GE 405 Cooperative Training (9h)**

The student starts the Cooperation Training during the summer that precedes his final year of study and continues to the end of the next semester in either the Governmental or Private sectors. At the end of training, student must prepare a detailed report which will be orally examined by a special committee of faculty professors.

**ME 241 Mechanical Drawing (3h)**

1- Using Solid Works software: Introduction to 3D modeling, 2D drawings (sketching), reference geometry, 3D drawings (features), drawing and editing mechanical parts, assembly drawings. 2- Standard Mechanical Parts: Screw threads, fasteners and springs. 3- Fits and Tolerances: fundamentals, types, symbols. 4- Detailed Drawings: orthographic views, auxiliary views, sectional views, detailed views and dimensioning. 5- Manufacturing Symbols: Geometrical tolerance, surface finish, and weld symbols.

**ME 251 Materials Engineering (3h)**

Introduction to materials engineering; Structure and characteristics of metals; polymers and ceramics; Equilibrium-phase diagrams; Microstructures of alloys; Imperfections; Diffusion; Mechanical properties of metals, polymers, ceramics; Heat treatment of plain-carbon steels, cast irons and precipitation hardening.

**ME 330 Manufacturing Processes (4h)**

Basic structure of materials processes, Classification of manufacturing processes, Basic material processes, Manufacturing properties of materials, Liquid state forming processes, casting processes of metals and non metals, Mass-conserving processes of solid state materials, forming of metals. Basics of materials processes, Mass-conserving processes of solid state materials, forming of polymers, and powders, Mass-reducing processes of solid state materials, machining processes, Joining and fabrication processes, welding, brazing, riveting, bonding, etc., Modern manufacturing processes.

**ME 340 Mechanical Design -1 (3h)**

Design process; Origin and identification of engineering design problems; Creativity in engineering design; Technical analysis; Human and legal factors; Problem solving and decision making; Design communication; Failures resulting from static loading; Variable loading and fatigue failure; Material selection for strength and rigidity; Design of mechanical elements: screws, power screws, fasteners and connections, welded, brazed and bonded joints; Rolling contact bearings; Term design project.

**ME 343 Measurements and Instrumentation (2h)**

Measuring concepts; Experimental procedures; Standards and dimensional units of measurement, analyzing, assessing and presenting experimental data, analog measured: time-dependent characteristics, Response of measuring systems, Sensors, Signal conditioning, digital techniques in mechanical measurements, displacement measurements, measurement of motion, measurement of force and torque, measurement of strain and stress, measurement of pressure, measurement of temperature, measurement of flow.

**ME 351 Mechanics of Materials (4h)**

Study of the mechanical behavior of solid bodies (Rods, shafts, beams, etc.) under various types of loading. Mechanical and thermal stresses and strains; Stress-strain relations; Axial deformation; Shear and bending moments in beams; Stresses in beams; Torsion of shafts and thin wall tubes; Combined loadings; Analysis of plane stress and plane strain; Theories of failures; Thick – and thin-wall cylinders; Strain gauges and applications; Deflection of beams; Statically indeterminate problems; Energy methods; Stability of axially loaded beams (columns).

**ME 352 Mechanics of Materials Laboratory (1h)**

Strain gauge applications: tension test, torsion test, cantilever beam, pressurized cylindrical vessel; Deflection of beams; Buckling of columns

**ME 360 Mechanics of Machinery (3h)**

Topological characteristics of planar mechanisms; Degree-of-freedom; Position, velocity and acceleration analysis of linkages: graphical and analytical methods; Static and dynamic force analysis of machinery: graphical and analytical methods; Flywheels; Cam mechanisms; Law of gearing; Simple and planetary gear trains; Term project.

**ME 363 Mechanics of Machinery Lab (1h)**

Introduction to the mechanics of machinery, study of various type of mechanisms like slider crank, four – bar, quick return mechanism, Hooke’s coupling and different kinds of gear trains through working models. Drawing the displacement profiles for various combinations of cam and follower. Balancing of rotating and reciprocating masses. Verification of gyroscopic torque equation etc.

**ME 371 Thermodynamics -1 (3h)**

Basics and definitions of thermodynamics; properties of pure substances First law of thermodynamics; Second law of thermodynamics; Entropy; Carnot and reversed Carnot cycles; simple and modified Rankine cycle; Gas power cycles; Refrigeration and heat pump cycles.

**ME 372 Thermodynamics – 2 (3h)**

Thermodynamic relations;Availability; Ideal gas mixtures; Gas-vapor mixtures; Thermodynamics of reciprocating gas compressors; Combustion; Introduction to internal combustion engines.

**ME 374 Heat and Mass Transfer (4h)**

Steady and unsteady heat conduction; Free and forced convection for external and internal flows; Heat exchangers; Properties and process of radiation, radiation exchange between surfaces. Mass transfer, Diffusion

**ME 380 Fluid Mechanics (4h)**

Dimensions and units; Fundamental concepts in fluids; Fluid statics; Control volume; Conservation of mass and momentum equations and its applications ; Energy equation; Differential form of equations; Stream function; Euler's equations; Bernoulli's equation and its applications; Dimensional analysis and model studies; Introduction to turbomachinery., Dynamics of fluid flow, steady and non steady viscous flow in pipes, Navier-Stokes equations; external flow characteristics, Boundary layer characteristics and equations; Blasius flow; Momentum integral equation; drag and lift. Introduction to one dimensional compressible flows; Types of flows; Isentropic flow in variable-area passages, shock waves.

**ME 383 Thermo-fluid Laboratory -1 (1h)**

Temperature and humilities various measurements, Dead weight, Impact of a jet, hammer in pipes, Measuring the hydrostatic forces on the submerged surfaces, Performance test for a multi-stage reciprocating air compressor; Measurement of heating value of a gaseous fuel; Exhaust-gas analysis; Performance of spark ignition engine; Performance of compression ignition engine; Demonstration of fluid flow (flow visualization).

**ME 384 Thermo-fluid Laboratory -2 (1h)**

Visualization of potential flow fields; Visualization of real flow around streamlined and bluff bodies; Pipe flow, velocity distribution, pressure drop and friction factor; Flow measurements: orifice, venturi and nozzle calibrations; Calibration of thermocouples; Free convection for a lumped capacitance thermal system; determination of thermal conductivities of a new metals; thermal performance of fins (free and forced convection).

**ME 400 Graduation Project (3h)**

The student is assigned, among a team of students and one or more faculty professors, the design of an applied project which simulates the real working condition to which the student will be exposed after graduation. The project should be comprehensive and includes all the necessary preliminary field studies, vesability studies, final design drawings, bill of quantities, and the total operating cost of the project. The graduation project shall continue for one semesters. At the end of the semester, there will be a seminar held for the working team of students to present the details of the project. The working team will be orally examined and evaluated based on the presentation as well as the oral discussion

**ME 423 Renewable Energy (3h)**

Basic and principles of conventional and non-conventional energy, energy conversion, power plant cycles, The distribution, variability and availability of all categories of renewable energy. Principles of renewable energy systems such as solar, wind, geothermal, and Nuclear energy. Environmental aspects of implementation of renewable energy. Topic also covers some practical applications to utilizing the renewable energy such as sea water desalination and power plants.

**ME 425 Solar Energy (3h)**

Thermal aspects of solar energy conversion. Solar radiation measurement and prediction. Selected topics in heat transfer. Flat plate and focusing collector analysis. Solar energy storage. Solar systems including hot water, space heating and cooling, distillation and thermal power conversion.

**ME 431 Tool Manufacturing (3h)**

Principles of cutting tools, jigs, fixtures, fit and tolerances, tool cutting geometry, tool life, cost analysis, economics, and safety in tooling design applications.

**ME 441 Mechanical Design -2 (3h)**

Design of mechanical elements: springs, lubrication and journal bearings, spur, helical, bevel, and worm gears, clutches and brakes, miscellaneous power transmission components; Term design projects.

**ME 453 Modern Engineering materials (3h)**

Electrical, magnetic, optical and thermal properties of materials. Advanced ceramics, composites. Advanced engineering plastics.

High temperature materials. Advanced coatings. Advanced materials processing system. Rapid solidification and powder metallurgy. Selection of modern materials.

**ME 455 Corrosion Engineering (3h)**

Technical and economical aspects of corrosion problems. Types of corrosion: pitting, crevice, intergranular, galvanic, and stress-corrosion cracking. Mechanism and prevention of corrosion failures. Cathodic protection of pipelines and submerged structures. Principles of inhibition of corrosion in process industries. Behavior of iron, copper, aluminum and their alloys in corrosive environments. Metallurgical aspects of corrosion. Design consideration in prevention of corrosion failures.

**ME 462 Mechatronics (3h)**

Mechanical system interfacing and actuation; Operational and power amplifiers; Analog to Digital and digital to analog converters; Digital data acquisition basics; Position/Orientation control; PWM control of DC motors, Sensors and actuators; Microprocessor-, microcontroller- and PC-based control; PLC basics and their programming; C programming (M-code & G-code) of CNC machine tools.

**ME 463 Mechanical vibrations (3h)**

Fundamentals of mechanical vibration, including free and forced vibration of single-, multi-and infinite-degree of freedom systems. Modal analysis and matrix formulation of vibration problems. Approximate solution techniques. Vibration and modal analysis of continuous systems: beams, rods, and strings. Approximate analytical as well as numerical solutions using suitable software such as MATLAB. Numerous examples and applications of vibration measurement and analysis, including vibration isolation and dynamic absorbers and rotating machinery. Laboratory experimentation for justifying the above topics.

**ME 466 Robotics (3h)**

Introduction to robotics and their applications, spatial descriptions and transformation, manipulator forward kinematics, manipulator inverse kinematics, trajectory generation Jacobians: velocities and static forces, manipulator dynamics, control of manipulators, robot programming, robot sensors and vision.

**ME 467 System Dynamics and Automatic Control (4h)**

Laplace transformation methods; Modeling of mechanical , electrical , hydraulic, pneumatic and thermal systems; Analogies; Mixed systems; Representation of control system components; Transfer functions and block diagrams; Time response of feedback control systems; Routh stability criterion, Root locus technique; Frequency response methods; Compensation; Term project.

**ME 468 System Dynamics and Automatic Control Laboratory (1h)**

Experiments in support of control system theory including : servo control of electrical motors, control of linear and torsional vibrations, control of gyroscopic motion, control of pendulum motion, hydro-mechanical liquid level control, pressure control, pneumatic servomechanism, vibration control; digital simulation of linear systems using a software package (MATLAB).

**ME 470 Thermal Power Plants (3h)**

Forms of energy, oil, gas and coal. Combustion processes, energy cycles. Steam generators and their component design. Turbines. Load curves. Field trips to power plants and other energy installations.

**ME 474 Refrigeration Engineering (3h)**

Mechanical vapor compression refrigeration cycles (single-stage and multi-stage); refrigerant compressors; refrigerants; absorption refrigeration systems; thermoelectric cooling; flash cooling; gas cycle refrigeration; ultra-low-temperature refrigeration (cryogenics); food refrigeration; transport refrigeration. Laboratory will be utilized to carry out experiments on refrigeration equipment and in problem solving sessions.

**ME 475 Air Conditioning (3h)**

Thermodynamics of moist air; construction of the psychrometric chart; psychrometric processes; psychrometric systems; industrial processes, air conditioning systems; duct design and air distribution methods; cooling towers. Experiments utilizing air conditioning equipment will be conducted for air conditioning systems will be practiced through a practical project in tutorial sessions.

**ME 480 Turbo Machinery (3h)**

Thermo-fluid dynamics aspects of fluid flow, efficiencies of turbomachines. Two dimensional cascades: turbine and compressor cascade correlations and performance. Axial turbines (two-dimensional analysis), axial flow compressors and fans (two-dimensional analysis), centrifugal compressors and fans, radial flow turbines.

**ME 482 Compressible Fluids (3h)**

Fundamentals of compressible fluid flow (gas dynamics) in relation to effects of area change (nozzles and diffusers), friction and heat interaction (Fanno, Rayleigh line and isothermal flow), combustion waves normal and oblique shock waves and their effects on flow properties (extended diffusers and supersonic airfoils). Applications to flow through pipelines, subsonic, sonic and supersonic flights, turbomachinery and combustion.

**ME 483 Pumping Machinery (3h)**

Terminology and description of typical pump machinery. Momentum and energy transfer between fluid and rotor. Performance characteristics of centrifugal and axial flow fans, compressors, and pumps. Various types of losses. Positive displacement pumps. Cavitation and water hammer problems in pump systems. Special problems in pump design and applications. Laboratory experiments will include performance evaluation of various types of pumps and problem-solving sessions.

**ME 490 Selected Topics In Mechanical Engineering (3h)**

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student

**Phys 104 General Physics (4h)**

Electromagnetism: Coulomb's law in the electric fields, Gauss law, Electric potential, Energy stored, Capacitance and dielectrics, Current and resistance, Electric energy and power, Direct current circuits, Kirchhoff "s Rules, Magnetic fields, Motion of a charged particle in a magnetic field, Sources of the Magnetic fields, Ampere's law, Faraday 's law, in the inductance, Mutual inductance, Alternative current circuits, rms values, Impedance, Resonance, Power in RLC circuits.

Nuclear Physics:Photoelectric effect, Atomic spectrum, Bohr model, Nuclear structure, Radioactivity Decay, Half life, Radioactive Decay.

# College of Science

## Vision:

To provide an accredited academic university education leading to outputs of high efficiency in the basic sciences to meet the needs of the labor market and the implementation of distinct Applied Research that contributes to the development of the local community and activating community partnership leading to self-financing College.

## Mission:

Nationally distinguished faculty in the basic sciences that contribute to the consolidation of local sustainable development.

## Values:

The college of science values an academic environment that facilitates intellectual growth through open and honest expression. It is committed to excellence on all levels of the educational and creative experience, to the success of all its students and to the development of their capacity to arrive at sound and perceptive conclusions that respect differences and diversity in ideas. It is also dedicated to lifelong learning, which encourages the continual use of the mind. The college plays a vital role in the life of the surrounding community, in society as a whole and as a catalyst for economic development.

## Aims:

The College aims to make valuable contributions to the Kingdom's scientific, technological, and economic sectors through the research activities of faculty and graduates. More specifically, the objectives include:

- To provide advanced teaching programs in the various basic sciences and supply the community with competencies and trained specialists in the modern scientific techniques.
- To conduct studies and researches in order to build a technological research database to serve the needs and to solve the community's problems.
- To spread knowledge within the college and the community and to achieve publications and translation work.
- To offer scientific and experimental services in the field of preserving the environments and community service.
- To participate in the development of the university education and to establish the scientific and academic ties with the higher education institutions inside and outside the kingdom to serve the strategic development in the Kingdom of Saudi Arabia.
- To incite to use instructional technology in the field of teaching in order to improve the graduates performances.
- To participate in the intellectual development and the thinking maturity of the specialized Saudi cadres and to qualify them with analytical skills to enable them to fully participate in the achievement of the objectives of the total economic development.
- To encourages the creation of new knowledge and the preparation of students to have a positive influence on national and international levels.
- To promote lifelong learning inside and outside the college community, to guarantee continued growth and welfare of the society.

## About:

The College of Science was established in 1997, and the college proved to be another building block in establishing Qassim University as a modern institution of higher education. Students began studying at the college in AY1997–1998. The first class of students completed their studies and graduated in AY2001–2002. The college awards a bachelor's degree in science. The college aims to increase the students' knowledge in a wide range of scientific fields and to develop the skills they need to be an expert in individual areas of specialization. In addition, the college provides the students with an education foundation in computer programming and English, as required by the country's labor market.

## Degrees:

Bachelor
Master

## Programs:

The college awards bachelor's degrees in the following majors:

- Mathematics,
- Physics and
- Chemistry.
- Biology

It also awards a Master of Mathematics.

## Faculty Members:

**Mathematics Department:**

Dr. Zeid Ibrahim AL- Muhiameed

**Head Of Mathematics Department**

Dr. Eid Mohammed Al-Eid

Math. Statistics

Dr. Abdulrahman Soliman Al- Hussein

Dr. Zeid Ibrahim AL- Muhiameed

Prof. Ahmed El Saway

Prof. Al Saïd Kouachi

Prof. Alaya Jilani Rabah

Prof. Bousselsal Mahmoud

Prof. Sherif Zaki

Prof. Mohammed Helmy Mahran

Prof. Mohamed Fahmy El- Sayed

Dr. Ibrahim Abou-Tair

Dr. Amar Rebbouh

Dr. Khalid M. A. Shebrawi

Dr. Abdelhakim Aknouche

Dr. Lotfi Riahi

Dr. Messaoud Souilah

Dr. Maref Alzoubi

Dr. Néji Bettaibi

Dr. Aboubakry Hmeid

Dr. Anwar Fawakhreh

Dr. Bouras Beldacem

Dr. Jafar Husni Ahmed

Dr. Sidi Hamidou

Dr. Shaban El-Shehawy

Dr. Adel Widyan

Dr. Emad Abdel-Baky

Dr. Dlala Mohsen

Dr. Mohamed Basher

Dr. Mohammad Jazamati

Dr. Mohammad Manna

**Physics Department:**

Pro. Suleiman Saleh,

**Head of the Department**

Prof. Suleiman Saleh Al-Thoyaib

Dr. Ziad hussain AlMasri

Dr. Sodky Abo Laila

Dr. Atef El-Taher

Dr. Essam Shaaban

Dr.Alaa Abdul Hamid

Dr. Magdy El-Hagary

Dr. Moayad Al Sbaylh

Dr. Ibrahim Tomsah

Dr. Ayman Abd El Khalek Felfala

Dr. Bassam Shehadeh

Dr. Mohamed Emmam-Ismail

Mr. Ahmed Sabry abdelrahman

Mr. Ayman Hasan Altorra

**Chemistry Department:**

Prof. Fathy El-Saied

Prof. Abdel Moneim El-Ghanam

Prof. Magdi Khalifa

Dr. Tamer Y. Soror

Dr. Atef Mahmoud

Dr. Ayman Kamel Helmy

Dr. Abdulrahman Mallah

Mr. Ahmed S. Radwan

Mr. Hussien H. Alganzory

Mr. Fadl El-gendy

**Biology department**

Aaishah Mohammad Ka'aby

Dr. Abeer Abass Ahmed Abdelbary

Ashwaq Ibrahim Alhuraby

Dr. Baheia Ahmed Mohamed Tolan

Dr. Fatimah  Abd El-Rahman Al-Homiad

Dr. Hala Rashad Abd El-Rahman

Hana  Apduliziz Algroush

Hayat Saud Alrashidi

Dr. Inas abd El-Moaty Tolba

Dr. Magda Hassan Mohamed gazer

Dr. Mona Mahmoud Elsayed Abdalla Mahmoud

Dr. Mona Saleh al -Tamy

Dr. Nada  Hamad Abdullah Al-Khashiban

Dr. Nadia Hanafy Mahmoud Aleryan

Dr. Noorah Saleh Al-Sowayan

Dr. Nashwa Ibrahim Ibrahim Mohamed Eldeep

Noha fahad Alngumshey

Samah Hamad Albahaijany

Seham Ibrahim Al-nafea

Shouaa  Abdulaziz Alrobaish

Tomadoer Ahmed Alhamdi

Dr. Wafa Abdullah Hamad Alkherb

Dr. Zakia Mahmoud Mohamed Hassan

Dr. Zeinab Zakaria Saleh

Dr. Fawziah Khalaf Rashed Al-harbi

## Study Plan:

**Program: Mathematics**

**Study plan:**

**The first and second level is the nature science preparation**

**Level 3**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration(2)** | Math.202 | 4 |
| **Principal of Probability Distribution Theorem** | Stat212 | 4 |
| **Basics of Mathematics** | Math.231 | 3 |
| **Introduction to Geometry** | Math.273 | 3 |

**Level 4**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration in many variables** | Math.203 | 4 |
| **Mathematical applications on computers** | Math.251 | 2 |
| **Vectors** | Math.204 | 3 |
| **Linear algebra** | Math.242 | 4 |
| **Theory of numbers** | Math.243 | 3 |

**Level 5**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Linear Programming** | Math.213 | 4 |
| **History of Mathematics** | Math.232 | 3 |
| **Introduction to Differential Equations** | Math.321 | 4 |
| **Numerical analysis** | Math.351 | 4 |

**Level 6**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Mathematical Methods** | Math.326 | 4 |
| **Group Theory** | Math.343 | 4 |
| **Real Analysis (1)** | Math.382 | 4 |

**Level 7**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Rings and Fields** | Math.444 | 4 |
| **Introduction to Topology** | Math.471 | 4 |
| **Real Analysis (2)** | Math.483 | 4 |
| **Project** | Math.499 | 4 |

**Level 8**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Introduction to Partial Differential Equations** | Math.422 | 4 |
| **Introduction to Differential Geometry** | Math.472 | 4 |
| **Complex Analysis** | Math.484 | 4 |

## COURSE DESCRIPTION:

**Level 3**

**Math .202 Differentiation & Integration(2) :** This course aims at giving students definite integral and its properties , mean value theorem of integral and the fundamental theorem of calculus. It also discusses indefinite integral , standard integrals, derivatives & integrals of hyperbolic and inverse hyperbolic functions, integration methods such as: integration by substitution , integration by parts , integration by partial fractions and other substitutions. Also L'Hospitals Rule , evaluation of area and volume of revolution, arc length, Numerical integration (Trapezoidal rule), Polar coordinates, Polar curves graphs and areas using polar coordinates.

**Stat212 Principal of probability distribution theorem:**
This course discusses the discrete and continuous probability distributions (The mass and density probability functions and their properties, expectation, variance, standard deviation and the moment generating functions) . The discrete and continuous bi variety random variables and their properties (expectation, covariance, correlation coefficient, variance of sum or difference of two random variables and the moment generating
functions of bi variety random variables) . Bi variety distributions (marginal and conditional distributions ,independence of random variables , conditional expectation) .Also distribution functions of random vectors and random samples (distribution of sample mean – law of large number – central limit theorem) are discussed.

**Math.231 Basics of mathematics :**
This course aims at introducing mathematical logic, methods of proofs, mathematical induction, set theory, the product of sets, binary operations, equivalence relations, equivalence classes and partitions ,
mappings , the images and inverse images of sets under mappings , equivalence sets, countable and finite sets. Binary operations, morphisms, definition and examples of groups- definition and examples of rings and fields, polynomials and partial fractions.

**Math.273 Introduction to geometry:**

This course provides students with the main concepts of plane Euclidean geometry such as: coordinates, transformation, reflections ,translation, isometrics and similarity. Theorems on triangles, circles, tangents and angles. Polygons, polyhedral, regular polyhedral, their classification, and properties. Spherical geometry such as: sum of angle formula for spherical triangles, projection, conservative functions. Affine geometry : linear and affine transformation, isometrics, finite affine planes.

**Level 4**

**Math.203 Differentiation & integration in many variables:**This course studies the functions in two or more variables, domain of the function, three dimension rectangular coordinates, limits, continuity, partial derivative, higher-order partial derivatives, differentiation of composed function, maxima and minima-method of Lagrange multipliers for maxima and minima. Double integrals in Cartesian and polar coordinates , triple integrals in spherical and cylindrical coordinates,

infinite series, convergence tests, representations of functions by power series, Taylor , Maclaurin, and the binomial series.

**Math.251 Mathematical applications on computers**

This course provides an introduction to mathematics software as Mathematica, Mat lap and solving some problems in calculus and linear

algebra by mathematica and Mat lap. Applications: modeling , simulation and visualization , internet research . Writing mathematical reports and projects using scientific work place.

**Math.204 Vectors:**

Students studies vectors in two and three dimensions, scalar and vector products, equations of lines and planes in 3-dimensional space. Surfaces of revolution and their equations in cylindrical and spherical Coordinates. Vector valued functions of a real variable, curves in space, curvature, rates of change in tangent and normal directions, directional derivatives and gradient of a function. Application to equations of normal and tangent space to a surface at a point. Vector fields, divergence, curl of a vector, line and surface integrals, Green's theorem, Gauss' divergence theorem and Stock's theorem.

**Math.242 Linear algebra**

This course studies matrices and their operations, types of matrices, elementary transformations, determinants, elementary properties of determinants, inverse of a matrix, rank of matrix, linear systems of

equations, vector spaces, linear independence , finite dimensional spaces , linear subspaces, inner product spaces, linear mappings, Kernel and image of a linear mapping- Eigen values and Eigen vectors of a matrix and of a linear operator mapping.

**Math.243 Theory of numbers:**

Students study the first and second principle of mathematical induction, well-ordering principle , divisibility, Euclidean algorithm, prime numbers and their properties, linear Diophantine equations, congruencies and their properties, linear congruencies- the Chinese remainder theorem, Fermat's

little theorem, Euler's theorem, Wilson's theorem, arithmetic functions and Pythagorean triples.

**Level 5**

**Math. 213 Linear programming:**

This course gives introduction to operations research, mathematical model for some real problems and mathematical formulation of linear programming problem. Graphical method for solving linear programming problems, convex sets, polygons, extreme point and optimality theorem. Analytical method (Simplex method) , big-M method , Two-phase method, formulation mistakes, dual problem, sensitivity analysis, application to transportation and network problems.

**Math.232 History of mathematics:**

This course aims at giving students some knowledge about the evolution of some mathematical concepts ,facts and algorithms in arithmetic , algebra, trigonometry ,Euclidean geometry, analytic geometry and calculus through early civilizations such as ancient Egyptian , Babylonians, Greeks, Indians, Chinese, Muslims and Europeans . Evolution of solutions of some conjectures and open problems.

**Math.321 Introduction to differential equations**:

This course gives basic definitions and construction of an ordinary differential equation. Methods of solving ordinary differential equations of first order . Orthogonal trajectories, ordinary differential equations of high orders with constant coefficients and with variable coefficients, types of solutions, linear systems of ordinary differential equations, series solutions of a linear ordinary differential equation of second order with polynomial coefficient and Laplace transform.

**Math. 351 Numerical analysis:**

Students study numerical methods for solving nonlinear equations (bisection – iteration – Newton – false position … ), errors and rates of convergence. Direct methods for solving linear systems (Gauss elimination,LU decomposition) and iterative methods (Jacobi –Gauss Seidel – Relaxation). Errors iteration matrices and convergence of iterative methods, polynomial interpolation (Lagrange-
Newton's methods: divided differences- forward and backward differences) and analysis of errors. Numerical differentiation and integration, errors and accuracy. Gaussian integration formulas.

**Level 6**

**Math.326 Mathematical Methods :**

This course discusses series solutions of ordinary differential equations with variable coefficients, inner product space of functions, self- ad joint operator, Sturm-Lowville theory, orthogonal polynomials and special functions( Legendre, Hermit, gamma, beta, Bessel). Generalized theory of Fourier series and Fourier integrals.

**Math.343 Group Theory:**

This course studies the axioms of group theory and some examples of groups. Subgroups, cyclic groups, Lagrange theorem, normal subgroup, factor group, homomorphism, fundamental theorems of isomorphism, auto morphisms, Caley theorem and its generalization, simple groups, permutation groups, class equation, group action on a set, p-groups, Cauchy theorem- Sylow's theorems, external and internal direct product of group, Burnside theorem, dihedral- quaternion, groups of auto morphisms on finite and infinite cyclic groups.

**Math.382 Real Analysis (1):**

This course introduces basic properties of the field of real numbers , completeness axiom , series and their convergence , monotone sequence , Bolzano-Weirstrass theorem , Cauchy criterion, basic topological properties of the real numbers, limit of a function , continuous functions and their properties . Uniform continuity , compact sets and its properties. The derivative of a function ,mean value theorem and Lupital rule and Taylor theorem.

**Level 7**

**Math.444 Ring and Fields:**

Students study rings, group of units, group of auto morphisms of a ring , ideals and factor rings and principal ring. They also study prime and maximal ideals, field of quotient of integral domain, characteristic of a ring, direct sum of rings, modules, Euclidean rings, ring of polynomials, roots of polynomials over a field, fields extensions, finite and simple extensions of fields, algebraic closure of a field, splitting fields and finite fields.

**Math.471 Introduction to Topology:**

This course introduces topological spaces, examples, closure of a set, derived set, topological subspaces, bases ,finite product topology, sub-bases, metric spaces, examples, metrizability, continuous functions, characterization of continuous functions on topological and metric spaces, homeomorphisms and examples. Topological property, compact spaces, examples , limit point and sequentially compact spaces.

**Math.483 Real Analysis (2):**

This course studies definition of Riemann integral, Darboux theorem , Riemann sums , properties and the principle theorem in calculus. Series of functions, point twice convergence , uniform convergence, algebra
and σ – algebra (sigma algebra), finite additivity and countable additivity, main extension theorem and outer measure. Measurable sets , measure , Lebesgue measure and its properties, simple functions, measurable functions, Lebesgue integral, theorems of convergence, the relation between Lebesgue and Riemann integral.

**Math.499 Project:**

A student prepares a research project in one of the Math. topics under the supervision of the staff.
The student should submit a report for an oral exam.

**Level 8**

**Math.422 Introduction to partial differential equations:**

This course discusses classification and formation of partial differential equation , first order linear partial differential equation , solution
using Lagrange's method , Cauchy problem , second order linear partial differential equation in several variables , physical application using separation of variables , classifications of partial differential equation , some boundary value problems and Green's function.

**Math.472 Introduction to differential geometry:**

This course discusses theory of curves in $R^3$, regular curves , arc length and reparameterization , natural parameterization, Serret-Frenet apparatus, existence and uniqueness theorem for space curves, Bertrand curves. Involutes and evolutes, local theory of surfaces, simple surfaces, coordinate transformations, tangent vectors & tangent spaces . First and second fundamental forms, normal and geodesic curvature , Weingarten map, principal Gaussian and mean curvatures, geodesics, equations of Gauss and Godazzi-Mainardi.

**Math.484 Complex Analysis:**

This course discusses complex numbers, Cartesian and polar representation of complex numbers, powers and roots of complex numbers, limits and continuity of complex functions, analytic functions , Cauchy-Riemann equations. Harmonic functions, exponential, trigonometric , hyperbolic functions and logarithmic functions. Complex integration, contour integral , Cauchy's theorem, Cauchy's integral
Formula, bounds on analytic functions ,Taylor and Laurent series, power series, zeros and singularities. Residue theory and applications to real and improper integrals.

**BA Degree Program : Physics**

The first year for these program is the preparatory year of natural Science

**Level 1**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 101** | Language Skills | 2 | - |
| **CHEM101** | General Chemistry (1) | 4 | - |
| **ENG101** | English Language | 3 | - |
| **IC101** | Introduction to Islamic Culture | 2 | - |
| **MATH101** | Calculus (1) | 4 | - |
| **PSY101** | Thinking Skills | 2 | - |
| **Total** | 17 | | |

**Level 2**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 103** | Arabic Editing | 2 | - |
| **CSC101** | Introduction to Computers and Programming | 3 | - |
| **ENG103** | English Language (2) | 3 | ENG101 |
| **IC102** | Islamic and Society Building | 2 | IC101 |
| **PHYS101** | General Physics (1) | 4 | - |
| **STAT101** | Statistical Probability | 3 | - |
| **Total** | 17 | | |

**Level 3**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC103** | Economic System in Islam | 2 | IC101 |
| **MATH201** | Calculus for Science (2) | 3 | MATH101 |
| **PHYS243** | General Physics (2) | 4 | PHYS101 |
| **PHYS211** | Classical Mechanics (1) | 3 | MATH101 PHYS101 |
| **PHYS231** | Vibrations and Waves | 2 | MATH101 PHYS101 |
| **PHYS243** | Thermodynamics | 3 | PHYS101 |
| **Total** | 17 | | |

**Level 4**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **MATH205** | Calculus for Physics (3) | 3 | MATH201 |
| **PHYS232** | Physical Optics | 3 | Phys231 |
| **PHYS234** | Health Physics | 2 | - |
| **PHYS203** | Mathematical Physics (1) | 3 | MATH201 |
| **PHYS212** | Classical Mechanics (2) | 3 | PHYS211 |
| **PHYS221** | Electromagnetism (1) | 3 | PHYS202 |
| **Total** | 17 | | |

**Level 5**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **BUS103** | Communication Skills | 2 | - |
| **MATH210** | Differential Equations | 3 | MATH205 |
| **PHYS302** | Mathematical Physics (2) | 3 | PHYS203 |
| **PHYS321** | Electromagnetism (2) | 3 | PHYS212 |
| **PHYS351** | Modern Physics | 3 | PHYS232 |
| **PHYS393** | Optics Physics | 3 | PHYS232 |
| **BIO314** | Healthy Culture | 2 | - |
| **Total** | 18 | | |

**Level 6**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC104** | Political System in Islam | 2 | IC101 |
| **PHYS303** | Mathematical Physics (3) | 3 | PHYS30 |
| **PHYS350** | Quantum Mechanics (1) | 3 | PHYS212<br>PHYS351 |
| **PHYS391** | Electromagnetism Lab | 2 | PHYS221 |
| **PHYS393** | Modern Physics Lab | 2 | PHYS351 |
| **PHYS342** | Statistical Physics | 3 | PHYS243 |
| **PQUR126** | Islamic Morals | 2 | |
| **Total** | 17 | | |

**Level 7**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS422** | Electronics | 4 | PHYS243 |
| **PHYS452** | Quantum Mechanics (2) | 3 | PHYS350 |
| **PHYS471** | Solid State Physics (1) | 3 | PHYS350 |
| **PHYS481** | Nuclear Physics (1) | 3 | PHYS351 |
| | Selective Course (Faculty) | 2 | - |
| **Total** | 16 | | |

**Level 8**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS455** | Molecular and Atomic Spectra | 3 | PHYS452 |
| **PHYS495** | Solid State Lab | 2 | PHYS471 |
| **PHYS497** | Nuclear Physics Lab | 2 | PHYS481 |
| **PHYS498** | Project | 2 | PHYS497 PHYS495 |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course | 2 | - |
| **Total** | 17 | | |

## Course Description:

**CHEM 10 : General Chemistry**

Theoretical part : Chemical calculations, gasea, liquid state, thermochemistry, solutions, chemical kinetics, chemical and ionic equilibria Bohr Theory and electronic configuration of atoms and periodic table . An Introduction to types of chemical bonds .

Practical part : some experiments on properties of matter : density , viscosity, qualitative analysis : identification of acidic and basic radicals for inorganic salts .

**Course Number : CSC 101 Introductions to Computer and Programing**

Credit Hours ( lecture and Lab ) : 3 (2+ 1)

Level : Second

Theoretical parts : Introduction to programming , structured program development, program control, functions, array. Assignments in algorithm design and translation of algorithms in high level language like C language

Practical part: Excercices on the theoretical part.

**Course Number :** ENG **101 - English Language**

The course aims to introduce students to :

An awarenss of the basics of the English language in general .

An understanding of the basics of English grammar .

The basics of English pronunciation.

Specialized academic topics in the students, respective disciplines.

Proposed Teaching Methods

The course will be conducted via lectures in the main seminar, workshops and group discussions will also be used .

**Course Number : Math 101 - Calculus -1**

Real number and real line – Inequality. Function – The graph of a function- even and odd functions- composite of functions- Review of Trigonometric functions – inverse functions- Limits – The definition of a limit – Properties of Limits- Techniques for Evaluaring Limits – Infinites Limits. Continuity at a point on an open interval - one sided limits and continuity on a closed interval – Properties of continuity . The Derivative of a function – Differentiability and continuity – chain Rule – Derivatives of Trigonometric function – Logarithmic and Exponential functios ( Differentiation ) - Hyperbolic functions – inverse Trigonometric functions Differentiation . Externa on an interval- Rolle,s Theorem and mean value theorem – Increasing and Decreasing functions and the first derivative test – concavity and second derivative test- related rates .

**PHYS 101 General Physics (1) (3 + 1) h.**

Theoretical part: Physics and measurements, Units and dimensions, Dynamics of particle in one dimension (displacement, average velocity, instantaneous velocity, acceleration, free fall), vector algebra and geometry, Motion in two dimensions, Projectile motion, Uniform circular motion, Tangential and radial accelerations, Newton's first law and inertial frames, Mass and weight, Newton's second law, Newton's third law, Friction, Work and energy, Vector scalar products, Work of variable forces, Kinetic energy and work-energy theorem, Conservative and non-conservative forces and potential energy, Power, Conservation of mechanical energy, The conservation law of linear momentum, Impulse, Collisions, Collision in one and two dimensions, Rotational motion with constant angular acceleration, Angular quantities, Moment of inertia, Torque and angular momentum, Work of rotational motion, Properties of matter: Elasticity, Stress, Strain, Modulus's, Strain energy, Fluid mechanics: Density and relative density, the concept of pressure, Pascal law, Archimedes principle, Fluid flow, Bernoulli's equation and its applications. State of matters, heat and Temperature and zero law of thermodynamics, Phase transitions, Latent heats, Ideal gases.

Practical part: Error and measurements, Force table, Hook’s Law, Free fall, Projectile motion, Boyle’s Law, Young’s Modulus, Specific Heat of a Solid, Coefficient of Thermal expansion, Surface tension in capillary tube, viscosity, Newton's law of cooling, Determination of the Paraffin wax fusion temperature.

**PHYS 202 General Physics (2) (3 + 1) h.**

Theoretical part: Electric Charge, Insulators and conductors, Coulomb's law, Point charge, The electric field, Electric field of multiple point charges, The electric field of continuous charge distribution, examples of various shapes (disks, rings, spheres, planes), The parallel plate capacitor, Electric dipole, motion of point charge and electric dipole in electric field, Electric flux, Gauss's law, Applications of Gauss's law, Conductor in electrostatic equilibrium, Electric potential, The potential of point charges, The potential of dipole, The electric potential of many charges, Capacitance and capacitors, Energy stored in a capacitor, Fundamental circuits, The electric current, Batteries, current density, Conductivity and resistivity, Ohm's law, Series resistors, Parallel resistors, Kirchhoff's laws, RC circuits, Magnetism and magnetic force, source of magnetic fields, Magnetic field of a current, Magnetic dipoles, Ampere's law and solenoids, The magnetic force on a moving charge, The magnetic force on a current-carrying wire, Forces and torques on current loops, Induced current, Motional emf, Magnetic flux, Lenz's law, Faraday's law, Induced fields and EM waves, Inductors, LC circuits, LR circuits, AC circuits and phase, Capacitors in AC circuits, RC filter circuits, Inductor circuits, The RLC circuits, Power in AC circuits, Wave phenomena, geometrical optics, speed of light, Longitudinal and transverse waves, Sound, The nature of light and the laws of geometric optics, reflection and refraction, Fermat’s principle, Snell’s law, Image formation.

Practical part: Verification of Ohm’s Law, Metric bridge, Charge and discharge of capacitors, Inductive Reactance, Capacitive Reactance, RCL circuits, Transformers, Speed of sound in air , Refractive Index of a Prism, Focal length of Lenses, Focal Length of Mirrors.

**PHYS 211 Classical Mechanics (1) (3 + 0) h.**

Space time, Review of Newton's law and conservation of linear momentum in Cartesian and polar coordinate system, applications on projectile motion in a linear air resistance medium, Quadratic air resistance. Motion of charges in a uniform magnetic field, The center of mass, angular momentum of several particles, Kinetic energy and work, Potential energy and conservative forces, Gradient relation, Time dependent potential energy, Energy for one dimensional linear system, Curvilinear one-

dimensional systems, Central forces, The energy of interaction of two particles, The energy of multi-particle systems, CM and relative coordinates, The equation of the orbit, Kepler orbits, The unbound Kepler orbits, Change of orbits, Mechanics in non inertial frames, The tides, Rotating frames and angular velocity vector. Newton's second law in rotating frame, The centrifugal force, Coriolis force, Coriolis force and
free fall, The Foucault pendulum, Coriolis acceleration.

**PHYS 231 Vibration and Waves (2 +0) h.**

Periodic motion, Simple harmonic oscillation, Damped oscillation, Forced oscillation, Application of damped and forced oscillations, Superposition of simple harmonic oscillations, traveling waves, standing, Beats, Transverse wave in wires, Longitudinal wave in rods, Application of longitudinal wave in open and closed air columns, Fourier analysis, Doppler effect.

**PHYS 243 Thermodynamics (3 + 0) h.**

Fundamental concept in heat and thermodynamics, Thermal Equilibrium and zeroth law of thermodynamics, Ideal gases, Kinetic theory of gases, First law of thermodynamic, Application of first law of thermodynamic, isothermal and adiabatic processes. Irreversible process and reversible processes, Carrnot cycle, Otto cycle-cleapeyron latent heat equation, Second law of thermodynamic, Heat Engines, Refrigerators, Entropy, Thermodynamic functions, Maxwell relations, Third law of thermodynamic, Phase change, Applications on thermodynamic laws.

**PHYS 203 Mathematical Physics I (3 + 0) h.**

Determinants, Matrices, Solving linear equations and differential equations by matrices, Application on the motion of the rotation of the rigid body, Vector Algebra: Vector products, Position, Displacement, Vector transformation, Gradient, The Divergence, The Curl, Laplace operator, Line, Surface, and Volume Integrals, Gauss theorem, Stock's theorem, Green's theorem, Spherical polar coordinates, Cylindrical coordinates.

**PHYS 212 Classical Mechanics II (3 + 0) h.**

Calculus of variations, The Euler-Lagrange equation and applications, Lagrange's equations for Unconstrained motion, Constrained systems, Generalized momenta and Ignorable coordinates, Lagrange multipliers and constraint forces, Rotational motion of rigid body, The inertial tensor, Principal axes of Inertia, Precession of a top by weak torque, Euler's equations, Euler's angles, Coupled oscillations and normal modes, The double pendulum, Three coupled pendulum, Hamiltonian mechanics for one dimensional systems, Hamiltonian mechanics in several dimensions, Ignorable
coordinates, Phase space orbits, Liouville's Theorem.

**PHYS 221 Electromagnetism I (3 + 0) h.**

Review of vector Operations and algebra, Linear and rotational transformation of vectors, Vector field, Review of vector differential calculus: (gradient, the divergence, the curl, product rules of algebra , Second Derivatives,), Review of integral Calculus: (linear, surface, and volume integrals of vector functions), The fundamental theorem for: (calculus, gradient, divergence, curl), Curvilinear Coordinates: (spherical polar and cylindrical coordinates), The Dirac delta function in one and three dimension, The divergence of reciprocal square of radial distance, The Helmholtz theorem, Coulomb's law, The electric field, Continuous charge distributions, Divergence and curl of electrostatic field, Field lines and flux, Gauss's law and its applications, Electric potential, The potential of a localized charge distribution, The work done to move a charge, The energy of a point charge distribution, The energy of a continuous charge distribution, Properties of conductors and induced charges, Surface charge and the force on a conductor, Capacitors, Poisson's equation, Laplace's equation in one, two and three dimensions, Boundary conditions and uniqueness theorems, Conductors and the second uniqueness theorem, The Method of images and induced surface charge and calculating force and energy, Multipole expansion and approximate potentials at large distances, The monopole and dipole terms, The electric field of a dipole, Polarization, Field of a polarized object, Induced dipole and dielectrics, Polar molecules, Bound charges, The field inside a dielectric and the electric displacement, Gauss's law in the presence of dielectrics, Boundary conditions, Linear Dielectrics: (susceptibility, permittivity, dielectric constant), Boundary value problems with linear dielectrics, Force and energy in dielectric systems, Magnetostatics and the Lorentz law , Magnetic fields and magnetic forces, The Biot-Savart law, The magnetic field of a steady current, The divergence and curl of the magnetic field, Ampere's law and its applications, Magnetic vector potential, Magnetostatic boundary conditions, Multipole expansion of the vector potential, Magnetic fields in matter and the magnetization, Magnetic materials: (diamagnets, paramagnets, ferromagnets), Torques and forces on magnetic dipoles, Effect of magnetic field on atomic orbits, The field of a magnetized object, Bound currents, The magnetic field inside matter and the auxiliary field, Ampere's law in magnetized materials, Boundary Conditions, Linear and nonlinear media, Magnetic susceptibility and permeability, Ferromagnetism.

**PHYS 232 Physical Optics (3 + 0) h.**

The nature of light , The superposition of waves, Interference of two-beams of light (division of the wave front & division of amplitude) Interferometers( Young , Fresnel's biprism , loyed mirror, Fresnel's double mirrors , wedge interferometer , Newton rings , Michelson interferometer , Jamin & Mach-Zehnder refractometers ), Interference of multiple beams , Fabry-Perot interferometer , Applications of interferometry, Diffraction , Fraunhofer diffraction (single slit, two slits, multiple slits) – diffraction grating - Fresnel diffraction (circular aperture & circular Obstacle ), Polarization - polarization by absorption , reflection , refraction & double refraction, Optical active materials & polarometer .Interference of polarized light , Analysis of polarized light , Electro-optics (Kerr effect & Pockels effect ) , Magneto- optics (Faraday effect).

**PHYS 302 Mathematical Physics II (3 + 0) h.**

Complex numbers, Analytic functions, Limits and Continuity, Analyticity, The Cauchy, Riemann Equations, Elementary Functions, Complex Integration, Contoursm, Independence of path-Cauchy integral theorem- Bounds for analytic Functions, Series representations for analytic functions, Residue Theory, Conformal Mapping, Invariance of Laplace's Equation, Geometric Considerations, Bilinear Transformations, The Schwartz, Christoffel Transformations.

**PHYS 321 Electromagnetism II (3+0) h.**

Electromotive force, Ohm's law, Motional electromotive force, Electromagnetic induction, Faraday's law, The induced electric field, Inductance, Energy stored in magnetic fields, The modified Ampere's law, Maxwell's equations in vacuum, Maxwell's equations in matter, Boundary conditions, Conservation laws and the continuity equation, Poynting's theorem, Newton's third law in electrodynamics and momentum, Maxwell's stress tensor, Conservation of momentum, Angular momentum, Electromagnetic waves in one dimension, The wave equation, Sinusoidal waves, Boundary conditions: reflection and transmission, Polarization, Electromagnetic waves in vacuum, Monochromatic plane waves, Energy and momentum in electromagnetic waves, Electromagnetic waves in matter, Propagation in linear media, Reflection and transmission at normal incidence, Reflection and transmission at oblique incidence, Absorption and dispersion, Electromagnetic waves in conductors, Reflection at a conducting surface, The frequency dependence of permittivity, Guided waves and wave guides, TE waves in a rectangular wave guide, The coaxial transmission lines, Electric dipole radiation, Magnetic dipole radiation, Radiation from an arbitrary source, Power radiated by a point charge, Radiation reaction with matter.

**PHYS 351 Modern Physics (3 + 0) h.**

Special Theory of Relativity: wave propagation, Michelson Morley experiment, Galilean transformation, Lorentz transformations, Relative velocity, Lorentz contraction, Time Dilation, relativity of mass, Mass and energy, Applications, The particle like properties of Electromagnetic radiation: Electromagnetic waves, The photoelectric effect, black body radition, The Compton Effect, X-rays Waves like properties of particles: De-Broglie hypothesis, Electron diffraction experiment of Davison and Germer, Electron microscope, Uncertainity principle, quantum theory, Atomic Structure: atomic properties, The Thomson model, Rutherford Model for atomic nuclei, alpha particle scattering, Atomic Spectra, Bohr theory of the hydrogen atom, Sommerfeld's Model, Failure of the Bohr theory Frank-Hertz experiment, The basic ideas of the Quantum Mechanics.

**PHYS 393 Optics Lab (0 + 2) h.**

Prism spectrometer (refractive index and dispersion), Grating spectrometer, Fresnel's biprism with He-Ne laser, Fresnel's double mirrors with He-Ne laser, Newton's rings, Michelson interferometer, Mach-Zehnder-interferometer, Diffraction at a single slit, Diffraction at double slits, Diffraction at one-and two dimensional gratings, Diffraction at a single slit measuring and evaluating with Video Com, Polarimter and optical activity, Abbe's refractometer, Inverse square law of light radiation and absorption coefficient of glass or plastic materials, Polarization of light.

**PHYS 303 Mathematical Physics III (3+0) h.**

Series Method for solving linear differential equations, Fuch's theorem, Second solution, Legendre polynomials, Hermite polynomials, Lagurre polynomials, Bessel Functions, Fourier transformation and its application, Laplace transformation and its application, Eigenvalue problem, Differentional equations of Boundary value problem.

**PHYS 342 Statistical Physics (3 + 0) h.**

Probability, One random variable, Some important probability distributions, Many random variables, Sums of random variables and the central limit theorem, Rules for large numbers, entropy, Kinetic theory of gases, Maxwell's distribution of the velocities of gas molecules and its applications, Distribution function of the energy of molecules, Liouville's theorem, Equilibrium properties, The microcanonical ensemble, Two-level systems, The ideal gas, Mixing entropy and the Gibbs paradox, The canonical ensemble, Canonical examples, The Gibbs canonical ensemblem, The grand canonical ensemble, Quantum statistical mechanics, Maxwell-Boltzmann distribution, Bose Einstein distribution, Fermi-Dirac distribution, Vibrations of a solid, Black-body radiation, Quantum microstates, Quantum macrostates, Ideal quantum gases, Hilbert space of identical particles, Canonical formulation, Grand canonical formulation, The degenerate fermi gas, The degenerate bose gas.

**PHYS 352 Quantum Mechanics (3 + 0) h.**

Reviews of the fundamental experiments in modern physics, the need for quantum mechanics. Wave packet and uncertainty principle, Schrödinger equation for free particle, Continuity relation, The dynamical variables and calculating the expectation values, Schrödinger equation with a potential in one dimension, Dynamical variables and calculating the expectation values in momentum space, Commutation relations, Hermitian operators, Linear operators, Completeness relation and orthonormality, Schrödinger equation in three dimensions, The fundamental postulates of quantum mechanics, Particle in an infinite well, Spectral expansion theory, The parity, Constants of motion and conservation laws, Momentum eigen functions and free body, One-dimensional potentials:(The potential step, The finite potential well at scattering and bound states, The potential barrier, The delta function potential at Scattering and Bound states, Simple harmonic oscillator, Oscillator eigen functions and eigen values, Ladder operators and dynamical variables, Schrödinger equation in three dimensions in Cartesian coordinates, Schrödinger equation in three dimension curvilinear coordinate system, Angular momentum and its eigen functions and eigen values, The addition of angular momentum, The central potentials.

**PHYS 392 Electromagnetism Lab (0 + 2) h.**

Measurement of e/m of the electron, Verification of Biot - Savart law , Verification of Faraday's law, Transformers , Measuring the force on current carrying conductors in a homogenous magnetic fields, RLC circuits, Generators, Motors, Transformers, Magnetic moment of magnetized rod, Helmholtz coils, Magnetic induction.

**PHYS 395 Modern Physics lab (0 + 2) h.**

Characteristics of microwaves, Franck- Hertz experiment, Stefan-Boltzmann law for heat radiation, Determination of Planck's constant by means of the photoelectric effect using the compact arrangement, Faraday effect, Fabry – Perot interferometer, Kerr effect, The Balmer series of hydrogen and determination of Rydbergs constant, Pockels effect, Zeeman effect.

**PHYS 422 Electronics (3 + 1) h.**

Theoretical part: Analog Electronics: The P-N junction diode and Zener diode with their applications Junction Field effect transistor - Bipolar junction transistor (Bias and amplifiers: JFET & BJT) – Differential and Operational Amplifiers, Introduction to Feedback Circuits, Multivibrators and Oscillators, Digital Electronics: Binary and Hexadecimal System, Logic Gates, Karnaugh Maps, Flip Flops, Shift Registers, Counters, Memories. Practical part: P-N junction application (half-wave rectifier, full-wave rectifier, clampers and limiters, Zener regulation) - Transistors JFET & BJT amplifiers. Amplifiers with 741(Inverting & Non inverting Amplifiers, Active Filters, Wien Oscillator, Astable Multivibrator). Half and Full Adder (7483), Flip Flop (7474-7476), Shift Register (7495-74194), Counters (7493-74193).

**PHYS 452 Quantum Mechanics II (3 + 0) h.**

Dirac notation, Vector space algebra and Hilbert space, Rephrasing wave mechanics and operator methods in abstract view, Angular momentum commutation relations, Raising and lowering operators for angular momentum, Expansion theory in abstract view, Matrix representation of angular momentum operators, General relations in matrix mechanics, Eigen states of spin ½, The intrinsic magnetic moment of spin ½ particles, Addition of two spins, Addition of Spin ½ and orbital angular momentum, Time independent perturbation theory and energy shifts, Degenerate perturbation theory, The Stark effect, Hyperfined splitting, Variational principle and its applications, The WKB approximation, Time-dependent perturbation theory, The interaction of charged particle with electromagnetic field, Two level-system, emission and absorption of radiations, spontaneous emission, Transition rate, selection rule, scattering theory, Partial wave analysis, The Born approximation.

**PHYS 471 Solid State Physics I (3 + 0) h.**

Different states of matter, classification of solids, crystal structure (Bravais lattices & Miller indices), methods of determination of crystal structure (X-ray diffraction, electron and neutron diffraction), crystal defects, crystal binding (interatomic forces, types crystal bonds), Methods of crystal growth, lattice dynamics (crystal vibration modes and phonons), thermal properties of insulators (specific heat of insulators: classical model, Einstein's model, Debye model,-thermal conductivity of insulators), Dependence of thermal conductivity on temperature, Free electron theory (classical model of free electron, Fermi gas of free electrons, Maxwell-Boltzmann distribution, Fermi-Dirac distribution function), band theory (zone theory and tight binding theory).

**PHYS 481 Nuclear Physics I (3 + 0) h.**

Properties of the nucleus: determination of nuclear charge, radius and mass, Nuclear binding energy, Natural Radioactivity: Decay law, Nuclear stability, Radioactivity and theory of transformation .Artificial Radioactivity: Discovery of artificial radionuclides, Transuranium elements, Interaction of radiation with matter: Interaction of heavy elements, interaction of light electrons, interaction of gamma rays with matter, interaction of neutrons with matter, Radiation Detectors: Gas detectors, Scintillation detectors, solid state detectors, Nuclear Reactions: Reactions of matter by gamma rays, reactions by alpha particles, reactions by protons, reactions by neutrons, Nuclear fission: Discovery of Nuclear fission, theory of Nuclear fission, Nuclear fusion: Energy production in stars, control of thermonuclear reactions.

**PHYS 455 Molecular and Atomic Spectra (3 + 0) h.**

Introduction: Comparing between atomic emission spectroscopy and atomic absorption spectroscopy; Optical spectroscopy, Atomic spectrum, Quantization of hydrogen atom, Atomic emission / absorption spectrophotometry Molecular spectroscopy , Spectroscopy of inner electrons. Zeemen's effect, Sodium spectrum, Effect of magnetic field on the energy levels of atom. Theory of magnetic energy, Anomalous Zeeman's effect and Lande splitting factor. Molecular Spectra of diatomic molecules, Vibrational energy levels in both classical mechanics and quantum mechanics. Rotational spectra of diatomic molecule in gaseous state and rotational energy levels, Molecular spectra; harmonic Oscillator, Non Rigid Rotator, Infrared Vibration, Rotation spectra, spectrum, IR spectrum, RBS spectra, XRD spectrum, measurements of Absorbance, Transmitting and Reflecting using double beam Spectrophotometers in all ranges of wavelengths (UV-VIS-NIR-IR), Normal modes of vibrations; Natural of infrared absorption, Basic Laser principles, Laser behavior, Properties of laser radiations, Different types of lasers, Laser spectroscopy, The total losses of the laser system, Transmission at the mirrors, Absorption and scattering by the mirrors, Absorption in the laser medium, Diffraction losses at the mirrors, The Ruby Laser, Three Level Laser (Helium-Neon Laser)-Four Level Laser ( Carbon dioxide Laser), Laser applications.

**PHYS 497 Solid State Physics lab (0 + 2) h.**

Studying the characteristics of the solar cell, electron diffraction experiments characteristics curves of an optical (photo) resistor, studying the electron spin resonance (ESR), calculation of the energy gap of germanium by an electrical method determination of the thermal coefficient of resistance of a noble metal (platinum) by computer, the magnetic susceptibility of some materials and its classification, X-ray spectroscopy and calculation of Planck's constant and Miller indices of crystal planes in NaCl single crystal, thermoelectric effect in semiconductors (calculation of Seebeck, Peltier and Thomson coefficients), superconductivity and determination of the transformation temperature TC of YBCO specimen by computer, determination of the absorption coefficient of aluminum for X-ray, Hall effect, studying the crystalline structure by using the field effect microscope.

**PHYS 498 Nuclear Physics Lab (0 + 2) h.**

Statistical nature of Radioactive decay law, Rutherford Scattering, Attenuation of gamma radiation, Absorption of beta radiation passing through different materials, Inverse square law in case of gamma-rays, Determination of the range of beta particles in absorbers by beta gamma source, Backscattering of beta particles, determination of the dead time of GM tube, Effect of a magnetic field on beta particles motion, Assessment of natural radionuclide in NaCl, Compton scattering.

**PHYS 499 Project (2 + 0) h.**
The student carries out a research under the supervision of one of the Staff members in one of the following branches: Theoretical Physics, Nuclear Physics, Solid State Physics, Fiber Optics, Laser, Plasma, Electronics. The student submit a a report about his work, and is evaluated by a committee selected by the department.

## Master of Science (M.S.) in Mathematics, Degree Plan

**First Semester**

| Course No. | Course Title | Credits |
|---|---|---|
| 516 Math. | Topology (1) | 4 |
| 518 Math. | Measure Theory and Integration | 4 |
| 524 Math. | Group Theory | 4 |
| Total | | 12 |

***Second Semester***

| Course No. | Course Title | Credits |
|---|---|---|
| 523 Math. | Rings and Modules | 4 |
| 526 Math. | Complex Analysis (1) | 4 |
| 528 Math. | Functional Analysis (1) | 4 |
| Total | | 12 |

**Third Semester**

| Course No. | Course Title | Credits |
|---|---|---|
| 532 Math. | Ordinary Differential Equations | 4 |
| | Elective Course | 4 |
| | Elective Course | 4 |
| Total | | 12 |

**Fourth Semester**

| Course No. | Course Title | Credits |
|---|---|---|
| | Elective Course | 4 |
| 555 Math. | Research Project | 3 |
| Total | | 7 |

### ( Compulsory Courses ) -- A

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| **516 Math.** | Topology (1) | 4 | -- |
| **518 Math.** | Measure Theory and Integration | 4 | -- |
| **523 Math.** | Rings and Modules | 4 | -- |
| **524 Math.** | Group Theory | 4 | -- |

| | | | |
|---|---|---|---|
| **528 Math.** | Functional Analysis (1) | 4 | 518 Math. |
| **532 Math.** | Ordinary Differential Equations | 4 | -- |
| **533 Math.** | Complex Analysis (1) | 4 | -- |

**B -- ( Elective courses )**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| **526 Math.** | Topology (2) | 4 | 516 Math. |
| **529 Math.** | Numerical Analysis | 4 | -- |
| **531 Math.** | Stochastic Analysis | 4 | 518 Math. |
| **534 Math.** | Linear Algebra | 4 | -- |
| **535 Math.** | Selected Topics in Algebra | 4 | 523 Math. , 524 Math. |
| **536 Math.** | Topological Vector Spaces | 4 | 516 Math., 534 Math. |
| **541 Math.** | Discrete Mathematics | 4 | 534 Math. |
| **542 Math.** | Partial Differential Equations | 4 | 518 Math. |
| **543 Math.** | Complex Analysis (2) | 4 | 533 Math. |
| **544 Math.** | Fields and Galois Theory | 4 | 524 Math., |
| **546 Math.** | Algebraic Topology | 4 | 516 Math., 524 Math., |
| **547 Math.** | Differential Geometry | 4 | 518 Math., 524 Math., |
| **548 Math.** | Functional Analysis (2) | 4 | 528 Math. |
| **549 Math.** | Quantum Mechanics | 4 | -- |

## C - Thesis or Research Project

| **Course No.** | **Course Title** | **Credits** | **Prerequisite** |
|---|---|---|---|
| 555 Math. | Research Project | 3 | -- |

## Course Description:

**516 Math. Topology (1) (Credits 4 hrs.)**

Topological spaces , Basic concepts ,Product spaces, Quotient spaces, Separation Axioms and Titez`s Theorem, Metric spaces and metrization, Urysohn,s theorem , Convergence Theory (Filters and nets ).

**518Math Measure Theory and Integration (Credit 4 hrs.)**

Rings, Semi-Rings, Algebras, Semi-Algebras, Algebra, Borel Algebra, Monotone Classes, Measure and its Elementary Properties, Extension Theorems, Completion and Approximation Theorems, Lebsgue Measure, Lebsgue Outer Measure, Lebsgue-Stelje's Measure, Measurable Functions and Basic Theorems, Lebsgue Integral and Main Theorems, Convergence of Measurable Functions, Integration with respect to a measure .

**523Math Rings and Modules (Credit 4 hrs.)**

Ideals and their radicals, Artinian and Noetherian modules and rings, Primary decompositions, Semi simple modules and rings and certain relevant theorems, Localization, Principal ideal theorem . graded rings and modules, Dimension theory , Dedekind rings.

**524Math Group Theory (Credit 4 hrs.)**

Free groups and presentation of groups , Free abelian groups, Structure of finitely generated abelian groups, Semi – direct product of groups . Classification of finite Groups, The Sylow Theorems, Normal and subnormal series, Nilpotent and Solvable groups .

**526Math Topology (Credit 4 hrs.)**

Connected spaces, Compact spaces and some types of it, Compactification and Alxendroff theory, Urysohn′ s theorem, function space, Baire,s theorem.

Prerequisite: 516 Math .

**528Math Functional Analysis (1) (Credit 4 hrs.)**

Normed spaces, Banach Spaces, Linear Operators on Normed Spaces, Bounded and Contiuous Linear operators, Hahn-Banach Theorem, Weak Topology, Open Mapping Theorem, Closed Linear Operators, Closed Graph Theorem, The Uniform Boundedness Theorem , Spaces $L^p$, The Space C(X) for a Metric Compact Space X, Inner Product and Hilbert Space, Adjoint, Unitary and Normal Operators, Projections, Spectral Theory in Finite Dimensional Spaces, Spectral Properties of Bounded Linear Operators.

Prerequisite: 518 Math.

**529Math Numerical Analysis (Credit 4 hrs.)**

Norms, Arithmetic, and well-posed computation, Iterative solution of non-linear equations (Functional iterations for a single equation, error propagation, second and higher order iteration motheds , Some explicit iteration procedures. The chord method, Newton mothod, method of false position and Aitkin`s delta square method. Special methods for polynomials. evaluation of polynomials and their derivatives, sturm sequence, Bernoulli`s method, Bairsou`s method ), Solution of Systems of Nonlinear equations, Substitution, Secant and Newton Raphson method, continuation methods.

**531Math Stochastic Analysis (Credit 4 hrs.)**

Measure theory in infinite dimensional Banach spaces. Gaussian measures, abstract Wiener Spaces, stochastic processes, Brownian motions, Ito^ integral, Ito^,s formula, martingale convergence theorems, basic inequalities, martingale representation theorem, Clark – Ocone theorem, stochastic differential equations, some properties of solutions of stochastic differential equations .

Prerequisite: 518 Math .

**532Math Ordinary Differential Equations (Credit 4 hrs.)**

Existence and uniqueness of solutions of linear systems . Stability theory. Poincare,s theory for two dimensional systems. Strum – Liouville boundary problems, Problems and applications.

**533Math Complex Analysis (1) (Credit 4 hrs.)**

Analytic functions. Cauchy ′ s theorem and consequences. Singularities and expansion theorems. Maximum modulus principle. Residue theorem and its application. Compactness and convergence in space of analytic and meromophic functions . Elementary conformal mappings.

**534 Math Linear Algebra (Credit 4 hrs.)**

Linear functionals and dual spaces , Canonical form of linear transformations , Jordan forms , Multilinear forms . Hermitian , unitary and normal transformations , Tensor product of vector spaces.

**535Math Selected Topics in Algebra (Credit 4 hrs.)**

Semi Group . Free Group . Representation Group . Commutative Rings . Non Commutative Rings . Homology Theory . Algebraic geometry Lattices . Modules .

Prerequisite: 523 Math, 524 Math

**536Math Topological Vector Spaces (Credit 4 hrs.)**

Filters, Locally convex spaces, Linear maps, Quotient spaces, Normality, Metrizability, Convergence of filters, Completeness, Locally compact spaces, Finite Dimentional spaces , Haha – Banach- Dieudonne Theorem, Grothendieke`s completeness Theorem.

Prerequisite: 516 Math, 534 Math.

**541Math Discrete Mathematics (Credit 4 hrs.)**

Introduction to discrete mathematical structures and their application . the main topics are induction, recursion, graph theory, and combinatorics. Applications include discrete and network optimization, discrete probability, game theory and voting systems.

Prerequisite: 534 Math.

**542Math Partial Differential Equations (Credit 4 hrs.)**

Introduction to distributions , Sobolev spaces , and Fourier transforms, elliptic equations, Hilbert space theory, potential theory, maximum principle, parabolic equations and systems, characteristics, representations of solutions, energy methods,

Prerequisite: 518 Math .

**543Math Complex Analysis (Credit 4 hrs.)**

Harmonic functions. The Riemann mapping theorem. Conformal mappings for multi-connected domains. Elliptic functions and picard,s theorem. Analytic continuation. Entire functions. Range of an analytic function. Topics in univalent functions and geometric function theory.

Prerequisite: 533 Math.

**544Math Fields and Galois Theory (Credit 4 hrs.)**

Historical background, separability and simple extensions, Galois extensions. Cyclotomic fields, Solvable and radical extension . Solvability of equations of degree less than five, Transcendence basis.

Prerequisite: 524 Math

**546Math Algebraic Topology (Credit 4 hrs.)**

Concept of categories and functors. Simplical complexes, subdivision and simplical approximations. Homotopy , fundamental group and covering spaces. Fundamental group of polyhedron. Chain complexes, homology groups and their topological invariance .

Prerequisite: 516 Math , 524 Math .

**547Math Differential Geometry (Credit 4 hrs.)**

Topological manifolds, differentiable manifolds, smooth functions, tangent space, smooth maps, Critical points, regular points, Immersions and submersions, inverse function theorem and implicit function theorem on manifolds. Tangent and cotangent bundles, smooth vector fields, one-parameter groups of local transformations,. Riemannian metric, isometries, differential forms and operators on differential forms, derham cohomology groups.

Prerequisite: : 518 Math, 524 Math

**548Math Functional Analysis (2) (Credit 4 hrs.)**

Algebra of bounded operators, self – adjoint operators in Hilbert Spaces , normal operators, compact operators, projections , spectral theory of linear operators in normed spaces and Hilbert spaces, spectral mapping theorem, Banach – Alaoglu theorem .
Prerequisite: 528 Math .

**549Math Quantum Mechanics (Credit 4 hrs.)**

Foundation of Quantum Mechanics and its mathematical tools. Energy Spectra for some molecules. Wave Mechanics and Schr dinger equation. Scattering Theory.

**555Math Research Project (Credit 3 hrs.)**

The supervisor chooses one topic related to the research field of the graduate student. This topic should be approved by the committee of the graduate studies.

The student searches for the references of the scientific material research papers, text books, etc..) with guidance of the supervisor.

The student write down the scientific material related to the topic after collection and studying.

The student should make an oral presentation to a defense committee that is responsible for the evaluation of the research project.

**BA Degree Program : Chemistry**

**Faculty Requirements 44 Credit Hours**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| **PSY 101** | Thinking skills and educational methods | | - |
| **ENG 101** | English 1 | | - |
| **ENG 103** | English 2 | | ENG101 |
| **CSC 101** | Introduction to computer sciences | | - |
| **MGMT 103** | Communication skills | | - |
| **MATH. 101** | Algebra 1 | | - |
| **STAT 101** | Statistics | | - |
| **CHEM 101** | General chemistry 1 | | - |
| **PHYS 101** | Physics 1 | | - |
| **MATH. 201** | Mathematics 2 | | MATH. 101 |
| **CHEM 202** | General chemistry 2 | | CHEM 101 |
| **PHYS 202** | Physics 2 | | PHYS 101 |
| **CHEM 230** | Thermodynamics | | CHEM 101<br>MATH. 201 |
| **CHEM 332** | Quantum Chemistry | | CHEM 202<br>MATH201 |
| | **Total** | **44** | |

**Faculty Elective Courses 5 Credit Hours**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| **ENG 203** | Scientific expressions | | ENG 101 |
| **CSC 202** | Skills in using Internet | | comp |
| **CHEM 307** | Management of laboratories and safety | | - |
| **CHEM 429** | Applied inorganic chemistry | | CHEM 322 |
| **CHEM 431** | Photochemistry | | CHEM 352 |
| **CHEM 451** | Environmental chemistry and pollution | | CHEM 250 |

**Compulsory courses of the Department**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| **CHEM 220** | Chemistry of main group elements | | CHEM 202 |
| **CHEM 231** | Phases of matter and solution | | CHEM 230 |
| **CHEM 244** | Organic Chemistry1 | | CHEM 202 |
| **CHEM 250** | Volumetric and gravimetric analysis | | CHEM 101 |
| **CHEM 320** | Chemistry of transition elements | | CHEM 220 |
| **CHEM 322** | Coordination chemistry | | CHEM 320 |
| **CHEM 330** | Kinetic chemistry | | CHEM 250 |
| **CHEM 331** | Electrochemistry | | CHEM 231 |
| **CHEM 340** | Organic chemistry2 | | CHEM 244 |
| **CHEM 345** | Heterocyclic chemistry | | CHEM 340 |
| **CHEM 351** | Optical methods of analysis | | CHEM 250 |
| **CHEM 352** | Electroanalytical methods of analysis | | CHEM 331 |
| **CHEM 397** | Field training | | -- |
| **CHEM 420** | Inorganic reaction mechanism | | CHEM 322 |
| **CHEM 423** | Organometallic chemistry | | CHEM 322 |
| **CHEM 433** | Surface chemistry and | | CHEM 330 |

| | | | |
|---|---|---|---|
| | catalysis | | |
| **CHEM 441** | Organic reaction mechanism | | CHEM 345 |
| **CHEM 442** | Spectra of organic chemistry | | CHEM 345 |
| **CHEM 449** | Chemistry of Natural products | | CHEM 345 |
| **CHEM 452** | Separation methods and Chromatography | | CHEM 250 |
| **CHEM 498** | Research project | | **-** |
| | **Total** | **54** | |

**Compulsory Courses in addition to the Departmental requirements**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| **BIOL 102** | Biology1 | 3 | - |
| **BCH 402** | Principles of biochemistry | 3 | BIOL 102<br>CHEM 340 |
| **STAT 406** | Statistics and data entering | 3 | STAT 101 |
| | **Total** | **9** | |

**Elective Courses from the Department**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| **CHEM 334** | Solid state chemistry | | CHEM 202 |
| **CHEM 421** | Spectra of inorganic chemistry | | CHEM 322 |
| **CHEM 425** | Nuclear chemistry | | CHEM 202 |
| **CHEM 428** | Bioinorganic chemistry | | CHEM 322 |
| **CHEM 434** | Corrosion | | CHEM 230<br>CHEM 331 |
| **CHEM 443** | Polymer chemistry | | CHEM 340 |
| **CHEM 445** | Photo organic chemistry | | CHEM 345 |
| **CHEM 447** | Petroleum chemistry | | CHEM 345 |
| **CHEM 448** | Applied organic chemistry | | CHEM 345 |
| **CHEM 458** | Analysis of materials | | CHEM 351<br>CHEM 352 |
| | **Total** | **20** | |

**Eelective courses can be chosen by the student and his Academic Advisor.**

**<u>Courses desrciption</u>**

**CHEM 101**: **General Chemistry (1)** Credit Hours (lecture + lab): **4(3+1)**

Chemical calculations, gases, liquid state, thermochemistry, solutions, chemical kinetics, chemical and ionic equilibria, Bohr Theory and electronic configuration of atoms and periodic table. An introduction to types of chemical bonds.

**CSC 101: Introduction to Computer** Credit Hours (lecture + lab)**: 3(2+1)**

Introduction to programming, structured program development, program control, functions, arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.

**CHEM 202**: **General Chemistry (2)** Credit Hours (lecture + lab): **4(3+1)**

Chemical bonding, chemistry of elements, chemical reactions in aqueous solutions, electrochemistry, nuclear chemistry and organic chemistry. (Pre-requisite: **CHEM 101)**

**CHEM 230**: **Chemical Thermodynamics** Credit Hours (lecture + lab): **3(2+1)**
Importance and expressions, Work and heat, zero low, fist low of thermodynamic and its applications, the second low and its applications, the third low of thermodynamic, chemical potential, free energy, chemical and physical equilibrium, thermodynamic statistics. (Pre-requisite: **CHEM 101 + MATH. 202 (Co-requisite))**

**BIOL 102**: **General Biology** Credit Hours (lecture + lab): **3(2+1)**

Plant cell structure, properties and classification of plant kingdom, metabolism, anatomy, photosynthesis. Structure of microbial cell, properties of microorganisms, its importance for human and environment, viruses, bacteria, fungi, algae and lichens. Animal cell structure, properties and classification of animal kingdom, protozoa, vertebrate and invertebrates.

**CHEM 220**: Course Name: **Chemistry of Main Group Elements**,Credit Hours (lecture + lab): **3(3+0)**

Modern theories of covalent bond, periodic table, principles of periodic arrangement of elements, Group IA, Alkali metals (lithium - ceasium), Group II A Alkaline earth metals (beryllium - barium), Group III A (boron - thallium), Group IV A (carbon – lead), Group VA (nitrogen – bismuth), Group VIA (oxygen – selenium), Group VII A (fluorine – iodine), Group VIIIA (noble gases), compounds of representative elements. (Pre-requisite: **CHEM 202)**

**CHEM 231:** Course Name: **Phase Rule and Solutions,** Credit Hours (lecture + lab): **3(2+1)**

Fractional molar quantities, evaporation pressure, boiling and freezing. Solid material and its composition, phase equilibrium and equilibrium in gaseous phase, mixing, thermodynamics of real and ideal non electrolytic solutions, collegative properties, solute and solvent activities, hydrolysis of ions, activity coefficient, electrolytic conduction, ionic mobility, transportation number, diffusion, transition and transfer, clapiron-clausus equation, phase rule; one component system, two component systems, and three component systems.**(**Pre-requisite: **CHEM 230)**

**CHEM 244**: Course Name: **Principles of Organic Chemistry -1**, Credit Hours (lecture + lab): **3(2+1)**

Aliphatic hydrocarbons (alkanes, cyclic alkanes, alkenes and alkynes), aromatic hydrocarbons (electrophilic substitution reactions, activity and direction, polynuclear aromatic hydrocarbons), alkyl and aryl halides (nomenclature, physical properties, preparation methods, nucleophilic substitution reactions). (Pre-requisite: **CHEM 202 ).**

**CHEM 250**: **Volumetric and Gravimetric Analysis**, Credit Hours (lecture + lab): **4(2+2)**

Introduction to volumetric analysis, methods of expressing concentration, calculations in analytical chemistry, neutralization reactions, precipitation reactions, compleximetric titration, redox reactions, principles of gravimetric analysis, solubility product, preliminary treatment of precipitation process, calculations in gravimetric analysis.(Pre-requisite: **CHEM 101).**

**CHEM 320**: **Chemistry of Transition Elements**, Credit Hours (lecture + lab): **2(2+0)**

Transition elements, definition, general properties of transition elements and study of groups of d- block transition elements .Study of elements of group IV ( titanium, zirconium and hafnium), elements of group V ( vanadium, niobium and tantalum), elements of group VI ( chromium, molybdenum and tungsten), elements of group VII ( manganese, technetium and rhenium ), elements of group VIII (iron, cobalt and nickel ( the first triad of group VIII ), elements of group $I_B$ ( copper, silver and gold ), elements of group $II_B$ ( zinc, cadmium and mercury ). Elements of f- block elements ( lanthanides and actinides ) .Definition and general properties of lanthanides and actinides, magnetic properties and spectra of lanthanides and actinides. Separation and industrial uses of lanthanides . Metal complexes of lanthanides and actinides. Radioactivity of actinides.(Pre-requisite: **CHEM 220 ).**

**CHEM 330:** Course Name: **Chemical Kinetics**, Credit Hours (lecture + lab): **3(1+2)**

Rate of chemical reactions, factors affecting the rate of reaction, order of reaction and half life time, determination of rate, order and rate constant of chemical reaction, Arhenius equation, determination of activation energy, collision theory, transition state, chain reaction and reaction mechanism.(Pre-requisite: **CHEM 250 ).**

**CHEM 331**: **Electrochemistry**, Credit Hours (lecture + lab): **3(2+1)**
Potentiometric measurements, electrochemical reactions and Nernest equation, reference electrodes, standard potentials, thermodynamics of electrochemical reactions, diffusion and electrochemical reactions, voltammetry, mechanism of electrode reactions, physical and chemical meaning of corrosion, study of the effect of media on the corrosion. (Pre-requisite: **CHEM 231).**

**CHEM 340**: **Principles of Organic Chemistry (2),** Credit Hours (lecture + lab): **3(2+1**

**:** Introduction to stereochemistry, classification, properties, preparation methods and reactions of (aldehydes, ketones, carboxylic acids and their derivatives, amines). Carbohydrates (monosaccharide, disaccharides, polysaccharides) amino acids and proteins(acidic character, basic character of amino acids, preparation methods and reactions). (Pre-requisite: **CHEM 244 ).**

**CHEM 351: Spectrophotometric Methods of Analysis, Credit Hours (lecture + lab): 3(2+1)**

Molecular (UV-VIS) and atomic spectral analysis methods, single and double beam spectral instruments, components of instruments (sources- monochromators- detectors …. etc.), qualitative and quantitative spectral analysis aspects, Beer`s low and its application, spectrophotometric titrations, interferences, fluorescence and phosphorescence. Flame atomic absorption spectroscopy apparatus, interference and their elimination, methods applications of flame atomic absorption, fluorescence and emission spectra for qualitative analysis. (Pre-requisite: **CHEM 250).**

**CHEM 322**: **Chemistry of Metal Complexes**, Credit hours (lecture + lab ): **2(1 + 1)**

Definition of a metal complex. Types of ligands . Coordination numbers and structure. Polynuclear metal complexes. Isomerism in metal complexes .Nomenclature of metal complexes . Theories of bonding in metal complexes, magnetic properties of metal complexes, valence bond theory, molecular orbital theory and crystal field theory. Ligand field theory in application. Crystal field stabilization energies. Jan- Teller effect. Reactions of metal complexes. Coordination equilibria in solutions and determination of formation and dissociation constants. Electronic spectra of metal complexes.(Pre-requisite: **CHEM 320).**

**CHEM 332:Quantum Chemistry**, Credit Hours (lecture + lab): **2(2+0)**

Electromagnetic radiation and the quantum theory, Bohr's atomic theory, the foundation of quantum mechanics, Schrodinger's equation, wave mechanic, quantum mechanic's postulates, quantum mechanic's of some simple systems, quantum mechanic's of hydrogen like atoms, angular momentum and magnetic moment, the rigid linear rotor, spin quantum numbers, many-electron atoms, approximate methods in quantum mechanic's.

(Pre-requisites: **CHEM 202 + MATH 201).**

**CHEM 345: Heterocyclic Organic Chemistry,** Credit Hours (lecture + lab): **3(2+1)**

Nomenclature, methods of preparation, study the physical and chemical properties of five and six-membered rings heterocyclic compounds which contain one or more hetero atoms, study the heterocyclic compounds which contain more than one fused ring. Study the different applications of these compounds.( Pre-requisite: **CHEM 340).**

**CHEM 352**: **Electroanalytical Methods,** Credit Hours (lecture + lab): **3(2+1)**

Classification of electrochemical methods of analysis, potentiometric methods, ion selective electrodes (ISE), molecular selective electrodes (MES), electrochemical sensors, voltametric methods of analysis and polarography, stiripping voltammetric methods, amperometric methods of analysis, coluometry, electrolytic conductance, electrogravimetry. (Pre-requisite: **CHEM 331).**

**CHEM 397**: **Field Training** , Credit Hours (lecture + lab): **2(0+2)**

the students spend a training period in a suitable industrial company, or in university laboratories, or in the hospital's laboratories, or water plants and submit a report, under the supervision of a professor from the Department. The students will be evaluated according to Department regulations.

**STAT 406: Statistical Treatment of Chemical Data ,Credit Hours (lecture + ex.): 3(2+1)**

Standard deviation, relative standard deviation, random error and its sources, confidence, precision and accuracy, (t) test, (f) test, calibration curves for determination of concentration of solution, application of available PC-software to solve numerical problems in the various areas of chemistry and to treat laboratory data, implementation of ready-to-use PC- programs in chemistry. (Pre-requisites: **STAT 101)**.

**CHEM 423**: **Organometallic Chemistry**, Credit Hours (lecture + lab): **2(2+0)**

Definition, classification, and stability of organometallic compounds, nature of organometallics for essential elements (classifications, preparation methods), derivatives for one element from each group, study of organometallic compounds of transition elements, bonding nature in transition element complexes, reactions of bond cleavage, reactions of oxidation and addition, applications on catalysis**.** ( Pre-requisite: **CHEM 322 )**

**CHEM 441**: **Mechanism of Organic Reactions,** Credit Hours: **2(2+0)**

Study the chemical and physical methods to follow the reaction mechanism, nucleophilic and electrophilic substitution reactions, elimination reactions, electrophilic addition to a double bond, addition to a carbonyl group, rearrangement in organic compounds. **(**Pre-requisite: **CHEM 345).**

**CHEM 452: Separation Methods and Chromatography, Credit Hours (lecture + lab): 3(2+1)**

Basic principles of separation methods: using distillation, precipitation, solvent extraction, chromatographic methods, chromatographic columns, high pressure columns, capillary columns, thin layer chromatography, paper chromatography, gel chromatography, gas and liquid chromatography, chromatogram, apparatus components, qualitative and quantitative chromatographic analysis. **(**Pre-requisite: **CHEM 250)**

**BICH 402**: **Principles of biochemistry**, Credit Hours (lecture + lab): **3(2+1)**

Biological buffer solutions, carbohydrates**,** amino acids, peptides, polypeptides and proteins, lipids, enzymes, hermones, nucleic acids, cations, trace elements in blood. (Pre-requisite: **BIOL 102 + CHEM 340).**

**CHEM 420**: **Mechanism of Inorganic Reactions,** Credit Hours (lecture + lab): **2(2+0)**

Coordination compounds and coordination numbers. Substitution reactions in metal complexes of octahedral geometry. Substitution reactions in metal complexes of square planar geometry. Neucleophlic substitution reactions for tetrahedral complexes. Oxidation and reduction reactions. Determination of reactions rates experimentally. **(**Pre-requisite: **CHEM 322).**

**CHEM 433**: **Surface Chemistry and Catalysis,** Credit Hours (lecture + lab): **2(2+0)**

Solid–gas interface, solid–liquid interface, liquid–liquid interface, changed surface interface, introduction to types of catalysis, Heterogeneous catalysis for solid gas interface and solid–liquid interface, homogeneous catalysis, chemical kinetics in heterogeneous catalysis, types of catalysts, their preparations, and properties, industrial catalytic reactions. **(**Pre-requisite: **CHEM 330).**

**CHEM 442**: **Spectra of Organic Compounds,** Credit Hours (lecture + lab): **3(2+1)**

Different spectroscopic methods for the identification of structure of organic compounds, study the spectra of (ultraviolet, visible, infrared, nuclear magnetic resonance for $^{1}H$ and $^{13}C$, and mass spectrum), applications including the different types of spectra.(Pre-requisite: **CHEM 345).**

**CHEM 449**: **Chemistry of Natural Products**, Credit Hours (lecture + lab): **2(2+0)**

Introduction to natural products, extraction methods from their sources. Separation and determination of their structures, Terpines (classifications, examples, their importance). Alkaloids (classifications, examples of five and six-membered heterocyclic rings), identification of natural phenolic compounds. **(**Pre-requisite : **CHEM 345).**

**CHEM 498**: **Research Project,** Credit Hours (lecture + lab): **1(1+0)**

The students conduct a research work in certain scientific subject and submit an essay; The students will be evaluated according to Department regulations.

## ELECTIVE COURSES

**CHEM 307**: **Laboratory Management and Safety Rules,** Credit Hours (lecture + lab): **2(2+1)**

Detailed description of managements of chemistry lab. and activity including collection, transportation and storage of samples, quality control tests, communication tools, analysis of obtained results, emergency and safety rules.

**CHEM 334** : **Solid State Chemistry**, Credit Hours (lecture + lab): **2(2+0)**

An introduction to crystal structures, Physical methods for characterizing solids, Preparative methods, bonding in solids and electronic properties, Defects and non-stoichiometry, Carbon-based electronics, Zeolites and related structures, Optical properties of solids, Magnetic and dielectric properties, Superconductivity, Nanoscience.(Pre-requisite: **CHEM 202).**

**CHEM 421**: **Spectra of Inorganic Compounds**, Credit Hours (lecture + lab): **2(2+0)**

Vibrational spectra, group theory, symmetry elements, groups and their representation, classification of compounds and their point group, use of species character tables for calculation of principal vibrations, selection rules for vibration, activity of vibrations in Infrared and Raman regions, use of spectra in inorganic chemistry, electronic spectra, instruction of molecular orbitals, selection rules for electronic transitions, uses of electronic spectra in inorganic chemistry, Mossbouer spectra, sources of gamma rays, applications.**(**Pre-requisite: **CHEM 322).**

**CHEM**: **Nuclear and radiation Chemistry**, Credit hours (lecture + lab): **2 (2 + 0)**

Origin of nuclear Science. Nuclei, isotopes and isotope isolation. Nuclear mass and stability. Unstable nuclei and radioactive decay. Absorption of nuclear radiation. Radiation effects on matter. Uses of radioactive tracers. Energetics of nuclear reactors. Particle accelerators . Mechanisms and models of nuclear reactions. The transuranium elements. Thermonuclear reactions : the beginning and future. Radiation biology and radiation protection. Principles of nuclear power. Nuclear power reactors. Nuclear fuel cycle. (Pre-requisite: **CHEM 202).**

**CHEM 428**: **Bioinorganic Chemistry,** Credit Hours (lecture + lab): **2(2+0)**

Bioinorganic chemistry and includes: non oxidizing, reducing metal enzymes, nitrogen fixation, oxygen carriers Applications of metal and non-metal compounds and their complexes in medicine and biology**. (**Pre-requisite: **CHEM 322 ).**

**CHEM 429: Applied Inorganic Chemistry**, Credit hours ( lecture + lab ) : **2 ( 2 + 0 )**

This course concerned with the different applications of inorganic materials such as : Industry of fertilizers,1-phosphorous cements 2-nitrogen containing fertilizers as ammonium sulphate, ammonium nitrate and urea 3-potassium-containing fertilizers. Industry of aluminium. Industrial silicon products as; silicon oils, silicon rubbers and silicon resins. Industry of silicate products as glass. Inorganic fibres as asbestos fibres, textile glass fibres, optical fibres. carbon fibres, metal fibres, oxide fibres and non-oxide fibres. Industry of construction materials; as cement, gypsum, enamels and ceramics. Inorganic pigments. (Pre-requisite: **CHEM 322).**

**CHEM 431**: **Photochemistry**, Credit Hours (lecture + lab): **2(2+0)**

Electronic excitation of atoms and molecules, excited states of polyatomic molecules. Kinetics of electronic excited state, electronic energy transition, chemical reactivity of excited electronic molecules, photoelectronic and photoionic spectra, diffraction of light in laboratory and outdoor (environment). (Pre-requisite **CHEM 352).**

**CHEM 434**: **Corrosion**, Credit Hours (lecture + lab): **2(2+0)**

General introduction - types of corrosion – corrosion environments- forms of corrosion - - local corrosion - uniform corrosion atmospheric corrosion - thermodynamic of - electrochemistry Pourpaix diagrams corrosion - of corrosion - mixed potential theory - corrosion of iron, corrosion inhibition – cathodic protection – anodic protection - corrosion of iron in concrete – pipeline corrosion - corrosion inhibitors. (Pre-requisites: CHEM 230 + CHEM331).

**CHEM 443**: **Polymer Chemistry,** Credit Hours (lecture + lab): **2( + )**

Basic concepts of polymer chemistry, condensation and addition polymerization, copolymerization, polymer structure and properties, molecular weight determination of polymers, analysis and testing of polymers, important industrial polymers, copolymers and plastic technology.(Pre-requisite: **CHEM 340).**

**CHEM 447**: **Petroleum Chemistry**, Credit Hours (lecture + lab): **2(2+0)**

Introduction to petroleum, theories of formation of petroleum- physical and chemical properties, methods of analysis, chemical processes ( thermal and catalytic cracking- catalytic alkylation) natural gas ( its use- classifications- methods of purifications), lubricating oils, distillation of petroleum ( purification- methods of improvement), artificial petroleum and methods of preparation, saturated and unsaturated hydrocarbons as starting materials in petrochemical industries, polymers derived from petroleum. (Pre-requisite: **CHEM 345).**

**CHEM 448: Applied Organic Chemistry, Credit Hours (lecture + lab): 2(2+0)**

Oils, fats and soaps: chemical constitution, distinction between oils and fats, chemical analysis of oils and fats acid, acid saponification and iodine values, definition, determination and significances.Dyes: theory of color and constitution, chromophore and auxochrome, classification of dyes based on applications, synthesis of acid dye (congo red), basic dye (malchite green), moderate dye (alizarin), ingrain dye (bismark brown), vat dye (indigo), disperse dye (celliton–B) reactive dye (copper phthalocyanine), sulphur dyes (sulphur black), azo dye (aniline yellow). Effluent in dyeing industry. (Pre-requisite: CHEM 345).

**CHEM 451: Environmental Chemistry and Pollution, Credit Hours (lecture + lab): 2(1+1)**

Introduction about environment, type of pollutants in air, water, soil and agricultural products, surface and underground water pollution, factors required to insure water quality for different uses. Soil analysis and determination of environmental pollutants such as pesticides, fertilizers, polycyclic hydrocarbons, analysis of agricultural products.(Pre-requisite: **CHEM 250** ).

**CHEM 458**: **Ore Analysis**, Credit Hours (lecture + lab): **2(1+1)**

General relationships of a mineral ore with types of matter, classification of ores, methods of ore separation, Rules for obtaining a true sample, methods of sampling, preliminary treatment of sample. Decompose of sample. Reduction of sample weight. Concentration of ores. Selectivity factor, major and minor constituents to be determined. General characteristics of analysis, accuracy of analysis, statement of analysis, measurements of systematic and random errors... Examples of ore analysis. (Pre-requisite: **CHEM 351 CHEM 352).**

## BA Degree Program : Biology

**University Requirements**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| IC 101 | Islamic Culture (1) | 2 | - |
| IC 102 | Islamic Culture (2) | 2 | IC 101 |
| IC 103 | Islamic Culture (3) | 2 | IC 101 |
| IC 104 | Islamic Culture (4) | 2 | IC 101 |
| ARAB 101 | Language Skills | 2 | - |
| ARAB 103 | Arabic Writing | 2 | - |

| | | | |
|---|---|---|---|
| | **Total** | **12** | |

## II Compulsory requirements of the College

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| **ENG 101** | English Language (1) | 3 | **-** |
| **MATH 101** | Calculus (1) | 4 | - |
| **CHEM 101** | General Chemistry (1) | 4 | - |
| **PSY 101** | Thinking Skills and Learning Styles | 2 | - |
| **STAT 101** | Introduction to Statistics & Probabilities | 3 | **-** |
| **PHYS 101** | General Physics (1) | 4 | **-** |
| **CSC 101** | Introduction to Computers & Programming | 3 | **-** |
| **ENG 103** | English Language (2) | 3 | ENG 101 |
| **BUS 103** | Communication Skills | 2 | **-** |
| **ENG 201** | Reading & Translation in Sciences | 3 | ENG 102 |
| **BIO 210** | General Biology (1) Zoology | 3 | - |
| **BIO 211** | Micro technique | 2 | **-** |
| **BIO 220** | General Biology (2) Botany | 3 | - |
| **BIO 250** | General Genetics | 3 | **-** |
| | **Total** | **42** | |

## III Electives offered by the College

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| **BUS 111** | Principles of Business administration | 2 | **-** |
| **CSC 201** | Internet Skills | 2 | CSC 101 |
| **213 CHEM** | Introduction to Nano Technology | 2 | CHEM 101 |
| **313 BIO** | Insect products | 3 | - |
| **314 BIO** | Health Education | 2 | **-** |
| **323 BIO** | Phytochemistry | 3 | |
| **324 BIO** | Medicinal and aromatic Plants | 3 | **-** |

## IV Compulsory Courses of the Department

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|

| | | | |
|---|---|---|---|
| **BIO 212** | Histology & Cytology | 3 | **-** |
| **BIO 213** | Arthropoda | 3 | - |
| **BIO 221** | Environmental Science | 3 | - |
| **BIO 260** | Plant Physiology | 4 | - |
| **BIO 310** | Comparative Anatomy | 4 | BIO 210 |
| **BIO 311** | Entomology | 3 | BIO 213 |
| **BIO 313** | Protozoology & Parasitology | 3 | BIO 210 |
| **BIO 322** | Cell Biology | 3 | BIO 212 |
| **BIO 330** | Microbiology | 4 | BIO 220 |
| **BIO 343** | Plant Anatomy | 3 | BIO 220 |
| **BIO 344** | Plant Taxonomy | 3 | BIO 220 |
| **BIO 424** | Ecosystem & Pollution | 3 | BIO 221 |
| **BIO 425** | Molecular Biology | 2 | BIO 322 |
| **BIO 426** | Flora & Fauna of Saudi Arabia | 3 | BIO 221 |
| **BIO 433** | Phycology | 3 | BIO 330 |
| **BIO 451** | Cell Genetics | 3 | BIO 250 |
| **BIO** | Growth & | 3 | BIO 260 |

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|---|---|---|---|
| **462** | Differentiation in Plants | | |
| **BIO 470** | Animal Physiology | 4 | BIO 310 |
| **BIO 490** | Graduation Project | 2 | BIO 425<br>BIO 470 |
| | **Total** | **59** | |

**V Compulsory Courses offered by other Departments**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| **CHEM 100** | Laboratory Management & Safety Rules | 1 | **-** |
| **CHEM 240** | Principles of Organic Chemistry (1) | 3 | **-** |
| **BCH 302** | Biochemistry | 3 | CHEM 240 |
| | **Total** | **7** | |

**VI Elective Courses**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| **BIO 415** | Embryology | 3 | BIO212<br>BIO470 |
| **BIO 416** | Immunology & Serology | 3 | BIO470 |
| **BIO** | Economic | 3 | BIO311 |

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|---|---|---|---|
| 417 | Entomology | | |
| BIO 418 | Animal Behavior | 2 | BIO210 |
| BIO 419 | Histochemistry | 3 | BIO212 CHEM240 |
| BIO 434 | Introduction to Biotechnology | 2 | BIO330 |
| BIO 436 | Fungi and plant pathology | 3 | BIO330 |
| BIO 446 | Economic Plants | 3 | BIO344 |
| BIO 452 | Molecular genetics | 3 | BIO250 |
| BIO 453 | Population genetics | 2 | BIO250 |
| BIO 464 | Plant Nutrition | 3 | BIO260 |

**VII Free Courses**

These courses are to be selected by the student according to his desire, either from within the University, college or from outside the University. The registration has to be in coordination with the Academic Advisor.

**Levelwise Tables**

**Bachelor Degree Study Plan**

**Level 1:**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| IC 101 | Islamic Culture (1) | 2 | - |
| ARAB 101 | Language Skills | 2 | - |
| PSY 101 | Thinking Skills and Learning Styles | 2 | - |
| ENG 101 | English Language (1) | 3 | - |
| MATH 101 | Calculus (1) | 4 | - |
| CHEM 101 | General Chemistry (1) | 4 | - |
| | **Total** | **17** | |

**Level 2:**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| CSC 101 | Introduction to Computers & Programming | 3 | - |
| STAT 101 | Introduction to Statistics & Probabilities | 3 | - |
| PHYS 101 | General Physics (1) | 4 | - |
| IC 102 | Islamic Culture (2) | 2 | IC 101 |
| ENG 103 | English Language (2) | 3 | ENG 101 |
| ARAB 103 | Arabic Writing | 2 | - |
| | **Total** | **17** | |

**Level 3:**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| CHEM 100 | Laboratory Management & Safety Rules | 1 | - |
| IC 103 | Islamic Culture (3) | 2 | IC 101 |
| ENG 201 | Reading & Translation in Sciences | 3 | ENG 102 |
| BIO 210 | General Biology (1) Zoology | 3 | - |
| BIO 211 | Micro- technique | 2 | - |
| BIO 212 | Histology & Cytology | 3 | - |
| BIO 220 | General Biology (2) Botany | 3 | - |
| | **Total** | **17** | |

**Level 4:**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| **BUS 103** | Communication Skills | 2 | - |
| **CHEM 240** | Principles of Organic Chemistry (1) | 3 | - |
| **BIO 213** | Arthropoda | 3 | - |
| **BIO 221** | Environmental Science | 3 | - |
| **BIO 250** | General Genetics | 3 | - |
| **BIO 260** | Plant Physiology | 4 | - |
| | **Total** | **18** | |

**Level 5:**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| **IC 104** | Islamic Culture (4) | 2 | IC 101 |
| **BCH 302** | Biochemistry | 3 | CHEM 240 |
| **BIO 310** | Comparative Anatomy | 4 | BIO 210 |
| **BIO 330** | Microbiology | 4 | BIO 220 |
| **BIO 343** | Plant Anatomy | 3 | BIO220 |
| | **Total** | **16** | |

**Level 6:**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| **BIO 311** | Entomology | 3 | BIO 213 |

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|---|---|---|---|
| **BIO 313** | Protozoology & Parasitology | 3 | BIO 210 |
| **BIO 322** | Cell Biology | 3 | BIO 212 |
| **BIO 344** | Plant Taxonomy | 3 | BIO 220 |
| - | Free course | 3 | - |
| - | Elective course (college) | 3 | - |
| | **Total** | **18** | |

**Level 7:**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| **BIO 425** | Molecular Biology | 2 | BIO 322 |
| **BIO 433** | Phycology | 3 | BIO330 |
| **BIO 451** | Cytogenetic | 3 | BIO250 |
| **BIO 470** | Animal Physiology | 4 | BIO310 |
| - | Elective course (departmental) | 3 | - |
| - | Elective course (college) | 3 | - |
| | **Total** | **18** | |

**Level 8:**

| Course No. | Course Title | Credits | Prerequisite |
|---|---|---|---|
| **BIO 424** | Ecosystem & Pollution | 3 | BIO221 |
| **BIO 426** | Flora & Fauna of Saudi Arabia | 3 | BIO221 |
| **BIO 462** | Growth & Differentiation in Plants | 3 | BIO260 |
| **BIO 490** | Graduation Project | 2 | - |
| - | Elective course (departmental) | 3 | - |
| - | Free course | 3 | - |
| | **Total** | **17** | |

## Course Descriptions

**BIO 210: General Biology(1)-Zoology, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective : study of animal Taxonomy according to the degree of complexity of structure, function, A habits, type of environment and mode of life.

Theoretical part: Classification of animal kingdom – General features of the main animal groups (phyla and classes) ,their geographical distribution and environmental adaptations – Biological ,morphological and anatomical study of examples of each phylum or class..

Practical part: Microscopical examination of slides and specimens of invertebrate examples( protozoa – porifera – coelenterata – platyhelminthes –nematoda-molusca and echinodermata) .External features and dissection of the toad ( as an example of vertebrates ) .

Course outcomes : Student should know the scientific basis of animal kingdom classification: 1- Understanding the different phyla of animal kingdom and its geographical distribution. 2- knowing the properties and mode of life for different animals groups . 3-Biological, morphological and anatomical structures adaptations with the environment.

**BIO 211: Micro Techniques, Credit Hours (Theory+Lab): 2 (0+2)**

Course objective: Teaching the students the techniques of tissues sectioning

Practical part : Studying all types of light and electro- microscope, Modern techniques of paraffin and frozen tissue sectioning, how to use mechanical microtome's , cryostat and ultra microtome and histological Staining methods.

Course outcomes : The student should be familiar with the following:
1- Equipments used in micro techniques.
2- Modern techniques of paraffin sections preparation .
3- Smearing and squashing techniques of different tissues
4-Different types of fixatives.
5- Types of stains for histological examination.

**BIO 212: Histology & Cytology, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: Inform the students more about the body different types of tissues

Theoretical part: A study of the cell and its contents ,the different types of tissues – e.g Digestive system and its glands – Urinary system – Respiratory system , Reproductive system – Endocrine glands – Nervous system .

Practical part : Studying frozen sections of different tissues .

Course outcomes : At the end of the course, the student should be familiar with the following:
1- Cell structure, organelles and their functions.
2- Cell division.
3- Different types of tissues with examples.
4- Histological structures of different organs.

**BIO 213: Arthropoda, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: Taxonomy and general characteristics of phylum arthropoda.

Theoretical part:. Taxonomical categories of phylum Arthropoda and morphological characteristics of their different classes, general specifications of insects, taxonomy of class Insecta, Studing insect associations.

Practical part: A Study of some specimens belonging to different species in different classes,Studying of taxonomical categories of different species.

Course outcomes : At the end of the course, the student should be familiar with the following points:
1-The differentiation between different arthropods by their morphological characteristics.
2- Class insects specific characteristics.
3- How to differences insects from other arthropods, the harmful and the beneficiary because of their close relation to human.

**BIO 220: General Biology (2) - Botany, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: The students should be aware of the scientific basics of plant kingdom, the study of various categories of the plant kingdom through the general characteristics and methods of reproduction .The study of some genera.

Theoretical Part: The evolution of plant morphology of angiosperms regarding 1 - seed germination (germination conditions s and changes occurring in the germinating seeds ,2 – morphological types of the roots , stems, and leaves) and their modification. A study of Prokaryotes (bacteria ) , Eukaryotes (fungi , lichens , Algae and Archegoniate including Bryophyte ( Hepaticeae and Musci) ,and Tracheophyta ( Pteropsida and Gymnospermae ),and viruses.

Practical part: The student acquire the skills, knowledge and process all of the following:

The use of light microscope . The study of different types of seed germination, morphology and modification of roots , stems and leaves. Microscopic examination of lives specimens and slides of Prokaryotes and Eukaryotes .

Course outcomes: At the end of study , student must be familiar with the following :
1- Changes occurring in the seeds germination and morphology of different plants parts
2- classification principles of living organisms types and how to differentiate between Prokaryotes and Eukaryotes.

**BIO 221: Environmental Science, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: Study of biological and abiotic factors and their impact on the activity and distribution of organisms in their habitats and the relationships between different organisms and its impact on the vital community, environmental resistance and the natural balance.

Theoretical part:.Study the basic concepts of the environment, the types of ecosystems and energy flow in the ecosystem. Study food chains , food webs , and the environmental pyramids . Study the impact of environment, biological and abiotic factors on the spread and distribution of different organisms, periodic and the diversity of biological communities. Study the biogeochemical cycles . Study the environmental imbalance and environmental changes and its importance, A study of some environmental problems and proposed solutions.

Practical part: How to collect animal specimens by type and way of living . Identify the devices used to record and assess the non-living factors affecting the activity and distribution of different organisms (temperature , humidity , air pressure , wind and the amount of rainfall). Study the impact of physical factors such as temperature, humidity and light ,and the impact of competition on living organisms

Course outcomes : At the end of the study , student should be able to:
1- Understand biological and a biotic factors and their impact on the activity,and distribution of organisms in their habitats.
2- Examine relationships between different organisms and its impact on vital community
3- Understand environmental resistance and the natural balance.

**BIO 250: General Genetics, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: The student should be aware of genetics principles and vocabulary , as one of the most important biological sciences.

Theoretical part: An introduction to genetics – gene concept – the classical genetics – the first and second Mendelian laws – the segregation law – test crosses- dominance and co-dominance inheritance – the dominance and recessive concepts – genetic modification – the lethal genes – Sex-influenced characters –Sex-linked characters – modified genes – lethal cytoplasm – the multiple alleles – the blood groups in humans – epestasis – the allelic interactions – the sex inheritance – the cross-inheritance – the quantitative characters – the maternal effect – the organelles inheritance.

Practical part: Studying the cellular basics of genetic transmission in mitotic and meiotic divisions –mutations in Drosophila melanogaster . The applications of different genetic cases – Qui –square test .

Course outcomes : The student should be familiar with basic information of genetic science definition topics and its development such as:

1- The gene concept, the Mendelien laws, the dominance and co- dominance inheritance and the dominance and recessive concepts.
2- The genetic modifications , the maternal effect, linkage and crossing over and sex determination.
3- Practical application on different genetic cases.

**BIO 260: Plant Physiology, Credit Hours (Theory+Lab): 4 (2+2)**

Course objective: The student should be aware of some of cell physiology, water relations (absorption, ascent of sap, transpiration ), plant nutrition and enzymes .

Theoratical part : Solutions, cell water relations, water absorption, ascent of sap, transpiration, major &minor elements, their absorption, translocation and importance . Photosynthesis . Enzymes and enzyme cofactors their nature and type ,mechanism and factors affecting their action. Nomenclature and classification of enzymes.

Practical part : Experiments that manifest cell physiology , water relations, mineral nutrition and enzyme action .

Course outcomes :
1- The students acquires the knowledge and skills by performing experiments which can distinguish between types of solutions and practice the following phenomena; osmosis , permeability, imbibitions, diffusion and water absorption.
2- Enzymes and enzyme cofactors their nature and type, mechanism and factors affecting their action.
3- Photosynthesis.

**BIO 310: Comparative Anatomy, Credit Hours (Theory+Lab): 4 (3+1)**

Course objective: Study of Comparative Anatomy for Chordata

Theoretical part: Anatomical Study of different Chordata with Comparative Study of Body Systems in the Chordata (Cephalochordata – Cyclostomata – Fishes – Amphibia – Reptiles – Birds – Mammals )

Practical part: Slides Examination of the Following Regions (Pharynx – Intestine – Tail – Body Wall) in Chordata . Anatomy of body systems of the Following Vertebrates (Dog Fish , Bolti Fish , Lizard, Dab , Pigeon , Rabbit ). Study the Skeletal System ( Axial , and Appenedicular ) of Vertebrates .

Course outcomes : At the end of study, student should be familiar with the following:
1. Chordata phylum anatomical different types.
2. External morphology of different body systems in each animal.
3. A comparative capability between body systems of different animals.
4. How to dissect an animal to study its body systems.

**BIO 311: Entomology, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: Study the external and internal structures of different insect species.

Theoretical part: Study the insect origin and factors affecting their distribution , insect relationships with other living organisms , structure and body wall components and moulting mechanism , different body parts as well as their different appendages (Head-Thorax-Abdomen) , internal organs and their function (digestive, circulatory and respiratory systems). Study of excretion and excretory organs, male and female reproductive system, life cycle, different reproductive methods and metamorphosis in insects.

Practical part: Studying morphological shape of insects , different appendages in head, thorax and abdomen and their modifications , different types of larvae and pupae . Dissecting an insect species in order to recognize the internal organs.

Course outcomes: The student should be familiar with the following:
1. Insect origin and factors affecting their distribution and relationships with other living organisms .
2-Structure and body wall component and moulting mechanism, internal organs and their function.
3-Different reproductive methods and metamorphosis in insects.

**BIO 312: Insect Products, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: A study of some insects producing useful products such as honeybees, silk worms and others.

Theoretical part: Historical background of beekeeping ,The economic importance of beekeeping , Honey bees biology and life cycle , Factors affecting the egg-laying , Workers jobs . The behavior of bees: chemical and kinetic communication in bees , Pheromones, sources and types and their role in the lives of bees . Collection of nectar, pollen, water and Propolis .Honeybees products and their role in alternative medicine.

Historical background of silkworms and silk . How to promote silk industry . Structure of Head glands , Larval mouth parts (Spinneret) . Economic Importance of silkworms , Pests and diseases of silkworms and their control.

Other insects species producing important products (Wasps, ants, ……)

Practical part: Classification and types of honey bees (strains of *Apis mellifera*). The specifications of the standard strain of honeybee . Characteristics of the krinioli, Italian, and native bees , establishment of bee hives , bees seasonal cycles , management of bee hives and timing of seasonal operations . Breeding of queens and artificial insemination . Standardization of honey.

Types of silk worms, taxonomy and morphological characteristics of silk worms, biology and breeding of silk worms ,physical and chemical properties of silk thread , mass production of silk worms and commercial production of silk.

Course outcomes : At the end of study, student should be familiar with the following:
1. Some insect producing useful products.
2. Establishment of bee hives.
3. How to test honey bee quality.
4. Mass production of silk worms and commercial production of silk.
5. Other insect species producing important product.

**BIO 313: Protozoology & Parasitology, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: To cope with the Taxonomy of parasites. Discuss the general characteristics and classification of Protozoa, Helminthes and Arthropoda. Describe and discuss the life cycle, structure and function of various organs of representative example of the previously mentioned parasites. To realize the symptoms, diagnosis, prevention, economical , medical and veterinary importance of Protozoa, Helminthes and athropoda as the causative agents of some diseases of man and his domestic animals.

Theoretical part: General introduction to Protozoology and Parasitology , and host parasite interaction. Classes of phyla Protozoa, Helminthes and Arthropoda , illustrating various classes characteristics of the studied phyla. A comparative study of morphology , life cycle, symptoms, diagnosis and prevention of different representative parasites of the different classes. Protozoology includes(Ciliophora,Mastigopgora, Sporozoa, Sarcodina), .Helminthology includes (Class:Trematoda such as *Fasciola sp.-Schistosoma sp*.), (Class:Cestoda sush as *Taenia solium-Taenia saginata-Dipylidium caninum*) and (Class: Nematoda such as *Ascaris lumbricoides-Ancylostoma duodenale)* and Arthropoda includes ( Crustacea Arachnida, Entomology).

Practical part: Microscopic slides examination of selected examples from each classe of Protozoa , Helminthes, and Arthropoda, and their major organs .

Course outcomes : The student should be able to:

1. Recognize the parasites general characteristics and classification and understand host parasite interaction.
2. Examine Symptoms ,diagnose , ways of prevention , economical ,medical and veterinary importance.
3. Recognize parasites of economical importance.

**BIO 314: Health Education, Credit Hours (Theory+Lab): 2 (2+0)**

Course objective: Educate students about some health problems and how to keep their health in a good state , methods of first aids , and how to deal with some cases of emergency.

Theoretical part: Introduce students to protective medicine, causes of diseases, methods of infection, epidemiological diseases e.g . hepatitis, typhoid, malaria, meningitis , influenza, lishmaniasis , cholera , yellow fever , diabetes , hypertension, ophthalmic diseases , obesity, AIDS, cancer, osteoporosis, the immune system (immunoglobulin and vaccination), important vitamins and nutrients for pregnant and lactating women, and health care during pregnancy and lactation. Methods of preserving food . First aid.

Course outcomes : At the end of study, student should be familiar with the following:

1. Symptoms of major diseases and health problems , how to avoid contracting them and how to keep his health in a good state .
2. Family health care general principles and women health during pregnancy and lactation .
3. Methods of first aid.

**BIO 322: Cell Biology, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: Introduce student to advanced knowledge about the different cell organelles ( the structure and function ).

Theoretical part: An introduction to cytological and biochemical methods of cells study , the cell theory ,and the different organelles of plant and animal cell , structure and function. The cell membrane in prokaryotes and eukaryotes a and its properties .The plasma membrane transport mechanisms , the active transp, the facilitated transport ,the Singer and Nelson model – the lysosomic diseases .

Practical part: Studying different cell organelles using scientific pictures, and microscopic e slides examinations . Studying cell cycle and cell divisions.

Course outcomes : The student should acquire Knowledge about how to differentiate between cell organelles using cytological and biochemical methods.

**BIO 322: Phytochemistry, Credit Hours (Theory+Lab): 3 (1+2)**

Course objective: Study the plant chemical components and the medicinal value associated with the physiological and pharmacological effects of these plants. Study the methods of extraction, separation, purification, and identification.

Theoretical part: The definition of phytochemistry, .Identify the plant chemical components contents of primary and secondary metabolic products. Methods of extraction , separation, purification and identification of plant constituents (carbohydrates , amino acids ,proteins , lipids , glycosides , flavonoids , saponins , alkaloids ,volatile oils and tannins ) using chromatographic analysis.

Practical part: How to select the plant, and the collection methods. How to perform a preliminary phytochemical screening to identify the active components of plant contents. Study the extraction , separation, purification, and identification methods of the primary and secondary metabolic components using paper and thin-layer chromatography analysis.

Course outcomes : At the end of study, student should be able to :
1. Understand the basics principles of plant metabolic components identification methods.
2. Recognize the medicinal value of plant primary and secondary metabolic chemical components.

**BIO 324: Medicinal & Aromatic Plants, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: Educate the students with advantage and disadvantage of medicinal herbs, and how to take advantage of sources of traditional medicine and treatment methods based on scientific documents.

Theoretical part : Define the folk medicine, medicinal and aromatic plants. Classification of Herbal plants (medicinal , aromatic and poisonous). Documentation of plant name through the traditional prescriptions and biological effect to determine their biological activities. Identify active substances (medicinal , aromatic and poisonous)and their biological effect to determine the diseases which can be cured by traditional medicine. Identify plant parts used in folk medicine.

Practical part: Construction a medicinal and aromatic plant herbarium .

Course outcomes: The student should be able to:
1. Understand the proper use of medicinal herbs for medication .
2. Know how to protect and maintain those herbs from extinction.
3. Take interest in WHO and FAO recommendations confirming the use of herbs in medication.

**BIO 330: Microbiology, Credit Hours (Theory+Lab): 4 (3+1)**

Course objective: Introduce student to the principles and diversity of microorganisms, their importance and effect human life and environment.

Theoretical part: The history of microorganisms discovery, diversity and classification .Cellular characteristics, reproduction , energy release, growth factors, growth control and growth determination methods . Bacteria classification. Brief introduction to microorganisms in air, soil, water, sewage and food. Non cellular organisms, (Viruses) their characteristics, forms, structure, hosts range . Examples of human and animal diseases caused by microorganisms.

Practical part: Natural and synthetic media and methods of their preparation. Method of sterilization, staining, isolation and purification of microorganisms, determination of their numbers in different substrates, microbial use in food industry(yogurt, sour milk, vinegar).

Course outcomes: The Student should be familiar with the following:
1. How to differentiate between microorganisms and be capable of maintaining their cultures in the laboratory.
2- The factors affecting microorganisms growth and how to control it.

**BIO 343: Plant Anatomy, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: The student has to learn about the plant cell, its contents, cells and tissues types, vascular bundles and their function. The anatomical structure of monocotyledons and dicotyledons plants (root , stem and leaves) and how to distinguish between them. The secondary thickening in roots and stems. The structural adaptation to environmental conditions.

Theoretical part: Structure of plant cell (cell wall- protoplast with living and non living plant cell contents) .Meristematic tissues (types and function) , Permanent tissues which include 1-Ground tissues( parenchyma- collenchyma- sclerenchyma and secretory tissues )2-Vascular tissues (xylem- phloem- vascular cambium- type of vascular bundles)3-Boundary tissues( epidermis with stomata and trachoma's hair- periderm). Anatomical structure of young plant organs (monocot & dicot) . Secondary thickening. Variation in the internal structure of plant organs induced by ecological factors .

Practical part: Examine the living and non living contents of the cell -forms of different permanent and non permanent tissues – anatomy of root , stem and leaves(monocot & dicot) . Secondary thickening . Aquatic and xerophytic plant.

Course outcomes: At the end of study, a student must be aware of the anatomical structure of the following:
1. The plant cell and its contents,
2. Various forms of plant tissues and organs.
3. Structural adaptation to environmental conditions

**BIO 344: Plant Taxonomy, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: The student has to learn the basic principles of different classification and taxonomic systems - the identification of plants by their scientific names according to the rules of the Binomial Nomenclature - Description of the plants and their taxonomical status.

Theoretical part: History of the classification of flowering plants and the relationship between taxonomy and other plant science , the foundations established in the classification of plants (natural - Industrial – Evolutionary category), Elements of taxonomy, parts of the flower(their structure andfunction0 , Development of embryo sac - Installation of the ovule and its forms , Symmetry and sex in the flower, pollination and fertilization, inflorescences (Racemose - Cymose)and fruits types .Study morphological and floral characters of monocot and dicot plants to distinguish the analytical key of different families and orders .

Practical part: How to dissecting a flower( floral diagram and the longitudinal section – placentation and floral formula). Study the differences between inflorescences by bringing the whole plant samples. Study different types of fruits.

Course outcomes At the end of the study, a student must be able to :
1. Differentiate between the different parts of the flower, how to draw transverse and longitudinal section and draw the floral diagram and write formula .

2. Differentiate between the different types of inflorescences and fruits.

**BIO 415: Embryology, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: Studying the development of growth and differentiation of some Embryos.

Theoretical part: Develop an understanding of:

- Spermatogenesis – Oogenesis – Types of Ova – Fertilization and its types .
- Cleavage ( Segmentation) in each of : Amphioxus – Amphibia – Birds - Mammals
- Gastrulation – Germ Layers Formation in each of : Amphioxus – Amphibia – Birds.
- Organ Formation in of each : Amphioxus- Amphibia – Birds .
- Placentation in Mammals.

Practical part:

- Early stages study of zygote division in frog and chicken
- Study of stages of embryonic development in chick embryo
- Study of different types of placenta in mammals.

Course outcomes At the end of study , student must be able to identify and differentiate between:

1-Spermatogensis , oogenesis , types of ova

2- Stages of zygote division and embryonic development and differentiation of some embryo.

**BIO 416: Immunology & Serology, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: Study the structure of immune system and different types of defensive mechanism in the body and to take a knowledge about autoimmune diseases.

Theoretical Part: Structure_and function of immune system- types of immune cells – humural and acquired immunity - types of immune response- antigens and antibodies and mechanism of its action –immune tolerance and autoimmune diseases – allergy and some allergic reactions –transplantation and rejection –major histocompatibility complex –immunity and tumours – immunodeficiency disorders – acquired immune deficiency syndrome – factors affecting immune system e.g. diet , hormones , and aging . immunization and vaccination (types and methods of preparation ) .

Practical part: Anatomy of lymphatic system in rabbit or chicken –section in lymphatic organs ( thymus gland- lymph nodes –spleen –tonsil ) – white blood cell count – blood groups –antigen antibodies interactions – sedimentation test – allergic reaction .

Course outcomes At the end of study, student must be aware of the following:

1- The structure and function of immune system.

2- Different types of defensive mechanism in the body.

3- Types of immune response.

4- The autoimmune diseases.

5- Immunization and vaccination.

**BIO 417: Economic Entomology, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: Study of insect pests causing losses in crops , horticulture, stored products and others as well as control tactics in addition to some beneficial insect species and their rearing methods.

Theoretical part: The most important insect pests which cause damage in field crops , orchards and stored grains and other commodities – study medical and veterinary insect pests – study the different methods and tactics of insect control –some beneficial insects and their rearing .

Practical part: Study of some economic insect species ( morphological characteristics – life cycle – taxonomy ) and recognize the harmful or beneficial stage.

Course outcomes: At the end of study , student must be familiar with the following:
1. The most important insect pests which cause damage in field crops.
2. Some beneficial insects and their rearing.
3. The different methods and tactics of insect control – brief study.

**BIO 418: Animal Behavior, Credit Hours (Theory+Lab): 2 (2+0)**

Course objective: Study the types of animal behavior including its reasons and general laws affecting the behavior.

Theoretical part: The general laws of animal behavior –the general types of adapted behavior and its description –the relationship between heredity and behavior –innate and acquired behavior (taxes, reflexes, instincts, learning and reasoning) –the reflex behavior and behavior as a response to stimuli –the limiting factors of movement (social and ecological barriers) –the behavior and environment –the communication language in different animals –the territory and population –the relationship between hormones and behavior.

Course outcomes: At the end of study, a student must be familiar with the following:
1. The general laws of animal behavior .
2. Types of adapted behavior and its description.
3. The relationship between heredity and behavior .
4. Innate and acquired behavior.
5. The reflex behavior and behavior as a response to stimuli .
6. Behavior and environment .
7- Communicating language in different animals.
8. The relationship between hormones and behavior.

**BIO 419: Histochemistry, Credit Hours (Theory+Lab): 2 (1+1)**

Course objective: Give the students scientific principles of histochemistry and its applications in histopathology and advanced research.

Theoretical part:. Detection of carbohydrates, proteins, lipids and special digestive enzymes, oxidation and reduction process -Comparison between chemical materials present in normal and abnormal tissues - Application of histochemistry in some diseases and research .

Practical part : Advanced study of histochemical stains.

Course outcomes At the end of study, student must be aware of:
1- The scientific principles of histochemistry and applications in histopathology.
2- Application of histochemistry in some diseases and research.

**BIO 424: The ecosystem and pollution, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: Definition of the environment, the basics of ecology and the impact of environmental factors on components of the environment.

Theoretical part: Introduction to include: 1. concept of ecology, the role of the Arab-Muslim in various ecological fields. Basics of the ecosystem( definition - components - types - examples of ecosystems in the Kingdom of Saudi Arabia ).Operation jobs in the ecosystem. Energy flow( source of energy and movement through the ecosystem , chains and food webs, the environmental pyramids , environmental productivity). Nutrients recycling (biogeochemical cycles of nutrients) water, oxygen, carbon, nitrogen and sulfur cycles.1- The concept and environment of biological communities. 2- Nomenclature and classification of biological communities. 3- Vegetation science, Characteristics of plant communities (Quantitative and qualitative), and structural properties. Changes in plant communities, (water, and drought succession). Some topics of modern Applied Ecology. Biodiversity (definition, importance , influences the threatening of plant biodiversity). 4- Bioconservation of plant biodiversity. Environmental pollution and methods of control (air , water , soil, Audiovisual , food and medicinal pollution). Global warming definition, indicators , climate change and its impact on health ).

Practical part: How to study a particular ecosystem and what are the means and tools that can be used to study the living and nonliving components by explaining the available devices in the lab. Study the process of non-living components of the ecology system methods study vegetation. The samples preservation methods . Measurement of air, and water pollution ,as well as Food contamination. Effect of detergents and metals on plants.

Course outcomes At the end of study, student must be aware of the following:

1. The concept of ecology, the role of the Arab-Muslim in various ecological fields, and the basis of ecosystem.
2. Changes in plant communities.
3. Environmental pollution and methods of control.

**BIO 425: Molecular Biology, Credit Hours (Theory+Lab): 2 (2+0)**

Course objective: Student must learn the basics about the following : the molecular biology methods as a basic of genetic engineering science as one of the most important biological science recently – the applications of the science - gene expression regulation - transcription and replication processes.

Theoretical part: The basic molecular structure of the cell - the nucleic acids structure and function – DNA transcription and replication processes – protein synthesis – gene expression regulation – regulation of translation – electrophoresis of protein and nucleic acids – restriction enzymes – vectors .

Course outcomes: The student should acquire the background skills in the methods used in molecular biology as an introduction to genetic engineering, their applications and achievements in various fields.

**BIO 426: Flora and Fauna of Saudi Arabia, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: To examine the Floristic elements and components of different geographical provinces in Saudi Arabia, study characteristics of life forms in plant communities and association that grow through vegetation zones to determine the types of species , genus and family of wild plant - Study the wildlife of the most famous animals in Saudi Arabia and their adaptation with the environmental factors

Theoretical part: Introduction to history of the flora in the kingdom of Saudi Arabia . Geographic position of the Arabian Peninsula and its importance. The different provinces of natural vegetation according to environmental factors. Types of environments and vegetation in the Kingdom and the description of each Association: Southern and northern section of the western region( plants of slopes , foothill and rules of mountains, valleys , coastal plain and beach sea) - plant of central, eastern , and Empty Quarter . Study of the animal geography in Saudi Arabia -the general features, classification and adaptation of the endemic animals according to environmental factors .

The practical part : Training students how to: 1- Prepare and save the samples in herbarium ( plant collection - pressing and drying of samples - mounting samples – storage and preservation - herbarium card data) 2-identify plants flora of Saudi Arabia through the use of books of various flora. 3-study of specimens of the endemic animals and their classifications

Course outcomes: A student should be able to:
1. Identify plants flora of Saudi Arabia through proper and preservation of samples in a herbarium.
2. Acquire knowledge about different plant types growing in his community.
3. Identify the endemic animals, their classifications. General features and their adaptations according to environmental factors.

**BIO 433: Phycology, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: Identifying algae, their morphological , cellular structural characteristics and life cycles of representative genera. Study the basics of their classification according to an authenticated standard system of algal classifications. Study the ecological and economical impacts of algae on different aspects of life.

Theoretical part: Identify and classify algae, study their habitats, general characters and cellular structure, morphological shapes, different composition of photosynthetic pigments of each division, beside studying life cycles of different representative genera from each division. Simple and comprehensive idea about the environmental and economical importance of different algal division.

Practical part: Using the same classification system that was adopted in the theoretical course, morphological characters of different representative genera are studied using slides, fresh and /or dried samples. Different techniques are showed to collect algal samples from their native habitats: fresh, marine, soil….etc.. The students should be able to identify and classify samples correctly using the standard classification keys.

Course outcomes: At the end of study, a student must be familiar with the following:
1. Identification of algae, and knowing their general characters, cellular structure, and morphological shapes.
2. The life cycles of different representative genera from each division.
3. The standard system of algal classification following their developmental line.
4. The environmental and economical importance of algae.

**BIO 434: An introduction to Biotechnology, Credit Hours (Theory+Lab): 2 (2+0)**

Course objective: Students must have the main basic information about the biotechnology as one of the new and the most important applicable technique in genetic sciences.

Theoretical part: Concept of Biotechnology ,applications of biotechnology , Different methods to insert the foreign genes into the host cells and get the transformed organisms , Gene transformation and development of genetic characters in agricultural field and in animal production, Applications of biotechnology (gene therapy, medical production, antibiotic production).

Course outcomes: The should be aware of the applications of modern genetics and areas of use such as genetic improvement in the animal and agricultural fields, livestock, pharmaceutical, medical and antibiotic production.

**BIO 436: Fungi and Plant Pathology, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: Introduce student to fungi in general, morphology, anatomy and their classification with special stress on plant pathogenic fungi and their control.

Theoretical part: Fungi characteristics, morphology, cell structure, survival, and host relationship, classification, life cycles, economic and medical importance with special stress on plant pathogenic fungi and their control, definition of plant disease, principles of plant pathology and biotic and abiotic causal of plant diseases.

Practical part: Microscopical slides examination of fungi sexual and asexual structures, examining fresh plant samples for symptoms of fungal diseases, preparing slides from diseased tissues for microscopic examination of pathogenic fungi, slide culture for examining fungal structures, sporulation and identification of fungi.

Course outcomes: The student should be familiar with the:
1. Characteristics of fungi and their sexual and a sexual structure.
2. Identify the most important fungal diseases and fungi isolated from pathological samples.
3. Knowledge of different ways to control fungal diseases of plants.

**BIO 446: Economic Plants, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: To be aware of plants which have economic and medicinal value in Saudi Arabia ,and how to benefit from them.

Theoretical part: Introduction of systematic plant according to economic , medicinal and primary product . Grain plants and food industry , fiber plants , forest plants ,and drug plants. Algae and its economic role in the production of medicinal materials . Extraction methods of drinks, stimulants and refreshments. Aromatic plants and Spices .

Practical part: Collect the economical and medicinal plants in EL Qassim Region . Identify and classify them . Determine the most important parts in the selected genus and the active chemical constituents in each .

Course outcomes: At the end of the study, a student must be aware of: Plant systematic according to economic, medicinal importance and determine the most important parts in the selected genus and active chemical constituents in each.

**BIO 451: Cytogenetics, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: Students must have good knowledge about the chromosome structure and function, karyotyping, human chromosomes and main morphological chromosomal differences - the spontaneous and induced mutations.

Theoretical part: An introduction to genetics including chromosomal theory – the chemical and physical nature of the chromosome - the genetic material in living organisms - chromosome and genetic characters – morphological chromosomal studies – human chromosomes identification - Different chromosomal staining techniques – the chemical structure of chromatin and its contents – the nuclosome structure – the chromosomal behavior – study of morphological chromosome differences during divisions .

Practical part: karyotyping of plant chromosomes (onion chromosomes) – slides of chromosome types – Studying of cellular divisions (in vitro) - Studying of morphological chromosomal changes through different treatments such as: Sticky treatments – Karyotype treatments – radiation treatments - Studying of chromosomal breaks and bridges.

Course outcomes: The student must know the following:
1. Structure, function of chromosomes and genes, classification of human chromosomes.
2. Morphological chromosomal changes through spontaneous and induced differences.
3. The relation between the chromosomal behavior and genetic characters and syndromes.
4. Preparation of slides and application of different practical treatments.

**BIO 452: Molecular genetics, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: Student has to be aware of the genetic material –The nucleic acids - RNA synthesis – The electrophoresis techniques.

Theoretical part: The genetic material. The transformation experiments . Stability of DNA in the chromosomes. The nucleic acids structures. The double helix model . DNA properties( denaturation and annealing ). DNA polymerases, DNA replication . transcription of chromosomes and telomeres regions. The excision repair . RNA synthesis.

Practical part: Studying the important genetic techniques such as the protein electrophoresis techniques - Agarose gel – Polymerase chain reactions , gene amplification , genetic band identification -.extra .

Course outcomes: The student must have a good knowledge about the genetic material, genetic basics, the denaturation and annealing processes, gene transcription organization, the molecular basis of mutations and practicing the electrophoresis techniques of nucleic acids and proteins.

**BIO 453: Population genetics, Credit Hours (Theory+Lab): 2 (2+0)**

Course objective: Students must have the main basics about the inheritance in the Population , the estimations of genetic and zygotic frequency , Studying the gene pool, the genetic equilibrium in the Population.

Theoretical part: Studying the genetic and zygotic frequencies. The qualitative and quantitative characters, Hardy-Winberg equilibrium law, the isolation ,mutations and migration effects on the frequencies in the population , some inherited characters in human and the equilibrium in the population. The genetic drift. The natural selection.

Course outcomes: Student should know the following:
1.Estimation of genetic and zygotic frequencies.
2. Genetic equilibrium in the large populations, effect of the isolation, migration and mutation on the frequencies of the populations and some characters inherited in human and speciation "with applications in all cases".

**BIO 462: Growth and Differentiation in Plants, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: The student must know what is growth, phytohormones and its role in growth regulation, site of synthesis, their synthesis, distruction, physiological role in plants and its economic and agricultural applications.

Theoratical part: Definition of growth ,phytohomones (auxins, gibberellins, cytokinins, ethylene, abscisic acid )photoperiodism, dormancy and vernalization.

Practical part : Experiments are selected to practice the bioassay of different hytohormones and manifest their role on plant growth.

Course outcomes:
1. The student must be aware of the growth phenomenon in organisms, the growth regulating hormones , vernalization , photoperiodisn.
2. They must also distinguish between auxins , gibberellins, cytokinins and growth inhibitors , their synthesis , their destruction and their physiological and agricultural roles in plants.

**BIO 464: Plant Nutrition, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: Understand what is meant by major and minor elements,their absorption, translocation, importance, deficiency symptoms and their recycling .Different types of nutritional solutions and cultures,their advantages and disadvantages.

Theoretical part : Definition of major and minor elements, their absorption, translocation, physiological importance in plants , deficiency symptoms and their recycling. Different types of nutritional solutions and plant cultures .

Practical part : Experiments were done using sand and water cultures and different types of nutritional solutions and another which can investigate the symptoms of mineral deficiency in plants .

Course outcomes:

1. The students should acquire the knowledge of the most important major and minor elements of the plant ,its physiological role and their symptoms of theirdeficiency .
2. They must distinguish between different types of nutritional solutions and cultures and understand its advantages and disadvantages.

**BIO 470: Animal Physiology, Credit Hours (Theory+Lab): 4 (3+1)**

Course objective: Study the physiological structure and functions of different systems e.g.nervous system, muscular ,cardiovascular, respiratory, digestive, urinary, endocrine and reproductive system.

Theoratical Part: Structure and function of different systems e.g. nervous system, muscle and mechanism of contraction , blood cells, cardiovascular system and cardiac cycle,lymphatic system, respiratory system and gas exchange, digestive system and absorption, urinary system, endocrine system and reproductive system .

Practical part: Estimation of carbohydrates, proteins and lipids in the cell, simple muscle contraction curve and factors affecting it, blood cell count, determination of hemoglobin content, blood groups, sedimentation rate, bleeding and clotting time, estimation of amylase enzyme in the saliva, pathological estimation of some element in urine.

Course outcomes : At the end of the course , the student must know the following:

1. Structure and function of different body systems
2. The mechanical work of each organ of the body.
3. The homeostatic mechanisms inside the body, and the acquisition of practical skills in the application of what has been studied theoretically .

**BIO 490: Graduation Project, Credit Hours (Theory+Lab): 2 (0+2)**

Course objective: Qualifying the student to the principle of scientific research.

Practical part: How to plan and prepare for a scientific experiment . The selection of a certain problem, the experimental objectives , make use and benefit from the library facilities , design the scientific experiments , and obtain the experimental supply of biological materials , and instrument .

Course outcomes : The student should be familiar with the elements of scientific research, understand how to choose a research topic and be able to write a research report.

**CHEM 100: Laboratory Management and Safety Rules, Credit Hours (Theory+Lab): 1 (1+0)**

Course objective: Inform student about healthcare and safety in the laboratory, and how to deal with different types of equipments, toxic substances and radio active biological materials in the lab.

Theoretical part : It is comprised of: Introduction to security, safety and the definition of the various sources of risk in the laboratory - symbols, colors, and its significance - the security and safety before leaving the lab - Security and safety of various materials, equipments and the use of fire extinguishers, - chemical hazards and health - toxicology and risk - Disposal of hazardous materials – Laboratory emergency - First Aid.

Course outcomes : At the end of study , student should :

1. Be aware of the danger of the various laboratory materials and equipments.
2. Understand the equipment and personal security and laboratory safety
3. Acquire cognitive skills and practical use of fire extinguishers.
4. Be aware of toxicology and how to get rid of haz ardous materials.
5. Acquire practical skills of first aid.

**CHEM 240: Principles of Organic Chemistry - 1 , Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: To learn the chemistry of Carbon compounds, which are major contributors to the chemical structure of living organisms.

Theoretical part: Aliphatic hydrocarbons (alkanes, cyclic alkanes, alkenes and alkynes), aromatic hydrocarbons (electrophilic substitution reactions, activity and direction, polynuclear aromatic hydrocarbons), alkyl halides (nomenclature, physical properties, preparation methods, nucleophilic substitution reactions) alcohols ( nomenclature, preparation methods, reactions) ethers( nomenclature, preparation methods, reactions) phenols (structure, nomenclature, preparation methods, reactions).

Practical part: Some experiments on melting point, recrystallization, distillation, extraction, identification of different function groups.

Course outcomes : At the end of the course , student should be aware of the following:

1. The basis of organic chemistry , composition of organic compounds their classification.
2. Absorption properties of organic compounds, their physical and chemical properties.

**CHEM 302: Biochemistry, Credit Hours (Theory+Lab): 3 (2+1)**

Course objective: Definition of( carbohydrates, proteins, lipids, vitamins, enzymes, hormones).

Theoretical part: Introduction to biochemistry - Carbohydrate chemistry and the metabolism of some representatives - Fat chemistry and the metabolism of some representatives and their relation with carbohydrates , amino acids and peptides metabolism –Proteins chemistry and its metabolism – Enzymes( general properties, and the factors affecting the rate of enzymatic reactions)- Introduction to hormones and vitamins.

Practical part: Qualitative and quantitative tests for the detection of general carbohydrates, lipids, amino acids, and proteins.

Course outcomes : The student should be aware of the following:

1. The chemistry of carbohydrates , fats , amino acids , proteins and their metabolism.
2. The chemistry of enzymes and factors affecting the rate of enzymatic reaction.
3. Types of hormones and vitamins ( their structure and function).

The College of Science in Al Asiyyah is a newly established college, which is affiliated to Qassim University. It follows the same curriculum as the the College in the main campus. It is committed to excellence on all levels of the educational and creative experience, to the success of all its students and to the development of their capacity to arrive at sound and perceptive conclusions that respect differences and diversity in ideas. It is also dedicated to lifelong learning, which encourages the continual use of the mind. The college plays a vital role in the life of the surrounding community, in society as a whole and as a catalyst for economic development.

# College of Science in Al Asiyyah

## Vision:

The College of Science seeks to become a leader in educational and technological innovation, scientific discovery and creativity amounting the other local and international colleges of science. This happens through fostering an atmosphere of intellectual inspiration and partnership for the prosperity of society.

## Mission:

The idea of establishing the college of Sciences in Qassim came as a natural response to the educational revival the Kingdom enjoyed since its foundation to respond to the local community requirements by identifying and diagnosing the problems the community is facing in order to find the answers. It also aspires to meet the educational and development needs of society by providing high-quality academic programs, pioneering innovative research and creative articulation, and through active involvement in the community for the prosperous culture and economic development of the country. In addition, it aims at qualifying its students to face the rapid global changes while preserving our identity and principles which emanate from our glorious religion.

## Values:

## Aims:

The College aims to make valuable contributions to the Kingdom’s scientific, technological, and economic sectors through the research activities of faculty and graduates. More specifically, the objectives include:

- To provide advanced teaching programs in the various basic sciences and supply the community with competencies and trained specialists in the modern scientific techniques.
- To conduct studies and researches in order to build a technological research database to serve the needs and to solve the community’s problems.
- To spread knowledge within the college and the community and to achieve publications and translation work.
- To offer scientific and experimental services in the field of preserving the environments and community service.
- To participate in the development of the university education and to establish the scientific and academic ties with the higher education institutions inside and outside the kingdom to serve the strategic

development in the Kingdom of Saudi Arabia.

- To incite to use instructional technology in the field of teaching in order to improve the graduates performances.
- To participate in the intellectual development and the thinking maturity of the specialized Saudi cadres and to qualify them with analytical skills to enable them to fully participate in the achievement of the objectives of the total economic development.
- To encourages the creation of new knowledge and the preparation of students to have a positive influence on national and international levels.
- To promote lifelong learning inside and outside the college community, to guarantee continued growth and welfare of the society.

## About:

The College of Science was established in 1997, and the college proved to be another building block in establishing Qassim University as a modern institution of higher education. Students began studying at the college in AY1997–1998. The first class of students completed their studies and graduated in AY2001–2002. The college awards a bachelor's degree in science. The college aims to increase the students' knowledge in a wide range of scientific fields and to develop the skills they need to be an expert in individual areas of specialization. In addition, the college provides the students with an education foundation in computer programming and English, as required by the country's labor market.

## Degrees:

Bachelor
Master

## Programs:

The college awards bachelor's degrees in the following majors:

- Mathematics,
- Physics and
- Computer Science

## Faculty Members:

## Study Plan:

**Program: Mathematic**

**Study plan:**

**The first and second level is the nature science preparation**

**Level 3**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration(2)** | Math.202 | 4 |
| **Principal of Probability Distribution Theorem** | Stat212 | 4 |
| **Basics of Mathematics** | Math.231 | 3 |
| **Introduction to Geometry** | Math.273 | 3 |

**Level 4**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration in many** | Math.203 | 4 |

| | | |
|---|---|---|
| **variables** | | |
| **Mathematical applications on computers** | Math.251 | 2 |
| **Vectors** | Math.204 | 3 |
| **Linear algebra** | Math.242 | 4 |
| **Theory of numbers** | Math.243 | 3 |

**Level 5**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Linear Programming** | Math.213 | 4 |
| **History of Mathematics** | Math.232 | 3 |
| **Introduction to Differential Equations** | Math.321 | 4 |
| **Numerical analysis** | Math.351 | 4 |

**Level 6**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Mathematical Methods** | Math.326 | 4 |
| **Group Theory** | Math.343 | 4 |
| **Real Analysis (1)** | Math.382 | 4 |

**Level 7**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Rings and Fields** | Math.444 | 4 |
| **Introduction to Topology** | Math.471 | 4 |
| **Real Analysis (2)** | Math.483 | 4 |
| **Project** | Math.499 | 4 |

**Level 8**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Introduction to Partial Differential Equations** | Math.422 | 4 |
| **Introduction to Differential Geometry** | Math.472 | 4 |
| **Complex Analysis** | Math.484 | 4 |

## COURSE DESCRIPTION:

**Level 3**

**Math .202 Differentiation & Integration(2) :** This course aims at giving students definite integral and its properties , mean value theorem of integral and the fundamental theorem of

calculus. It also discusses indefinite integral , standard integrals, derivatives & integrals of hyperbolic and inverse hyperbolic functions, integration methods such as: integration by substitution , integration by parts , integration by partial fractions and other substitutions. Also L'Hospitals Rule , evaluation of area and volume of revolution, arc length, Numerical integration (Trapezoidal rule), Polar coordinates, Polar curves graphs and areas using polar coordinates.

**Stat212 Principal of probability distribution theorem:**
This course discusses the discrete and continuous probability distributions (The mass and density probability functions and their properties, expectation, variance, standard deviation and the moment generating functions) . The discrete and continuous bi variety random variables and their properties (expectation, covariance, correlation coefficient, variance of sum or difference of two random variables and the moment generating
functions of bi variety random variables) . Bi variety distributions (marginal and conditional distributions ,independence of random variables , conditional expectation) .Also distribution functions of random vectors and random samples (distribution of sample mean – law of large number – central limit theorem) are discussed.

**Math.231 Basics of mathematics :**
This course aims at introducing mathematical logic, methods of proofs, mathematical induction, set theory, the product of sets, binary operations, equivalence relations, equivalence classes and partitions ,
mappings , the images and inverse images of sets under mappings , equivalence sets, countable and finite sets. Binary operations, morphisms, definition and examples of groups-definition and examples of rings and fields, polynomials and partial fractions.

**Math.273 Introduction to geometry:**

This course provides students with the main concepts of plane Euclidean geometry such as: coordinates, transformation, reflections ,translation, isometrics and similarity. Theorems on triangles, circles, tangents and angles. Polygons, polyhedral, regular polyhedral, their classification, and properties. Spherical geometry such as: sum of angle formula for spherical triangles, projection, conservative functions. Affine geometry : linear and affine transformation, isometrics, finite affine planes.

**Level 4**

**Math.203 Differentiation & integration in many variables:**This course studies the functions in two or more variables, domain of the function, three dimension rectangular coordinates, limits, continuity, partial derivative, higher-order partial derivatives, differentiation of composed function, maxima and minima-method of Lagrange multipliers for maxima and minima. Double integrals in Cartesian and polar coordinates , triple integrals in spherical and cylindrical coordinates,

infinite series, convergence tests, representations of functions by power series, Taylor , Maclaurin, and the binomial series.

**Math.251 Mathematical applications on computers**

This course provides an introduction to mathematics software as Mathematica, Mat lap and solving some problems in calculus and linear

algebra by mathematica and Mat lap. Applications: modeling , simulation and visualization , internet research . Writing mathematical reports and projects using scientific work place.

**Math.204 Vectors:**

Students studies vectors in two and three dimensions, scalar and vector products,

equations of lines and planes in 3-dimensional space. Surfaces of revolution and their equations in cylindrical and spherical Coordinates. Vector valued functions of a real variable, curves in space, curvature, rates of change in tangent and normal directions, directional derivatives and gradient of a function. Application to equations of normal and tangent space to a surface at a point. Vector fields, divergence, curl of a vector, line and surface integrals, Green's theorem, Gauss' divergence theorem and Stock's theorem.

**Math.242 Linear algebra**

This course studies matrices and their operations, types of matrices, elementary transformations, determinants, elementary properties of determinants, inverse of a matrix, rank of matrix, linear systems of

equations, vector spaces, linear independence , finite dimensional spaces , linear subspaces, inner product spaces, linear mappings, Kernel and image of a linear mapping- Eigen values and Eigen vectors of a matrix and of a linear operator mapping.

**Math.243 Theory of numbers:**

Students study the first and second principle of mathematical induction, well-ordering principle , divisibility, Euclidean algorithm, prime numbers and their properties, linear Diophantine equations, congruencies and their properties, linear congruencies- the Chinese remainder theorem, Fermat's

little theorem, Euler's theorem, Wilson's theorem, arithmetic functions and Pythagorean triples.

**Level 5**

**Math. 213 Linear programming:**

This course gives introduction to operations research, mathematical model for some real problems and mathematical formulation of linear programming problem. Graphical method for solving linear programming problems, convex sets, polygons, extreme point and optimality theorem. Analytical method (Simplex method) , big-M method , Two-phase method, formulation mistakes, dual problem, sensitivity

analysis, application to transportation and network problems.

**Math.232 History of mathematics:**

This course aims at giving students some knowledge about the evolution of some mathematical concepts ,facts and algorithms in arithmetic , algebra, trigonometry ,Euclidean geometry, analytic geometry and calculus through early civilizations such as ancient Egyptian , Babylonians, Greeks, Indians, Chinese, Muslims and Europeans . Evolution of solutions of some conjectures and open problems.

**Math.321 Introduction to differential equations**:

This course gives basic definitions and construction of an ordinary differential equation. Methods of solving ordinary differential equations of first order . Orthogonal trajectories, ordinary differential equations of high orders with constant coefficients and with variable coefficients, types of solutions, linear systems of ordinary differential equations, series solutions of a linear ordinary differential equation of second

order with polynomial coefficient and Laplace transform.

**Math. 351 Numerical analysis:**

Students study numerical methods for solving nonlinear equations (bisection – iteration – Newton – false position … ), errors and rates of convergence. Direct methods for solving linear systems (Gauss

elimination,LU decomposition) and iterative methods (Jacobi –Gauss Seidel – Relaxation). Errors iteration matrices and convergence of iterative methods, polynomial interpolation (Lagrange-
Newton's methods: divided differences- forward and backward differences) and analysis of errors. Numerical differentiation and integration, errors and accuracy. Gaussian integration formulas.

**Level 6**

**Math.326 Mathematical Methods :**

This course discusses series solutions of ordinary differential equations with variable coefficients, inner product space of functions, self- ad joint operator, Sturm-Lowville theory, orthogonal polynomials and special

functions( Legendre, Hermit, gamma, beta, Bessel). Generalized theory of Fourier series and Fourier integrals.

**Math.343 Group Theory:**

This course studies the axioms of group theory and some examples of groups. Subgroups, cyclic groups, Lagrange theorem, normal subgroup, factor group, homomorphism, fundamental theorems of isomorphism, auto morphisms, Caley theorem and its generalization, simple groups, permutation groups, class equation, group action on a set, p-groups, Cauchy theorem- Sylow's theorems, external and internal direct product of group, Burnside theorem, dihedral- quaternion, groups of

auto morphisms on finite and infinite cyclic groups.

**Math.382 Real Analysis (1):**

This course introduces basic properties of the field of real numbers , completeness axiom , series and their convergence , monotone sequence , Bolzano-Weirstrass theorem , Cauchy criterion, basic topological properties of the real numbers, limit of a function , continuous functions and their properties . Uniform continuity , compact sets and its properties. The derivative of a function ,mean value theorem and Lupital rule and Taylor theorem.

**Level 7**

**Math.444 Ring and Fields:**

Students study rings, group of units, group of auto morphisms of a ring , ideals and factor rings and principal ring. They also study prime and maximal ideals, field of quotient of integral domain, characteristic of a ring, direct sum of rings, modules, Euclidean rings, ring of polynomials, roots of polynomials over a field, fields extensions, finite and simple extensions of fields, algebraic closure of a field, splitting fields and finite fields.

**Math.471 Introduction to Topology:**

This course introduces topological spaces, examples, closure of a set, derived set, topological subspaces, bases ,finite product topology, sub-bases, metric spaces, examples, metrizability, continuous functions, characterization of continuous functions on topological and metric spaces, homeomorphisms and examples. Topological property, compact spaces, examples , limit point and sequentially compact spaces.

**Math.483 Real Analysis (2):**

This course studies definition of Riemann integral, Darboux theorem , Riemann sums , properties and the principle theorem in calculus. Series of functions, point twice convergence , uniform convergence, algebra
and σ – algebra (sigma algebra), finite additivity and countable additivity, main extension theorem and outer measure. Measurable sets , measure , Lebesgue measure and its properties,

simple functions, measurable functions, Lebesgue integral, theorems of convergence, the relation between Lebesgue and Riemann integral.

**Math.499 Project:**

A student prepares a research project in one of the Math. topics under the supervision of the staff.
The student should submit a report for an oral exam.

**Level 8**

**Math.422 Introduction to partial differential equations:**

This course discusses classification and formation of partial differential equation , first order linear partial differential equation , solution
using Lagrange's method , Cauchy problem , second order linear partial differential equation in several variables , physical application using separation of variables , classifications of partial differential equation , some boundary value problems and Green's function.

**Math.472 Introduction to differential geometry:**

This course discusses theory of curves in $R^3$, regular curves , arc length and reparameterization , natural parameterization, Serret-Frenet apparatus, existence and uniqueness theorem for space curves, Bertrand curves. Involutes and evolutes, local theory of surfaces, simple surfaces, coordinate transformations, tangent vectors & tangent spaces . First and second fundamental forms, normal and geodesic curvature , Weingarten map, principal Gaussian and mean curvatures, geodesics, equations of Gauss and Godazzi-Mainardi.

**Math.484 Complex Analysis:**

This course discusses complex numbers, Cartesian and polar representation of complex numbers, powers and roots of complex numbers, limits and continuity of complex functions, analytic functions , Cauchy-Riemann equations. Harmonic functions, exponential, trigonometric , hyperbolic functions and logarithmic functions. Complex integration, contour integral , Cauchy's theorem, Cauchy's integral
Formula, bounds on analytic functions ,Taylor and Laurent series, power series, zeros and singularities. Residue theory and applications to real and improper integrals.

**BA Degree Program : Physics**

The first year for these program is the preparatory year of natural Science

**Level 1**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 101** | Language Skills | 2 | - |
| **CHEM101** | General Chemistry (1) | 4 | - |
| **ENG101** | English Language | 3 | - |
| **IC101** | Introduction to Islamic Culture | 2 | - |
| **MATH101** | Calculus (1) | 4 | - |
| **PSY101** | Thinking Skills | 2 | - |
| **Total** | 17 | | |

**Level 2**

| Course | Course Title | Credit | Pre- |
|---|---|---|---|

| Code | | | Course |
|---|---|---|---|
| **ARAB 103** | Arabic Editing | 2 | - |
| **CSC101** | Introduction to Computers and Programming | 3 | - |
| **ENG103** | English Language (2) | 3 | ENG101 |
| **IC102** | Islamic and Society Building | 2 | IC101 |
| **PHYS101** | General Physics (1) | 4 | - |
| **STAT101** | Statistical Probability | 3 | - |
| **Total** | 17 | | |

**Level 3**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC103** | Economic System in Islam | 2 | IC101 |
| **MATH201** | Calculus for Science (2) | 3 | MATH101 |
| **PHYS243** | General Physics (2) | 4 | PHYS101 |
| **PHYS211** | Classical Mechanics (1) | 3 | MATH101 PHYS101 |
| **PHYS231** | Vibrations and Waves | 2 | MATH101 PHYS101 |
| **PHYS243** | Thermodynamics | 3 | PHYS101 |
| **Total** | 17 | | |

**Level 4**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **MATH205** | Calculus for Physics (3) | 3 | MATH201 |
| **PHYS232** | Physical Optics | 3 | Phys231 |
| **PHYS234** | Health Physics | 2 | - |
| **PHYS203** | Mathematical Physics (1) | 3 | MATH201 |
| **PHYS212** | Classical Mechanics (2) | 3 | PHYS211 |
| **PHYS221** | Electromagnetism (1) | 3 | PHYS202 |
| **Total** | 17 | | |

**Level 5**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **BUS103** | Communication Skills | 2 | - |
| **MATH210** | Differential Equations | 3 | MATH205 |
| **PHYS302** | Mathematical Physics (2) | 3 | PHYS203 |
| **PHYS321** | Electromagnetism (2) | 3 | PHYS212 |
| **PHYS351** | Modern Physics | 3 | PHYS232 |
| **PHYS393** | Optics Physics | 3 | PHYS232 |
| **BIO314** | Healthy Culture | 2 | - |
| **Total** | 18 | | |

**Level 6**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC104** | Political System in Islam | 2 | IC101 |
| **PHYS303** | Mathematical Physics (3) | 3 | PHYS30 |
| **PHYS350** | Quantum Mechanics (1) | 3 | PHYS212 PHYS351 |
| **PHYS391** | Electromagnetism Lab | 2 | PHYS221 |
| **PHYS393** | Modern Physics Lab | 2 | PHYS351 |
| **PHYS342** | Statistical Physics | 3 | PHYS243 |
| **PQUR126** | Islamic Morals | 2 | |
| **Total** | 17 | | |

**Level 7**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS422** | Electronics | 4 | PHYS243 |
| **PHYS452** | Quantum Mechanics (2) | 3 | PHYS350 |
| **PHYS471** | Solid State Physics (1) | 3 | PHYS350 |
| **PHYS481** | Nuclear Physics (1) | 3 | PHYS351 |
| | Selective Course (Faculty) | 2 | - |
| **Total** | 16 | | |

**Level 8**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS455** | Molecular and Atomic Spectra | 3 | PHYS452 |
| **PHYS495** | Solid State Lab | 2 | PHYS471 |
| **PHYS497** | Nuclear Physics Lab | 2 | PHYS481 |
| **PHYS498** | Project | 2 | PHYS497 PHYS495 |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course | 2 | - |
| **Total** | 17 | | |

## Course Description:

**CHEM 10 : General Chemistry**

Theoretical part : Chemical calculations, gasea, liquid state, thermochemistry, solutions, chemical kinetics, chemical and ionic equilibria Bohr Theory and electronic configuration of atoms and periodic table . An Introduction to types of chemical bonds .

Practical part : some experiments on properties of matter : density , viscosity, qualitative

analysis : identification of acidic and basic radicals for inorganic salts .

**Course Number : CSC 101 Introductions to Computer and Programing**

Credit Hours ( lecture and Lab ) : 3 (2+ 1)

Level : Second

Theoretical parts : Introduction to programming , structured program development, program control, functions, array. Assignments in algorithm design and translation of algorithms in high level language like C language

Practical part: Excercices on the theoretical part.

**Course Number :** ENG **101 - English Language**

The course aims to introduce students to :

An awarenss of the basics of the English language in general .

An understanding of the basics of English grammar .

The basics of English pronunciation.

Specialized academic topics in the students, respective disciplines.

Proposed Teaching Methods

The course will be conducted via lectures in the main seminar, workshops and group discussions will also be used .

**Course Number : Math 101 - Calculus -1**

Real number and real line – Inequality. Function – The graph of a function- even and odd functions- composite of functions- Review of Trigonometric functions – inverse functions- Limits – The definition of a limit – Properties of Limits- Techniques for Evaluaring Limits – Infinites Limits. Continuity at a point on an open interval - one sided limits and continuity on a closed interval – Properties of continuity . The Derivative of a function – Differentiability and continuity – chain Rule – Derivatives of Trigonometric function – Logarithmic and Exponential functios ( Differentiation ) - Hyperbolic functions – inverse Trigonometric functions Differentiation . Exterma on an interval- Rolle,s Theorem and mean value theorem – Increasing and Decreasing functions and the first derivative test – concavity and second derivative test- related rates .

**PHYS 101 General Physics (1) (3 + 1) h.**

<u>Theoretical part:</u> Physics and measurements, Units and dimensions, Dynamics of particle in one dimension (displacement, average velocity, instantaneous velocity, acceleration, free fall), vector algebra and geometry, Motion in two dimensions, Projectile motion, Uniform circular motion, Tangential and radial accelerations, Newton's first law and inertial frames, Mass and weight, Newton's second law, Newton's third law, Friction, Work and energy, Vector scalar products, Work of variable forces, Kinetic energy and work-energy theorem, Conservative and non-conservative forces and potential energy, Power, Conservation of mechanical energy, The conservation law of linear momentum, Impulse, Collisions, Collision in one and two dimensions, Rotational motion with constant angular acceleration, Angular quantities, Moment of inertia, Torque and angular momentum, Work of rotational motion, Properties of matter: Elasticity, Stress, Strain, Modulus's, Strain energy, Fluid mechanics: Density and relative density, the concept of pressure, Pascal law, Archimedes principle, Fluid flow, Bernoulli's equation and its applications. State of matters, heat and Temperature and zero law of thermodynamics, Phase transitions, Latent heats, Ideal gases.

<u>Practical part:</u> Error and measurements, Force table, Hook's Law, Free fall, Projectile motion, Boyle's Law, Young's Modulus, Specific Heat of a Solid, Coefficient of Thermal expansion, Surface tension in capillary tube, viscosity, Newton's law of cooling, Determination of the Paraffin wax fusion temperature.

**PHYS 202 General Physics (2) (3 + 1) h.**

<u>Theoretical part:</u> Electric Charge, Insulators and conductors, Coulomb's law, Point charge, The electric field, Electric field of multiple point charges, The electric field of continuous charge

distribution, examples of various shapes (disks, rings, spheres, planes), The parallel plate capacitor, Electric dipole, motion of point charge and electric dipole in electric field, Electric flux, Gauss's law, Applications of Gauss's law, Conductor in electrostatic equilibrium, Electric potential, The potential of point charges, The potential of dipole, The electric potential of many charges, Capacitance and capacitors, Energy stored in a capacitor, Fundamental circuits, The electric current, Batteries, current density, Conductivity and resistivity, Ohm's law, Series resistors, Parallel resistors, Kirchhoff's laws, RC circuits, Magnetism and magnetic force, source of magnetic fields, Magnetic field of a current, Magnetic dipoles, Ampere's law and solenoids, The magnetic force on a moving charge, The magnetic force on a current-carrying wire, Forces and torques on current loops, Induced current, Motional emf, Magnetic flux, Lenz's law, Faraday's law, Induced fields and EM waves, Inductors, LC circuits, LR circuits, AC circuits and phase, Capacitors in AC circuits, RC filter circuits, Inductor circuits, The RLC circuits, Power in AC circuits, Wave phenomena, geometrical optics, speed of light, Longitudinal and transverse waves, Sound, The nature of light and the laws of geometric optics, reflection and refraction, Fermat’s principle, Snell’s law, Image formation.

Practical part: Verification of Ohm’s Law, Metric bridge, Charge and discharge of capacitors, Inductive Reactance, Capacitive Reactance, RCL circuits, Transformers, Speed of sound in air , Refractive Index of a Prism, Focal length of Lenses, Focal Length of Mirrors.

**PHYS 211 Classical Mechanics (1) (3 + 0) h.**

Space time, Review of Newton's law and conservation of linear momentum in Cartesian and polar coordinate system, applications on projectile motion in a linear air resistance medium, Quadratic air resistance. Motion of charges in a uniform magnetic field, The center of mass, angular momentum of several particles, Kinetic energy and work, Potential energy and conservative forces, Gradient relation, Time dependent potential energy, Energy for one dimensional linear system, Curvilinear one-dimensional systems, Central forces, The energy of interaction of two particles, The energy of multi-particle systems, CM and relative coordinates, The equation of the orbit, Kepler orbits, The unbound Kepler orbits, Change of orbits, Mechanics in non inertial frames, The tides, Rotating frames and angular velocity vector. Newton's second law in rotating frame, The centrifugal force, Coriolis force, Coriolis force and

free fall, The Foucault pendulum, Coriolis acceleration.

**PHYS 231 Vibration and Waves (2 +0) h.**

Periodic motion, Simple harmonic oscillation, Damped oscillation, Forced oscillation, Application of damped and forced oscillations, Superposition of simple harmonic oscillations, traveling waves, standing, Beats, Transverse wave in wires, Longitudinal wave in rods, Application of longitudinal wave in open and closed air columns, Fourier analysis, Doppler effect.

**PHYS 243 Thermodynamics (3 + 0) h.**

Fundamental concept in heat and thermodynamics, Thermal Equilibrium and zeroth law of thermodynamics, Ideal gases, Kinetic theory of gases, First law of thermodynamic, Application of first law of thermodynamic, isothermal and adiabatic processes. Irreversible process and reversible processes, Carrnot cycle, Otto cycle-cleapeyron latent heat equation, Second law of thermodynamic, Heat Engines, Refrigerators, Entropy, Thermodynamic functions, Maxwell relations, Third law of thermodynamic, Phase change, Applications on thermodynamic laws.

**PHYS 203 Mathematical Physics I (3 + 0) h.**

Determinants, Matrices, Solving linear equations and differential equations by matrices, Application on the motion of the rotation of the

rigid body, Vector Algebra: Vector products, Position, Displacement, Vector transformation, Gradient, The Divergence, The Curl, Laplace operator, Line, Surface, and Volume Integrals, Gauss theorem, Stock's theorem, Green's theorem, Spherical polar coordinates, Cylindrical coordinates.

**PHYS 212 Classical Mechanics II (3 + 0) h.**

Calculus of variations, The Euler-Lagrange equation and applications, Lagrange's equations for Unconstrained motion, Constrained systems, Generalized momenta and Ignorable coordinates, Lagrange multipliers and constraint forces, Rotational motion of rigid body, The inertial tensor, Principal axes of Inertia, Precession of a top by weak torque, Euler's equations, Euler's angles, Coupled oscillations and normal modes, The double pendulum, Three coupled pendulum, Hamiltonian mechanics for one dimensional systems, Hamiltonian mechanics in several dimensions, Ignorable coordinates, Phase space orbits, Liouville's Theorem.

**PHYS 221 Electromagnetism I (3 + 0) h.**

Review of vector Operations and algebra, Linear and rotational transformation of vectors, Vector field, Review of vector differential calculus: (gradient, the divergence, the curl, product rules of algebra , Second Derivatives,), Review of integral Calculus: (linear, surface, and volume integrals of vector functions), The fundamental theorem for: (calculus, gradient, divergence, curl), Curvilinear Coordinates: (spherical polar and cylindrical coordinates), The Dirac delta function in one and three dimension, The divergence of reciprocal square of radial distance, The Helmholtz theorem, Coulomb's law, The electric field, Continuous charge distributions, Divergence and curl of electrostatic field, Field lines and flux, Gauss's law and its applications, Electric potential, The potential of a localized charge distribution, The work done to move a charge, The energy of a point charge distribution, The energy of a continuous charge distribution, Properties of conductors and induced charges, Surface charge and the force on a conductor, Capacitors, Poisson's equation, Laplace's equation in one, two and three dimensions, Boundary conditions and uniqueness theorems, Conductors and the second uniqueness theorem, The Method of images and induced surface charge and calculating force and energy, Multipole expansion and approximate potentials at large distances, The monopole and dipole terms, The electric field of a dipole, Polarization, Field of a polarized object, Induced dipole and dielectrics, Polar molecules, Bound charges, The field inside a dielectric and the electric displacement, Gauss's law in the presence of dielectrics, Boundary conditions, Linear Dielectrics: (susceptibility, permittivity, dielectric constant), Boundary value problems with linear dielectrics, Force and energy in dielectric systems, Magnetostatics and the Lorentz law , Magnetic fields and magnetic forces, The Biot-Savart law, The magnetic field of a steady current, The divergence and curl of the magnetic field, Ampere's law and its applications, Magnetic vector potential, Magnetostatic boundary conditions, Multipole expansion of the vector potential, Magnetic fields in matter and the magnetization, Magnetic materials: (diamagnets, paramagnets, ferromagnets), Torques and forces on magnetic dipoles, Effect of magnetic field on atomic orbits, The field of a magnetized object, Bound currents, The magnetic field inside matter and the auxiliary field, Ampere's law in magnetized materials, Boundary Conditions, Linear and nonlinear media, Magnetic susceptibility and permeability, Ferromagnetism.

**PHYS 232 Physical Optics (3 + 0) h.**

The nature of light , The superposition of waves, Interference of two-beams of light (division of the wave front & division of amplitude) Interferometers( Young , Fresnel's biprism , loyed mirror, Fresnel's double mirrors , wedge interferometer , Newton rings , Michelson

interferometer , Jamin & Mach-Zehnder refractometers ), Interference of multiple beams , Fabry-Perot interferometer , Applications of interferometry, Diffraction , Fraunhofer diffraction (single slit, two slits, multiple slits) – diffraction grating - Fresnel diffraction (circular aperture & circular Obstacle ), Polarization - polarization by absorption , reflection , refraction & double refraction, Optical active materials & polarometer .Interference of polarized light , Analysis of polarized light , Electro-optics (Kerr effect & Pockels effect ) , Magneto- optics (Faraday effect).

**PHYS 302 Mathematical Physics II (3 + 0) h.**

Complex numbers, Analytic functions, Limits and Continuity, Analyticity, The Cauchy, Riemann Equations, Elementary Functions, Complex Integration, Contoursm, Independence of path- Cauchy integral theorem- Bounds for analytic Functions, Series representations for analytic functions, Residue Theory, Conformal Mapping, Invariance of Laplace's Equation, Geometric Considerations, Bilinear Transformations, The Schwartz, Christoffel Transformations.

**PHYS 321 Electromagnetism II (3+0) h.**

Electromotive force, Ohm's law, Motional electromotive force, Electromagnetic induction, Faraday's law, The induced electric field, Inductance, Energy stored in magnetic fields, The modified Ampere's law, Maxwell's equations in vacuum, Maxwell's equations in matter, Boundary conditions, Conservation laws and the continuity equation, Poynting's theorem, Newton's third law in electrodynamics and momentum, Maxwell's stress tensor, Conservation of momentum, Angular momentum, Electromagnetic waves in one dimension, The wave equation, Sinusoidal waves, Boundary conditions: reflection and transmission, Polarization, Electromagnetic waves in vacuum, Monochromatic plane waves, Energy and momentum in electromagnetic waves, Electromagnetic waves in matter, Propagation in linear media, Reflection and transmission at normal incidence, Reflection and transmission at oblique incidence, Absorption and dispersion, Electromagnetic waves in conductors, Reflection at a conducting surface, The frequency dependence of permittivity, Guided waves and wave guides, TE waves in a rectangular wave guide, The coaxial transmission lines, Electric dipole radiation, Magnetic dipole radiation, Radiation from an arbitrary source, Power radiated by a point charge, Radiation reaction with matter.

**PHYS 351 Modern Physics (3 + 0) h.**

Special Theory of Relativity: wave propagation, Michelson Morley experiment, Galilean transformation, Lorentz transformations, Relative velocity, Lorentz contraction, Time Dilation, relativity of mass, Mass and energy, Applications, The particle like properties of Electromagnetic radiation: Electromagnetic waves, The photoelectric effect, black body radition, The Compton Effect, X-rays Waves like properties of particles: De-Broglie hypothesis, Electron diffraction experiment of Davison and Germer, Electron microscope, Uncertainity principle, quantum theory, Atomic Structure: atomic properties, The Thomson model, Rutherford Model for atomic nuclei, alpha particle scattering, Atomic Spectra, Bohr theory of the hydrogen atom, Sommerfeld's Model, Failure of the Bohr theory Frank-Hertz experiment, The basic ideas of the Quantum Mechanics.

**PHYS 393 Optics Lab (0 + 2) h.**

Prism spectrometer (refractive index and dispersion), Grating spectrometer, Fresnel's biprism with He-Ne laser, Fresnel's double mirrors with He-Ne laser, Newton's rings, Michelson interferometer, Mach-Zehnder-interferometer, Diffraction at a single slit, Diffraction at double slits, Diffraction at one-and two dimensional gratings, Diffraction at a single slit measuring and evaluating with Video Com, Polarimter and optical activity, Abbe's refractometer, Inverse square law of light

radiation and absorption coefficient of glass or plastic materials, Polarization of light.

**PHYS 303 Mathematical Physics III (3+0) h.**

Series Method for solving linear differential equations, Fuch's theorem, Second solution, Legendre polynomials, Hermite polynomials, Lagurre polynomials, Bessel Functions, Fourier transformation and its application, Laplace transformation and its application, Eigenvalue problem, Differentional equations of Boundary value problem.

**PHYS 342 Statistical Physics (3 + 0) h.**

Probability, One random variable, Some important probability distributions, Many random variables, Sums of random variables and the central limit theorem, Rules for large numbers, entropy, Kinetic theory of gases, Maxwell's distribution of the velocities of gas molecules and its applications, Distribution function of the energy of molecules, Liouville's theorem, Equilibrium properties, The microcanonical ensemble, Two-level systems, The ideal gas, Mixing entropy and the Gibbs paradox, The canonical ensemble, Canonical examples, The Gibbs canonical ensemblem, The grand canonical ensemble, Quantum statistical mechanics, Maxwell-Boltzmann distribution, Bose Einstein distribution, Fermi-Dirac distribution, Vibrations of a solid, Black-body radiation, Quantum microstates, Quantum macrostates, Ideal quantum gases, Hilbert space of identical particles, Canonical formulation, Grand canonical formulation, The degenerate fermi gas, The degenerate bose gas.

**PHYS 352 Quantum Mechanics (3 + 0) h.**

Reviews of the fundamental experiments in modern physics, the need for quantum mechanics. Wave packet and uncertainty principle, Schrödinger equation for free particle, Continuity relation, The dynamical variables and calculating the expectation values, Schrödinger equation with a potential in one dimension, Dynamical variables and calculating the expectation values in momentum space, Commutation relations, Hermitian operators, Linear operators, Completeness relation and orthonormality, Schrödinger equation in three dimensions, The fundamental postulates of quantum mechanics, Particle in an infinite well, Spectral expansion theory, The parity, Constants of motion and conservation laws, Momentum eigen functions and free body, One-dimensional potentials:(The potential step, The finite potential well at scattering and bound states, The potential barrier, The delta function potential at Scattering and Bound states, Simple harmonic oscillator, Oscillator eigen functions and eigen values, Ladder operators and dynamical variables, Schrödinger equation in three dimensions in Cartesian coordinates, Schrödinger equation in three dimension curvilinear coordinate system, Angular momentum and its eigen functions and eigen values, The addition of angular momentum, The central potentials.

**PHYS 392 Electromagnetism Lab (0 + 2) h.**

Measurement of e/m of the electron, Verification of Biot - Savart law , Verification of Faraday's law, Transformers , Measuring the force on current carrying conductors in a homogenous magnetic fields, RLC circuits, Generators, Motors, Transformers, Magnetic moment of magnetized rod, Helmholtz coils, Magnetic induction.

**PHYS 395 Modern Physics lab (0 + 2) h.**

Characteristics of microwaves, Franck- Hertz experiment, Stefan-Boltzmann law for heat radiation, Determination of Planck's constant by means of the photoelectric effect using the compact arrangement, Faraday effect, Fabry – Perot interferometer, Kerr effect, The Balmer series of hydrogen and determination of Rydbergs constant, Pockels effect, Zeeman effect.

**PHYS 422 Electronics (3 + 1) h.**

Theoretical part: Analog Electronics: The P-N junction diode and Zener diode with their applications Junction Field effect transistor - Bipolar junction transistor (Bias and amplifiers: JFET & BJT) – Differential and Operational Amplifiers, Introduction to Feedback Circuits, Multivibrators and Oscillators, Digital Electronics: Binary and Hexadecimal System, Logic Gates, Karnaugh Maps, Flip Flops, Shift Registers, Counters, Memories. Practical part: P-N junction application (half-wave rectifier, full-wave rectifier, clampers and limiters, Zener regulation) - Transistors JFET & BJT amplifiers. Amplifiers with 741(Inverting & Non inverting Amplifiers, Active Filters, Wien Oscillator, Astable Multivibrator). Half and Full Adder (7483), Flip Flop (7474-7476), Shift Register (7495-74194), Counters (7493-74193).

**PHYS 452 Quantum Mechanics II (3 + 0) h.**

Dirac notation, Vector space algebra and Hilbert space, Rephrasing wave mechanics and operator methods in abstract view, Angular momentum commutation relations, Raising and lowering operators for angular momentum, Expansion theory in abstract view, Matrix representation of angular momentum operators, General relations in matrix mechanics, Eigen states of spin ½, The intrinsic magnetic moment of spin ½ particles, Addition of two spins, Addition of Spin ½ and orbital angular momentum, Time independent perturbation theory and energy shifts, Degenerate perturbation theory, The Stark effect, Hyperfined splitting, Variational principle and its applications, The WKB approximation, Time-dependent perturbation theory, The interaction of charged particle with electromagnetic field, Two level-system, emission and absorption of radiations, spontaneous emission, Transition rate, selection rule, scattering theory, Partial wave analysis, The Born approximation.

**PHYS 471 Solid State Physics I (3 + 0) h.**

Different states of matter, classification of solids, crystal structure (Bravais lattices & Miller indices), methods of determination of crystal structure (X-ray diffraction, electron and neutron diffraction), crystal defects, crystal binding (interatomic forces, types crystal bonds), Methods of crystal growth, lattice dynamics (crystal vibration modes and phonons), thermal properties of insulators (specific heat of insulators: classical model, Einstein's model, Debye model,-thermal conductivity of insulators), Dependence of thermal conductivity on temperature, Free electron theory (classical model of free electron, Fermi gas of free electrons, Maxwell-Boltzmann distribution, Fermi-Dirac distribution function), band theory (zone theory and tight binding theory).

**PHYS 481 Nuclear Physics I (3 + 0) h.**

Properties of the nucleus: determination of nuclear charge, radius and mass, Nuclear binding energy, Natural Radioactivity: Decay law, Nuclear stability, Radioactivity and theory of transformation .Artificial Radioactivity: Discovery of artificial radionuclides, Transuranium elements, Interaction of radiation with matter: Interaction of heavy elements, interaction of light electrons, interaction of gamma rays with matter, interaction of neutrons with matter, Radiation Detectors: Gas detectors, Scintillation detectors, solid state detectors, Nuclear Reactions: Reactions of matter by gamma rays, reactions by alpha particles, reactions by protons, reactions by neutrons, Nuclear fission: Discovery of Nuclear fission, theory of Nuclear fission, Nuclear fusion: Energy production in stars, control of thermonuclear reactions.

**PHYS 455 Molecular and Atomic Spectra (3 + 0) h.**

Introduction: Comparing between atomic emission spectroscopy and atomic absorption spectroscopy; Optical spectroscopy, Atomic spectrum, Quantization of hydrogen atom, Atomic emission / absorption spectrophotometry Molecular spectroscopy ,

Spectroscopy of inner electrons. Zeemen's effect, Sodium spectrum, Effect of magnetic field on the energy levels of atom. Theory of magnetic energy, Anomalous Zeeman's effect and Lande splitting factor. Molecular Spectra of diatomic molecules, Vibrational energy levels in both classical mechanics and quantum mechanics. Rotational spectra of diatomic molecule in gaseous state and rotational energy levels, Molecular spectra; harmonic Oscillator, Non Rigid Rotator, Infrared Vibration, Rotation spectra, spectrum, IR spectrum, RBS spectra, XRD spectrum, measurements of Absorbance, Transmitting and Reflecting using double beam Spectrophotometers in all ranges of wavelengths (UV-VIS-NIR-IR), Normal modes of vibrations; Natural of infrared absorption, Basic Laser principles, Laser behavior, Properties of laser radiations, Different types of lasers, Laser spectroscopy, The total losses of the laser system, Transmission at the mirrors, Absorption and scattering by the mirrors, Absorption in the laser medium, Diffraction losses at the mirrors, The Ruby Laser, Three Level Laser (Helium-Neon Laser)-Four Level Laser ( Carbon dioxide Laser), Laser applications.

**PHYS 497 Solid State Physics lab (0 + 2) h.**
Studying the characteristics of the solar cell, electron diffraction experiments characteristics curves of an optical (photo) resistor, studying the electron spin resonance (ESR), calculation of the energy gap of germanium by an electrical method determination of the thermal coefficient of resistance of a noble metal (platinum) by computer, the magnetic susceptibility of some materials and its classification, X-ray spectroscopy and calculation of Planck's constant and Miller indices of crystal planes in NaCl single crystal, thermoelectric effect in semiconductors (calculation of Seebeck, Peltier and Thomson coefficients), superconductivity and determination of the transformation temperature TC of YBCO specimen by computer, determination of the absorption coefficient of aluminum for X-ray, Hall effect, studying the crystalline structure by using the field effect microscope.

**PHYS 498 Nuclear Physics Lab (0 + 2) h.**
Statistical nature of Radioactive decay law, Rutherford Scattering, Attenuation of gamma radiation, Absorption of beta radiation passing through different materials, Inverse square law in case of gamma-rays, Determination of the range of beta particles in absorbers by beta gamma source, Backscattering of beta particles, determination of the dead time of GM tube, Effect of a magnetic field on beta particles motion, Assessment of natural radionuclide in NaCl, Compton scattering.

**PHYS 499 Project (2 + 0) h.**
The student carries out a research under the supervision of one of the Staff members in one of the following branches: Theoretical Physics, Nuclear Physics, Solid State Physics, Fiber Optics, Laser, Plasma, Electronics. The student submit a a report about his work, and is evaluated by a committee selected by the department.

## Study Plan of Computer Science:

**Level -3**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC101** | Introduction to Islamic Culture | 2 |
| **Arab101** | Language Skills | 2 |
| **Phys104** | General Physics (2) | 4 |
| **Math105** | Different Calculus | 3 |
| **CEN111** | Logic Design | 4 |
| **CSC152** | Concepts of Algorithms & | 4 |

| | | |
|---|---|---|
| | Computer Programming | |
| | Total | 19 |

**Level-4**

| Course Code | Course Title | Credit |
|---|---|---|
| **Arab103** | Expository Writing | 2 |
| **Math106** | Integral Calculus | 3 |
| **Math109** | Linear Algebra and Analytical Geometry | 3 |
| **IT125** | Database | 4 |
| **CEN126** | Computer Architecture | 3 |
| **CSC153** | Object Oriented Programming | 4 |
| | Total | 19 |

**Level-5**

| Course Code | Course Title | Credit |
|---|---|---|
| **Math203** | Differential and Integral Calculus | 3 |
| **Stat224** | Introduction to Statistics & Probability | 3 |
| **CSC225** | Assembly Language | 3 |
| **CSC244** | Concepts of Algorithms | 3 |
| **CSC276** | Computer Graphics | 4 |
| **CSC283** | Discrete Structures | 4 |
| | Total | 20 |

**Level-6**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC102** | Islamic and Construction of Society | 2 |
| **Math207** | Differential Equations | 3 |
| **CSC214** | Data Structures | 4 |
| **IT224** | Visual Programming | 4 |
| **CSC237** | Programming Language Concepts | 3 |
| **CSC229** | Operating Systems | 4 |
| | Total | 20 |

**Level-7**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN301** | Signals and Systems Analysis | 4 |
| **CEN333** | Microprocessors Systems | 4 |
| **CSC338** | Compiler Design | 3 |
| **CEN345** | Computer Networks | 4 |
| **CSC346** | Software Engineering | 3 |
| | Total | 18 |

**Level-8**

| Course Code | Course Title | Credit |
|---|---|---|

| | | |
|---|---|---|
| **IC103** | The Islamic Economical System | 2 |
| **CSC313** | Algorithms Analysis & Design | 3 |
| **CSC327** | Operations Research and Programming Applications | 3 |
| **CSC357** | Internet Techniques & Web Programming | 3 |
| **CSC392** | Selected Topics in Computer Sciences | 3 |
| **CSC393** | Systems Programming | 3 |
| | Total | 17 |

**Level-9**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC104** | Fundamentals of the Islamic Political System | 2 |
| **CSC414** | Introduction to Unix/Lunix Systems | 3 |
| **IT463** | Knowledge Base Systems Applications | 3 |
| **CSC448** | Optimization Techniques | 3 |
| **IT481** | Communication Skills | 2 |
| **CSC498** | Graduation Project (1) | 2 |
| | Total | 15 |

**Level-10**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC445** | Introduction to Crytopgraphy & Information Security | 3 |
| **IT450** | Multimedia Data Management | 3 |
| **CSC458** | Distributed Systems & Parallel Processing | 3 |
| **CSC463** | Artificial Intelligence | 4 |
| **CSC499** | Graduation Project (2) | 4 |
| | Total | 17 |

## Course Description (Computer Science):

**CEN 111 Logic Design** (4h)

This course discusses the Digital computer and information (numbering systems, Arithmetic operations, Decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, Combinational circuits simplification, CMOS circuits), Combinational logic design (design procedure, decoders, multiplexes, Binary adder and subtracted), Sequential circuits (latches, flip flops, synchronous sequential circuits analysis and design), Analysis and design of synchronous sequential machines, Representation, state reduction and realization; Finite state machines.

**Textbook:** M. Mano, Digital Design, 3rd Ed., 2002.

**IS 125 Database(4h)**

This course discusses the Database definition, Database system, Overview of database management, database system architecture, Introduction to Relational databases, An Introduction to Structured Query Language(SQL), Database Integrity, Views, Normalization, Database design, Practical Applications.

**CEN 126 Computer Architecture (3h)**

This course discusses the Review of logic design principles. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design. System software. Micro-programmed CPU. Comparison between CISC, RISC and VLIW processors. Introduction to memory organization; I/O operations; Introduction to parallel processing techniques.

**CSC 237 Programming Languages Concepts (3h)**

This course discusses the Preliminaries. Evolution of the Major Programming Languages. Describing Syntax and Semantics. Lexical and Syntax Analysis. Names, Binding, Type Checking, and Scopes. Data Types. Expressions and Assignment Statements. Statement-Level Control Structure. Subprograms. Implementing Subprograms. Abstract Data Types. Support for Object-Oriented Programming. Concurrency. Exception Handling and Event Handling. Functional Programming Languages. Logic Programming Languages.

**CSC 283 Discrete Structures (4h)**

**Introduction to Discrete Structures**: This course discusses the algorithmic language. **Logic**: propositions, predicate logic, proofs, mathematical induction. **Sets**: special sets, operations, properties and identities, application of logic to knowledge-based systems. **Relations**: graphical and matrix representations, equivalence and order relations, application to databases **Functions:** types, cardinality, application to functional languages **Undirected Graphs**: Simple graphs, Eulerian paths, Hamiltonian circuits, trees, application to syntax diagrams **Directed Graphs** digraphs, consistent labeling, paths problems, Warshall's algorithm, shortest paths and Dijkstra's algorithm, application to routing in computer networks. **Machines and Computations**: automata as models, finite state automata (FSA) without outputs, FSA as language recognizers and their limits, introduction to Turing Machines, application of FSA to problem-solving.

**CSC 276 Computer Graphics (4h)**

This course discusses the Computer Graphics Applications Survey. **Color models** (chromaticity diagram, RGB, CMY, YIQ, HSV, and HLS color models). **Graphics Output Primitives** (coordinate frames, DDA, Bresenham's algorithm, circle-drawing, fill-area primitives algorithms). **2D Graphics** (2D cartesian coordinates, curves and parametric equations, functions and transformations, inverse functions. **3D Graphics** (vectors in 3D, dot and cross product, homogeneous coordinates, correlation between cartesian and homogeneous coordinates). **Geometric transformations** (2D geometric transformations, matrix representation and homogeneous coordinates, inverse transformations, 2D composite transformations). **Geometric representation** Lagrange polynomials of degree n, Hermite cubic polynomial, Bernstein polynomial, interpolation problem, Spline interpolation, problem of approximation, Bezier-

Bersnstein approximation, Bezier-B-Spline approximation, quadric surfaces.

**CSC 152 Concepts of Algorithms and Computer Programming (4h)**

This course discusses the Problem-solving, algorithmic design, Introduction to Programming, Structured Program Development, Program Control, Functions, Arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.

**IS 224 Visual Programming (3h)**

This course discusses the Selecting a Visual Language, Knowing the concepts and procedures used in Visual Languages, Syntax and semantics of the language used. Types of Data, conditional statements, recursion, data structures, modular programming, review of Object-Oriented Programming concepts and techniques, User Interface Design rules, Materializing an interface into a set of visual objects, File types, File organizing techniques, File usages, Publishing an interface on the web, Basic concepts of Human Computer Interaction, Comparison between the selected language and other visual languages.

**CSC 338 Compiler Design (3h)**

This course discusses the design and implementation of compilers. Compiler organization, algorithms for lexical, syntactic and semantic analysis, top-down and bottom-up parsing (e.g., recursive descent, LL, LR, LALR parsing). Symbol table organization, error detection and recovery, intermediate and object code generation, and code optimization. Student has to implement a compiler for a simple high level language as project.

**CSC 225 Assembly Language (3h)**

This course discusses the Introduction to PC hardware, PC software requirements, assembly language programmers requirements, program logical and control, string operations, arithmetic operations for processing binary data, assembling linking and executing a program.

**CSC 214 Data Structures (4h)**

This course discusses the Functions in C - Structures and pointers - Memory Management functions, Concepts and Definition of abstract data type, Array as ADT, Stack and operations, Queue and operations Linked List and stack as list, Queue as list and applications, Sorting, recursion, Tree Introduction to Graphs, Projects and Exercises.

**CSC 346 Software Engineering (3h)**

This course discusses the Software Engineering Concepts, System Engineering Concepts, Software Process, Analysis Concepts and Principles, Analysis Modeling Design, Real -Time System Design, Software Testing Techniques, Technical Metrics for Software, Project.

**CSC 229 Operating Systems (4h)**

This course discusses the Computer System Structure, Operating System Concepts, Operating System Structure, Procedures, CPU Scheduling, Process Synchronization, Batch Files, Recovery Console, Memory Management, Virtual Memory, File-System Interface, Storage Structure, Data Storage on Disks, File-Systems: Fat,Fat32, NTFS, Distributed Systems, Hardware Protection, The Linux system

**CSC 244 Concepts of Algorithms (3h)**

This course discusses the Growth function and Recurrence, Divide-and-Conquer: (Strassen, Fibonacci, Polynomial Multiplication), Heap Sort, Quick Sort, Bubble Sort, Insertion Sort, Merge Sort, Hash Table, Binary Search Tree, Dynamic Programming, Greedy Algorithms.

**CEN 333 Microprocessor Systems (3h)**

This course discusses the Architecture and Instruction set of different 16 bit microprocessors; Microprocessor chips. **Supporting chips**: Buffers, decoders, system clock generator, reset system. Memory chips and subsystems Interfacing 16-bit Microcomputers. Architecture of Microprocessor based systems, design technique, memory and I/O devices interfacing to the microprocessor, interfacing technique. **I/O techniques**: Interrupts, Direct memory access; **System development and design tools techniques**: hardware and software.

**CSC 153 Object Programming (4h)**

This course discusses the Introduction to Object - Oriented Programming, Program Control Structures, Functions, Arrays, Pointers and Strings, Classes Part I: Classes and data abstraction, Classes Part II: Operator Overloading, Inheritance Virtual Functions and Polymorphism.

**CEN 301 Signals and Systems (4h)**

This course discusses the Time-domain analysis of signals: Mathematical and graphical representation. Classifications. Basic operations. Basic signals. Sampling and aliasing. Time-domain analysis of systems: Block diagram representation. Differential and difference equation representation. Impulse and step responses. Frequency-domain analysis of signals: Spectra of continuous-time and discrete-time signals. Frequency-domain analysis of systems: Frequency response of continuous-time systems: Bode plot, Nyquist plot, feedback and its effects on system stability. Frequency response of discrete-time systems. Laplace transform and its applications. Z-transform and its applications: Relationship with Laplace. Exercises should be solved using MATLAB.

**CEN 345 Computer Networks (4h)**

This course discusses the **Introduction to computer networks**: Network Types, Overview of data transmission, Introduction to network protocols, The Internet protocol. **Network topologies**; Network architecture and the OSI reference model; The physical and Data Link Layer , flow and errors control, ARQ Stop/wait, Sliding window protocols, **DLC standards**: HDLC, PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, Hubs, routers, Ethernet Switches; **Network Layer Services**: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.

**CSC 393 Systems Programming (3h)**

This course discusses the Study of one particular processor, assembly for this processor. Introduction to the assembly language of this processor. Design and implementation of an assembler (translation to machine code). Linkers and loaders: Absolute loaders; Program relocation; Program linking; Data structures; Dynamic loading; Bootstrap loaders. Macro processors: Data structures and logic flow for a simple one-pass macro processor; Concatenation of macro parameters; Generation of labels in macro expansions; Conditional macro expansion; Macro processing within an assembler; General-purpose macro processors. Project.

**CSC392 Selected Topics for Computer science(3h)**

This course discusses the advanced topics in computer sciences are proposed, like: Java Object-Oriented programming, **Object-Oriented Software Engineering,** Application Programs, Operating Systems Design and implementation, Distributed Operating Systems, Distributed Computing, Introduction to Parallel Computing.

**CSC357 Internet Techniques web programming (3h)**

This course discusses the An overview of connecting to and navigating within the Internet system and the World Wide Web: Navigation. Search Engines. Advanced search techniques. Design of web pages using HTML, XML and Java. TCP/IP. Client/Server architectures. Mastering Connectivity. Security.

**CSC 327 Operations Research &Applications programming (3h)**

This course discusses the OR Approach, Methodology And Applications: modeling, constraints, objective and criteria. Problems of multiple criteria optimization, model validation and systems design. Mathematical programming; simulation, gaming; heuristic programming. Examples,: theory of inventory. Production; linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. Theory of games for two-person competitive situations. Project management through PERT-CPM.

**CSC 313 Algorithms Analysis and Design (3h)**

This course discusses the Introduction to Algorithms Analysis and Design, General Algorithms: 1- Greater Common Divisor Algorithm, 2- Smaller Common Multiple Algorithm, 3- Pascal-Triangle Algorithm, 4- Inverse Number Algorithm, 5- Recursive Algorithm), Algorithms And Procedures, Algorithm Analysis: (Algorithm Efficiency, Algorithm Run-time, Algorithm Complexity, Computation Horner Algorithm Complexity Degree, Multiplication Two Polynomials Complexity Degree, Computation Using While Loop Algorithm Complexity Degree), Sorting Algorithms: (Insert Sort Algorithm, Selection Sort Algorithm, Bubble Sort Algorithm, Heap Sort Algorithm, Merge Sort Algorithm, Qsort Algorithm, Files Sorting Algorithms), Searching Algorithms, Backtracking Algorithms: (8-th Queen Problem, Optimal Option Problem).

**CSC 498 Project I (2h)**

Student will study, design and develop an integrated system, and he will be examined at the end of the semester.

**IS 463 Knowledge base systems Application (3h)** This course discusses the Review of first-order logic, relational algebra, and relational calculus. Fundamentals of logic programming. Logic for knowledge representation. Architecture of a knowledge-base system. Fundamentals of deductive databases. Top-down and bottom-up query processing. Some important query processing strategies and their comparison. Project or term paper on current research topics.

**IS 481 Communication skills (3h)**

This course covers written, oral, and interpersonal communication. Students will hand in short pieces of writing each week, will make oral presentations several times in the semester, and will work together in simulated project meetings and other realistic scenarios of pair and small group interaction.

**CSC 448 Optimization Techniques (3h)**

This course discusses the Unconstrained optimization theory. Convex functions and convex sets. Algorithms for unconstrained optimization (Steepest descent Newton methods Conjugate gradient methods). Constrained optimization theory (Kuhn-Tucker conditions). Special problems: (Linear programming Quadratic Programming). Algorithms for constrained optimization. Since this is a course on optimization *techniques* you will need to be able to program with high level programming languages (e.g C/C++, Java, C#).

**CSC 414 introduction to Unix and Linux (3h)**

This course discusses the User/kernel interface, fundamental concepts of Unix, user authentication, basic and advanced I/O, file system, signals, process relationships, and inter-process communication. Fundamental

development and debugging tools such as "make" and "gdb" will also be covered.

**IS 491 Multimedia Data Management (3h)**

This course discusses the Significance and value of multimedia for a variety of end users. Multimedia data storage. Use of multimedia hardware for capture and management of sound, graphics and video. Multimedia development tools programming, scripting and design skills. Use of multimedia authoring tools for producing multimedia applications

**CS 463 Artificial Intelligence (4h)**

Introduction & Definitions. Agent and examples. Uninformed Search. Heuristic Search. Constrained Search Problems CSP). Logical agents. First Order Logic and examples Machine Learning. Project.

**CSC 458 Distributed Systems and Parallel (3h)**

This course discusses the Introduction to distributed systems, processes and processors, parallel architecture (multi-computers, multi-processors), communication in parallel systems, performance of parallel systems, examples of parallel programming, introduction to distributed systems, distributed algorithms, types of distributed systems, compatibility of distributed systems and discovery of the end of processes.

**CSC 445 Introduction to Cryptography and information security (3h)**

This course discusses the Basic concepts of cryptography and secure data: Overview of Cryptography and information security, Mathematical Overview, Shannon and cryptography, Transposition, Substitution Ciphers, Rotor Machine and Poly alphabetic Ciphers, Block Ciphers: symmetric key systems, DES, AES, Public Key Systems, Knapsack System, RSA System, Key Management, Digital Signatures and Authentication, Stream Ciphers, Linear Shift Registers, Non-Linear Shift Registers, Watermarking and Steganography, Applications.

**CSC 499 Project II (4h)**

Student will study, design and develop an integrated system. Examination to be held at the end of the semester.

# College of Science in Al Badayye

## Vision:

The College of Science seeks to become a leader in educational and technological innovation, scientific discovery and creativity amounting the other local and international colleges of science. This happens through fostering an atmosphere of intellectual inspiration and partnership for the prosperity of society.

## Mission:

The idea of establishing the college of Sciences in Qassim came as a natural response to the educational revival the Kingdom enjoyed since its foundation to respond to the local community requirements by identifying and diagnosing the problems the community is facing in order to find the answers. It also aspires to meet the educational and development needs of society by providing high-quality academic programs, pioneering innovative research and creative articulation, and through active involvement in the community for the prosperous culture and economic development of the country. In addition, it aims at qualifying its students to face the rapid global changes while preserving our identity and principles which emanate from our glorious religion.

## Values:

The College of Science in Al Badayye is a newly established college, which is affiliated to Qassim University. It follows the same curriculum as the the College in the main campus. It is committed to excellence on all levels of the educational and creative experience, to the success of all its students and to the development of their capacity to arrive at sound and perceptive conclusions that respect differences and diversity in ideas. It is also dedicated to lifelong learning, which encourages the continual use of the mind. The college plays a vital role in the life of the surrounding community, in society as a whole and as a catalyst for economic development.

## Aims:

The College aims to make valuable contributions to the Kingdom's scientific, technological, and economic sectors through the research activities of faculty and graduates. More specifically, the objectives include:

- To provide advanced teaching programs in the various basic sciences and supply the community with competencies and trained specialists in the modern scientific techniques.
- To conduct studies and researches in order to build a technological research database to serve the needs and to solve the community's problems.
- To spread knowledge within the college and the community and to achieve publications and translation work.
- To offer scientific and experimental services in the field of preserving the environments and community service.
- To participate in the development of the university education and to establish the scientific and academic ties with the higher education institutions inside and outside the kingdom to serve the strategic

development in the Kingdom of Saudi Arabia.

- To incite to use instructional technology in the field of teaching in order to improve the graduates performances.
- To participate in the intellectual development and the thinking maturity of the specialized Saudi cadres and to qualify them with analytical skills to enable them to fully participate in the achievement of the objectives of the total economic development.
- To encourages the creation of new knowledge and the preparation of students to have a positive influence on national and international levels.
- To promote lifelong learning inside and outside the college community, to guarantee continued growth and welfare of the society.

## About:

The College of Science was established in 1997, and the college proved to be another building block in establishing Qassim University as a modern institution of higher education. Students began studying at the college in AY1997–1998. The first class of students completed their studies and graduated in AY2001–2002. The college awards a bachelor's degree in science. The college aims to increase the students' knowledge in a wide range of scientific fields and to develop the skills they need to be an expert in individual areas of specialization. In addition, the college provides the students with an education foundation in computer programming and English, as required by the country's labor market.

## Degrees:

Bachelor
Master

## Programs:

The college awards bachelor's degrees in the following majors:

- Mathematics,
- Physics and
- Computer Science

## Study Plan:

**Program: Mathematic**

**Study plan:**

**The first and second level is the nature science preparation**

**Level 3**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration(2)** | Math.202 | 4 |
| **Principal of Probability Distribution Theorem** | Stat212 | 4 |
| **Basics of Mathematics** | Math.231 | 3 |
| **Introduction to Geometry** | Math.273 | 3 |

**Level 4**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration in many** | Math.203 | 4 |

| | | |
|---|---|---|
| **variables** | | |
| **Mathematical applications on computers** | Math.251 | 2 |
| **Vectors** | Math.204 | 3 |
| **Linear algebra** | Math.242 | 4 |
| **Theory of numbers** | Math.243 | 3 |

**Level 5**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Linear Programming** | Math.213 | 4 |
| **History of Mathematics** | Math.232 | 3 |
| **Introduction to Differential Equations** | Math.321 | 4 |
| **Numerical analysis** | Math.351 | 4 |

**Level 6**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Mathematical Methods** | Math.326 | 4 |
| **Group Theory** | Math.343 | 4 |
| **Real Analysis (1)** | Math.382 | 4 |

**Level 7**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Rings and Fields** | Math.444 | 4 |
| **Introduction to Topology** | Math.471 | 4 |
| **Real Analysis (2)** | Math.483 | 4 |
| **Project** | Math.499 | 4 |

**Level 8**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Introduction to Partial Differential Equations** | Math.422 | 4 |
| **Introduction to Differential Geometry** | Math.472 | 4 |
| **Complex Analysis** | Math.484 | 4 |

## COURSE DESCRIPTION:

**Level 3**

**Math .202 Differentiation & Integration(2) :** This course aims at giving students definite integral and its properties , mean value theorem of integral and the fundamental theorem of

calculus. It also discusses indefinite integral , standard integrals, derivatives & integrals of hyperbolic and inverse hyperbolic functions, integration methods such as: integration by substitution , integration by parts , integration by partial fractions and other substitutions. Also L'Hospitals Rule , evaluation of area and volume of revolution, arc length, Numerical integration (Trapezoidal rule), Polar coordinates, Polar curves graphs and areas using polar coordinates.

**Stat212 Principal of probability distribution theorem:**
This course discusses the discrete and continuous probability distributions (The mass and density probability functions and their properties, expectation, variance, standard deviation and the moment generating functions) . The discrete and continuous bi variety random variables and their properties (expectation, covariance, correlation coefficient, variance of sum or difference of two random variables and the moment generating
functions of bi variety random variables) . Bi variety distributions (marginal and conditional distributions ,independence of random variables , conditional expectation) .Also distribution functions of random vectors and random samples (distribution of sample mean – law of large number – central limit theorem) are discussed.

**Math.231 Basics of mathematics :**
This course aims at introducing mathematical logic, methods of proofs, mathematical induction, set theory, the product of sets, binary operations, equivalence relations, equivalence classes and partitions ,
mappings , the images and inverse images of sets under mappings , equivalence sets, countable and finite sets. Binary operations, morphisms, definition and examples of groups-definition and examples of rings and fields, polynomials and partial fractions.

**Math.273 Introduction to geometry:**

This course provides students with the main concepts of plane Euclidean geometry such as: coordinates, transformation, reflections ,translation, isometrics and similarity. Theorems on triangles, circles, tangents and angles. Polygons, polyhedral, regular polyhedral, their classification, and properties. Spherical geometry such as: sum of angle formula for spherical triangles, projection, conservative functions. Affine geometry : linear and affine transformation, isometrics, finite affine planes.

**Level 4**

**Math.203 Differentiation & integration in many variables:**This course studies the functions in two or more variables, domain of the function, three dimension rectangular coordinates, limits, continuity, partial derivative, higher-order partial derivatives, differentiation of composed function, maxima and minima-method of Lagrange multipliers for maxima and minima. Double integrals in Cartesian and polar coordinates , triple integrals in spherical and cylindrical coordinates,

infinite series, convergence tests, representations of functions by power series, Taylor , Maclaurin, and the binomial series.

**Math.251 Mathematical applications on computers**

This course provides an introduction to mathematics software as Mathematica, Mat lap and solving some problems in calculus and linear

algebra by mathematica and Mat lap. Applications: modeling , simulation and visualization , internet research . Writing mathematical reports and projects using scientific work place.

**Math.204 Vectors:**

Students studies vectors in two and three dimensions, scalar and vector products,

equations of lines and planes in 3-dimensional space. Surfaces of revolution and their equations in cylindrical and spherical Coordinates. Vector valued functions of a real variable, curves in space, curvature, rates of change in tangent and normal directions, directional derivatives and gradient of a function. Application to equations of normal and tangent space to a surface at a point. Vector fields, divergence, curl of a vector, line and surface integrals, Green's theorem, Gauss' divergence theorem and Stock's theorem.

**Math.242 Linear algebra**

This course studies matrices and their operations, types of matrices, elementary transformations, determinants, elementary properties of determinants, inverse of a matrix, rank of matrix, linear systems of

equations, vector spaces, linear independence , finite dimensional spaces , linear subspaces, inner product spaces, linear mappings, Kernel and image of a linear mapping- Eigen values and Eigen vectors of a matrix and of a linear operator mapping.

**Math.243 Theory of numbers:**

Students study the first and second principle of mathematical induction, well-ordering principle , divisibility, Euclidean algorithm, prime numbers and their properties, linear Diophantine equations, congruencies and their properties, linear congruencies- the Chinese remainder theorem, Fermat's

little theorem, Euler's theorem, Wilson's theorem, arithmetic functions and Pythagorean triples.

**Level 5**

**Math. 213 Linear programming:**

This course gives introduction to operations research, mathematical model for some real problems and mathematical formulation of linear programming problem. Graphical method for solving linear programming problems, convex sets, polygons, extreme point and optimality theorem. Analytical method (Simplex method) , big-M method , Two-phase method, formulation mistakes, dual problem, sensitivity

analysis, application to transportation and network problems.

**Math.232 History of mathematics:**

This course aims at giving students some knowledge about the evolution of some mathematical concepts ,facts and algorithms in arithmetic , algebra, trigonometry ,Euclidean geometry, analytic geometry and calculus through early civilizations such as ancient Egyptian , Babylonians, Greeks, Indians, Chinese, Muslims and Europeans . Evolution of solutions of some conjectures and open problems.

**Math.321 Introduction to differential equations**:

This course gives basic definitions and construction of an ordinary differential equation. Methods of solving ordinary differential equations of first order . Orthogonal trajectories, ordinary differential equations of high orders with constant coefficients and with variable coefficients, types of solutions, linear systems of ordinary differential equations, series solutions of a linear ordinary differential equation of second

order with polynomial coefficient and Laplace transform.

**Math. 351 Numerical analysis:**

Students study numerical methods for solving nonlinear equations (bisection – iteration – Newton – false position … ), errors and rates of convergence. Direct methods for solving linear systems (Gauss

elimination,LU decomposition) and iterative methods (Jacobi –Gauss Seidel – Relaxation). Errors iteration matrices and convergence of iterative methods, polynomial interpolation (Lagrange-
Newton's methods: divided differences- forward and backward differences) and analysis of errors. Numerical differentiation and integration, errors and accuracy. Gaussian integration formulas.

**Level 6**

**Math.326 Mathematical Methods :**

This course discusses series solutions of ordinary differential equations with variable coefficients, inner product space of functions, self- ad joint operator, Sturm-Lowville theory, orthogonal polynomials and special functions( Legendre, Hermit, gamma, beta, Bessel). Generalized theory of Fourier series and Fourier integrals.

**Math.343 Group Theory:**

This course studies the axioms of group theory and some examples of groups. Subgroups, cyclic groups, Lagrange theorem, normal subgroup, factor group, homomorphism, fundamental theorems of isomorphism, auto morphisms, Caley theorem and its generalization, simple groups, permutation groups, class equation, group action on a set, p-groups, Cauchy theorem- Sylow's theorems, external and internal direct product of group, Burnside theorem, dihedral- quaternion, groups of auto morphisms on finite and infinite cyclic groups.

**Math.382 Real Analysis (1):**

This course introduces basic properties of the field of real numbers , completeness axiom , series and their convergence , monotone sequence , Bolzano-Weirstrass theorem , Cauchy criterion, basic topological properties of the real numbers, limit of a function , continuous functions and their properties . Uniform continuity , compact sets and its properties. The derivative of a function ,mean value theorem and Lupital rule and Taylor theorem.

**Level 7**

**Math.444 Ring and Fields:**

Students study rings, group of units, group of auto morphisms of a ring , ideals and factor rings and principal ring. They also study prime and maximal ideals, field of quotient of integral domain, characteristic of a ring, direct sum of rings, modules, Euclidean rings, ring of polynomials, roots of polynomials over a field, fields extensions, finite and simple extensions of fields, algebraic closure of a field, splitting fields and finite fields.

**Math.471 Introduction to Topology:**

This course introduces topological spaces, examples, closure of a set, derived set, topological subspaces, bases ,finite product topology, sub-bases, metric spaces, examples, metrizability, continuous functions, characterization of continuous functions on topological and metric spaces, homeomorphisms and examples. Topological property, compact spaces, examples , limit point and sequentially compact spaces.

**Math.483 Real Analysis (2):**

This course studies definition of Riemann integral, Darboux theorem , Riemann sums , properties and the principle theorem in calculus. Series of functions, point twice convergence , uniform convergence, algebra
and σ – algebra (sigma algebra), finite additivity and countable additivity, main extension theorem and outer measure. Measurable sets , measure , Lebesgue measure and its properties,

simple functions, measurable functions, Lebesgue integral, theorems of convergence, the relation between Lebesgue and Riemann integral.

**Math.499 Project:**

A student prepares a research project in one of the Math. topics under the supervision of the staff.
The student should submit a report for an oral exam.

**Level 8**

**Math.422 Introduction to partial differential equations:**

This course discusses classification and formation of partial differential equation , first order linear partial differential equation , solution
using Lagrange's method , Cauchy problem , second order linear partial differential equation in several variables , physical application using separation of variables , classifications of partial differential equation , some boundary value problems and Green's function.

**Math.472 Introduction to differential geometry:**

This course discusses theory of curves in $R^3$, regular curves , arc length and reparameterization , natural parameterization, Serret-Frenet apparatus, existence and uniqueness theorem for space curves, Bertrand curves. Involutes and evolutes, local theory of surfaces, simple surfaces, coordinate transformations, tangent vectors & tangent spaces . First and second fundamental forms, normal and geodesic curvature , Weingarten map, principal Gaussian and mean curvatures, geodesics, equations of Gauss and Godazzi-Mainardi.

**Math.484 Complex Analysis:**

This course discusses complex numbers, Cartesian and polar representation of complex numbers, powers and roots of complex numbers, limits and continuity of complex functions, analytic functions , Cauchy-Riemann equations. Harmonic functions, exponential, trigonometric , hyperbolic functions and logarithmic functions. Complex integration, contour integral , Cauchy's theorem, Cauchy's integral
Formula, bounds on analytic functions ,Taylor and Laurent series, power series, zeros and singularities. Residue theory and applications to real and improper integrals.

**BA Degree Program : Physics**

The first year for these program is the preparatory year of natural Science

**Level 1**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 101** | Language Skills | 2 | - |
| **CHEM101** | General Chemistry (1) | 4 | - |
| **ENG101** | English Language | 3 | - |
| **IC101** | Introduction to Islamic Culture | 2 | - |
| **MATH101** | Calculus (1) | 4 | - |
| **PSY101** | Thinking Skills | 2 | - |
| **Total** | 17 | | |

**Level 2**

| Course | Course Title | Credit | Pre- |
|---|---|---|---|

| Code | | | Course |
|---|---|---|---|
| **ARAB 103** | Arabic Editing | 2 | - |
| **CSC101** | Introduction to Computers and Programming | 3 | - |
| **ENG103** | English Language (2) | 3 | ENG101 |
| **IC102** | Islamic and Society Building | 2 | IC101 |
| **PHYS101** | General Physics (1) | 4 | - |
| **STAT101** | Statistical Probability | 3 | - |
| **Total** | 17 | | |

**Level 3**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC103** | Economic System in Islam | 2 | IC101 |
| **MATH201** | Calculus for Science (2) | 3 | MATH101 |
| **PHYS243** | General Physics (2) | 4 | PHYS101 |
| **PHYS211** | Classical Mechanics (1) | 3 | MATH101 PHYS101 |
| **PHYS231** | Vibrations and Waves | 2 | MATH101 PHYS101 |
| **PHYS243** | Thermodynamics | 3 | PHYS101 |
| **Total** | 17 | | |

**Level 4**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **MATH205** | Calculus for Physics (3) | 3 | MATH201 |
| **PHYS232** | Physical Optics | 3 | Phys231 |
| **PHYS234** | Health Physics | 2 | - |
| **PHYS203** | Mathematical Physics (1) | 3 | MATH201 |
| **PHYS212** | Classical Mechanics (2) | 3 | PHYS211 |
| **PHYS221** | Electromagnetism (1) | 3 | PHYS202 |
| **Total** | 17 | | |

**Level 5**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **BUS103** | Communication Skills | 2 | - |
| **MATH210** | Differential Equations | 3 | MATH205 |
| **PHYS302** | Mathematical Physics (2) | 3 | PHYS203 |
| **PHYS321** | Electromagnetism (2) | 3 | PHYS212 |
| **PHYS351** | Modern Physics | 3 | PHYS232 |
| **PHYS393** | Optics Physics | 3 | PHYS232 |
| **BIO314** | Healthy Culture | 2 | - |
| **Total** | 18 | | |

**Level 6**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC104** | Political System in Islam | 2 | IC101 |
| **PHYS303** | Mathematical Physics (3) | 3 | PHYS30 |
| **PHYS350** | Quantum Mechanics (1) | 3 | PHYS212<br>PHYS351 |
| **PHYS391** | Electromagnetism Lab | 2 | PHYS221 |
| **PHYS393** | Modern Physics Lab | 2 | PHYS351 |
| **PHYS342** | Statistical Physics | 3 | PHYS243 |
| **PQUR126** | Islamic Morals | 2 | |
| **Total** | 17 | | |

**Level 7**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS422** | Electronics | 4 | PHYS243 |
| **PHYS452** | Quantum Mechanics (2) | 3 | PHYS350 |
| **PHYS471** | Solid State Physics (1) | 3 | PHYS350 |
| **PHYS481** | Nuclear Physics (1) | 3 | PHYS351 |
| | Selective Course (Faculty) | 2 | - |
| **Total** | 16 | | |

**Level 8**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS455** | Molecular and Atomic Spectra | 3 | PHYS452 |
| **PHYS495** | Solid State Lab | 2 | PHYS471 |
| **PHYS497** | Nuclear Physics Lab | 2 | PHYS481 |
| **PHYS498** | Project | 2 | PHYS497<br>PHYS495 |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course | 2 | - |
| **Total** | 17 | | |

## Course Description:

**CHEM 10 : General Chemistry**

Theoretical part : Chemical calculations, gasea, liquid state, thermochemistry, solutions, chemical kinetics, chemical and ionic equilibria Bohr Theory and electronic configuration of atoms and periodic table . An Introduction to types of chemical bonds .

Practical part : some experiments on properties of matter : density , viscosity, qualitative

analysis : identification of acidic and basic radicals for inorganic salts .

**Course Number : CSC 101 Introductions to Computer and Programing**

Credit Hours ( lecture and Lab ) : 3 (2+ 1) Level : Second

Theoretical parts : Introduction to programming , structured program development, program control, functions, array. Assignments in algorithm design and translation of algorithms in high level language like C language

Practical part: Excercices on the theoretical part.

**Course Number :** ENG **101 - English Language**

The course aims to introduce students to :

An awarenss of the basics of the English language in general .

An understanding of the basics of English grammar .

The basics of English pronunciation.

Specialized academic topics in the students, respective disciplines.

Proposed Teaching Methods

The course will be conducted via lectures in the main seminar, workshops and group discussions will also be used .

**Course Number : Math 101 - Calculus -1**

Real number and real line – Inequality. Function – The graph of a function- even and odd functions- composite of functions- Review of Trigonometric functions – inverse functions- Limits – The definition of a limit – Properties of Limits- Techniques for Evaluaring Limits – Infinites Limits. Continuity at a point on an open interval - one sided limits and continuity on a closed interval – Properties of continuity . The Derivative of a function – Differentiability and continuity – chain Rule – Derivatives of Trigonometric function – Logarithmic and Exponential functios ( Differentiation ) - Hyperbolic functions – inverse Trigonometric functions Differentiation . Exterma on an interval- Rolle,s Theorem and mean value theorem – Increasing and Decreasing functions and the first derivative test – concavity and second derivative test- related rates .

**PHYS 101 General Physics (1) (3 + 1) h.**

Theoretical part: Physics and measurements, Units and dimensions, Dynamics of particle in one dimension (displacement, average velocity, instantaneous velocity, acceleration, free fall), vector algebra and geometry, Motion in two dimensions, Projectile motion, Uniform circular motion, Tangential and radial accelerations, Newton's first law and inertial frames, Mass and weight, Newton's second law, Newton's third law, Friction, Work and energy, Vector scalar products, Work of variable forces, Kinetic energy and work-energy theorem, Conservative and non-conservative forces and potential energy, Power, Conservation of mechanical energy, The conservation law of linear momentum, Impulse, Collisions, Collision in one and two dimensions, Rotational motion with constant angular acceleration, Angular quantities, Moment of inertia, Torque and angular momentum, Work of rotational motion, Properties of matter: Elasticity, Stress, Strain, Modulus's, Strain energy, Fluid mechanics: Density and relative density, the concept of pressure, Pascal law, Archimedes principle, Fluid flow, Bernoulli's equation and its applications. State of matters, heat and Temperature and zero law of thermodynamics, Phase transitions, Latent heats, Ideal gases.

Practical part: Error and measurements, Force table, Hook’s Law, Free fall, Projectile motion, Boyle’s Law, Young’s Modulus, Specific Heat of a Solid, Coefficient of Thermal expansion, Surface tension in capillary tube, viscosity, Newton's law of cooling, Determination of the Paraffin wax fusion temperature.

**PHYS 202 General Physics (2) (3 + 1) h.**

Theoretical part: Electric Charge, Insulators and conductors, Coulomb's law, Point charge, The electric field, Electric field of multiple point charges, The electric field of continuous charge distribution, examples of various shapes (disks, rings, spheres, planes), The parallel plate capacitor, Electric dipole, motion of point charge and electric dipole in electric field, Electric flux, Gauss's law, Applications of Gauss's law, Conductor in electrostatic equilibrium, Electric potential, The potential of point charges, The potential of dipole, The electric potential of many charges, Capacitance and capacitors, Energy stored in a capacitor, Fundamental circuits, The electric current, Batteries, current density, Conductivity and resistivity, Ohm's law, Series resistors, Parallel resistors, Kirchhoff's laws, RC circuits, Magnetism and magnetic force, source of magnetic fields, Magnetic field of a current, Magnetic dipoles, Ampere's law and solenoids, The magnetic force on a moving charge, The magnetic force on a current-carrying wire, Forces and torques on current loops, Induced current, Motional emf, Magnetic flux, Lenz's law, Faraday's law, Induced fields and EM waves, Inductors, LC circuits, LR circuits, AC circuits and phase, Capacitors in AC circuits, RC filter circuits, Inductor circuits, The RLC circuits, Power in AC circuits, Wave phenomena, geometrical optics, speed of light, Longitudinal and transverse waves, Sound, The nature of light and the laws of geometric optics, reflection and refraction, Fermat's principle, Snell's law, Image formation.

Practical part: Verification of Ohm's Law, Metric bridge, Charge and discharge of capacitors, Inductive Reactance, Capacitive Reactance, RCL circuits, Transformers, Speed of sound in air , Refractive Index of a Prism, Focal length of Lenses, Focal Length of Mirrors.

**PHYS 211 Classical Mechanics (1) (3 + 0) h.**

Space time, Review of Newton's law and conservation of linear momentum in Cartesian and polar coordinate system, applications on projectile motion in a linear air resistance medium, Quadratic air resistance. Motion of charges in a uniform magnetic field, The center of mass, angular momentum of several particles, Kinetic energy and work, Potential energy and conservative forces, Gradient relation, Time dependent potential energy, Energy for one dimensional linear system, Curvilinear one-dimensional systems, Central forces, The energy of interaction of two particles, The energy of multi-particle systems, CM and relative coordinates, The equation of the orbit, Kepler orbits, The unbound Kepler orbits, Change of orbits, Mechanics in non inertial frames, The tides, Rotating frames and angular velocity vector. Newton's second law in rotating frame, The centrifugal force, Coriolis force, Coriolis force and

free fall, The Foucault pendulum, Coriolis acceleration.

**PHYS 231 Vibration and Waves (2 +0) h.**

Periodic motion, Simple harmonic oscillation, Damped oscillation, Forced oscillation, Application of damped and forced oscillations, Superposition of simple harmonic oscillations, traveling waves, standing, Beats, Transverse wave in wires, Longitudinal wave in rods, Application of longitudinal wave in open and closed air columns, Fourier analysis, Doppler effect.

**PHYS 243 Thermodynamics (3 + 0) h.**

Fundamental concept in heat and thermodynamics, Thermal Equilibrium and zeroth law of thermodynamics, Ideal gases, Kinetic theory of gases, First law of thermodynamic, Application of first law of thermodynamic, isothermal and adiabatic processes. Irreversible process and reversible processes, Carrnot cycle, Otto cycle-cleapeyron latent heat equation, Second law of thermodynamic, Heat Engines, Refrigerators, Entropy, Thermodynamic functions, Maxwell relations, Third law of thermodynamic, Phase change, Applications on thermodynamic laws.

**PHYS 203 Mathematical Physics I (3 + 0) h.**

Determinants, Matrices, Solving linear equations and differential equations by matrices, Application on the motion of the rotation of the

rigid body, Vector Algebra: Vector products, Position, Displacement, Vector transformation, Gradient, The Divergence, The Curl, Laplace operator, Line, Surface, and Volume Integrals, Gauss theorem, Stock's theorem, Green's theorem, Spherical polar coordinates, Cylindrical coordinates.

**PHYS 212 Classical Mechanics II (3 + 0) h.**

Calculus of variations, The Euler-Lagrange equation and applications, Lagrange's equations for Unconstrained motion, Constrained systems, Generalized momenta and Ignorable coordinates, Lagrange multipliers and constraint forces, Rotational motion of rigid body, The inertial tensor, Principal axes of Inertia, Precession of a top by weak torque, Euler's equations, Euler's angles, Coupled oscillations and normal modes, The double pendulum, Three coupled pendulum, Hamiltonian mechanics for one dimensional systems, Hamiltonian mechanics in several dimensions, Ignorable
coordinates, Phase space orbits, Liouville's Theorem.

**PHYS 221 Electromagnetism I (3 + 0) h.**

Review of vector Operations and algebra, Linear and rotational transformation of vectors, Vector field, Review of vector differential calculus: (gradient, the divergence, the curl, product rules of algebra , Second Derivatives,), Review of integral Calculus: (linear, surface, and volume integrals of vector functions), The fundamental theorem for: (calculus, gradient, divergence, curl), Curvilinear Coordinates: (spherical polar and cylindrical coordinates), The Dirac delta function in one and three dimension, The divergence of reciprocal square of radial distance, The Helmholtz theorem, Coulomb's law, The electric field, Continuous charge distributions, Divergence and curl of electrostatic field, Field lines and flux, Gauss's law and its applications, Electric potential, The potential of a localized charge distribution, The work done to move a charge, The energy of a point charge distribution, The energy of a continuous charge distribution, Properties of conductors and induced charges, Surface charge and the force on a conductor, Capacitors, Poisson's equation, Laplace's equation in one, two and three dimensions, Boundary conditions and uniqueness theorems, Conductors and the second uniqueness theorem, The Method of images and induced surface charge and calculating force and energy, Multipole expansion and approximate potentials at large distances, The monopole and dipole terms, The electric field of a dipole, Polarization, Field of a polarized object, Induced dipole and dielectrics, Polar molecules, Bound charges, The field inside a dielectric and the electric displacement, Gauss's law in the presence of dielectrics, Boundary conditions, Linear Dielectrics: (susceptibility, permittivity, dielectric constant), Boundary value problems with linear dielectrics, Force and energy in dielectric systems, Magnetostatics and the Lorentz law , Magnetic fields and magnetic forces, The Biot-Savart law, The magnetic field of a steady current, The divergence and curl of the magnetic field, Ampere's law and its applications, Magnetic vector potential, Magnetostatic boundary conditions, Multipole expansion of the vector potential, Magnetic fields in matter and the magnetization, Magnetic materials: (diamagnets, paramagnets, ferromagnets), Torques and forces on magnetic dipoles, Effect of magnetic field on atomic orbits, The field of a magnetized object, Bound currents, The magnetic field inside matter and the auxiliary field, Ampere's law in magnetized materials, Boundary Conditions, Linear and nonlinear media, Magnetic susceptibility and permeability, Ferromagnetism.

**PHYS 232 Physical Optics (3 + 0) h.**

The nature of light , The superposition of waves, Interference of two-beams of light (division of the wave front & division of amplitude) Interferometers( Young , Fresnel's biprism , loyed mirror, Fresnel's double mirrors , wedge interferometer , Newton rings , Michelson

interferometer , Jamin & Mach-Zehnder refractometers ), Interference of multiple beams , Fabry-Perot interferometer , Applications of interferometry, Diffraction , Fraunhofer diffraction (single slit, two slits, multiple slits) – diffraction grating - Fresnel diffraction (circular aperture & circular Obstacle ), Polarization - polarization by absorption , reflection , refraction & double refraction, Optical active materials & polarometer .Interference of polarized light , Analysis of polarized light , Electro-optics (Kerr effect & Pockels effect ) , Magneto- optics (Faraday effect).

**PHYS 302 Mathematical Physics II (3 + 0) h.**

Complex numbers, Analytic functions, Limits and Continuity, Analyticity, The Cauchy, Riemann Equations, Elementary Functions, Complex Integration, Contoursm, Independence of path- Cauchy integral theorem- Bounds for analytic Functions, Series representations for analytic functions, Residue Theory, Conformal Mapping, Invariance of Laplace's Equation, Geometric Considerations, Bilinear Transformations, The Schwartz, Christoffel Transformations.

**PHYS 321 Electromagnetism II (3+0) h.**

Electromotive force, Ohm's law, Motional electromotive force, Electromagnetic induction, Faraday's law, The induced electric field, Inductance, Energy stored in magnetic fields, The modified Ampere's law, Maxwell's equations in vacuum, Maxwell's equations in matter, Boundary conditions, Conservation laws and the continuity equation, Poynting's theorem, Newton's third law in electrodynamics and momentum, Maxwell's stress tensor, Conservation of momentum, Angular momentum, Electromagnetic waves in one dimension, The wave equation, Sinusoidal waves, Boundary conditions: reflection and transmission, Polarization, Electromagnetic waves in vacuum, Monochromatic plane waves, Energy and momentum in electromagnetic waves, Electromagnetic waves in matter, Propagation in linear media, Reflection and transmission at normal incidence, Reflection and transmission at oblique incidence, Absorption and dispersion, Electromagnetic waves in conductors, Reflection at a conducting surface, The frequency dependence of permittivity, Guided waves and wave guides, TE waves in a rectangular wave guide, The coaxial transmission lines, Electric dipole radiation, Magnetic dipole radiation, Radiation from an arbitrary source, Power radiated by a point charge, Radiation reaction with matter.

**PHYS 351 Modern Physics (3 + 0) h.**

Special Theory of Relativity: wave propagation, Michelson Morley experiment, Galilean transformation, Lorentz transformations, Relative velocity, Lorentz contraction, Time Dilation, relativity of mass, Mass and energy, Applications, The particle like properties of Electromagnetic radiation: Electromagnetic waves, The photoelectric effect, black body radition, The Compton Effect, X-rays Waves like properties of particles: De-Broglie hypothesis, Electron diffraction experiment of Davison and Germer, Electron microscope, Uncertainity principle, quantum theory, Atomic Structure: atomic properties, The Thomson model, Rutherford Model for atomic nuclei, alpha particle scattering, Atomic Spectra, Bohr theory of the hydrogen atom, Sommerfeld’s Model, Failure of the Bohr theory Frank-Hertz experiment, The basic ideas of the Quantum Mechanics.

**PHYS 393 Optics Lab (0 + 2) h.**

Prism spectrometer (refractive index and dispersion), Grating spectrometer, Fresnel's biprism with He-Ne laser, Fresnel's double mirrors with He-Ne laser, Newton's rings, Michelson interferometer, Mach-Zehnder-interferometer, Diffraction at a single slit, Diffraction at double slits, Diffraction at one-and two dimensional gratings, Diffraction at a single slit measuring and evaluating with Video Com, Polarimter and optical activity, Abbe's refractometer, Inverse square law of light

radiation and absorption coefficient of glass or plastic materials, Polarization of light.

**PHYS 303 Mathematical Physics III (3+0) h.**

Series Method for solving linear differential equations, Fuch’s theorem, Second solution, Legendre polynomials, Hermite polynomials, Lagurre polynomials, Bessel Functions, Fourier transformation and its application, Laplace transformation and its application, Eigenvalue problem, Differentional equations of Boundary value problem.

**PHYS 342 Statistical Physics (3 + 0) h.**

Probability, One random variable, Some important probability distributions, Many random variables, Sums of random variables and the central limit theorem, Rules for large numbers, entropy, Kinetic theory of gases, Maxwell’s distribution of the velocities of gas molecules and its applications, Distribution function of the energy of molecules, Liouville's theorem, Equilibrium properties, The microcanonical ensemble, Two-level systems, The ideal gas, Mixing entropy and the Gibbs paradox, The canonical ensemble, Canonical examples, The Gibbs canonical ensemblem, The grand canonical ensemble, Quantum statistical mechanics, Maxwell-Boltzmann distribution, Bose Einstein distribution, Fermi-Dirac distribution, Vibrations of a solid, Black-body radiation, Quantum microstates, Quantum macrostates, Ideal quantum gases, Hilbert space of identical particles, Canonical formulation, Grand canonical formulation, The degenerate fermi gas, The degenerate bose gas.

**PHYS 352 Quantum Mechanics (3 + 0) h.**

Reviews of the fundamental experiments in modern physics, the need for quantum mechanics. Wave packet and uncertainty principle, Schrödinger equation for free particle, Continuity relation, The dynamical variables and calculating the expectation values, Schrödinger equation with a potential in one dimension, Dynamical variables and calculating the expectation values in momentum space, Commutation relations, Hermitian operators, Linear operators, Completeness relation and orthonormality, Schrödinger equation in three dimensions, The fundamental postulates of quantum mechanics, Particle in an infinite well, Spectral expansion theory, The parity, Constants of motion and conservation laws, Momentum eigen functions and free body, One-dimensional potentials:(The potential step, The finite potential well at scattering and bound states, The potential barrier, The delta function potential at Scattering and Bound states, Simple harmonic oscillator, Oscillator eigen functions and eigen values, Ladder operators and dynamical variables, Schrödinger equation in three dimensions in Cartesian coordinates, Schrödinger equation in three dimension curvilinear coordinate system, Angular momentum and its eigen functions and eigen values, The addition of angular momentum, The central potentials.

**PHYS 392 Electromagnetism Lab (0 + 2) h.**

Measurement of e/m of the electron, Verification of Biot - Savart law , Verification of Faraday's law, Transformers , Measuring the force on current carrying conductors in a homogenous magnetic fields, RLC circuits, Generators, Motors, Transformers, Magnetic moment of magnetized rod, Helmholtz coils, Magnetic induction.

**PHYS 395 Modern Physics lab (0 + 2) h.**

Characteristics of microwaves, Franck- Hertz experiment, Stefan-Boltzmann law for heat radiation, Determination of Planck's constant by means of the photoelectric effect using the compact arrangement, Faraday effect, Fabry – Perot interferometer, Kerr effect, The Balmer series of hydrogen and determination of Rydbergs constant, Pockels effect, Zeeman effect.

**PHYS 422 Electronics (3 + 1) h.**

Theoretical part: Analog Electronics: The P-N junction diode and Zener diode with their applications Junction Field effect transistor - Bipolar junction transistor (Bias and amplifiers: JFET & BJT) – Differential and Operational Amplifiers, Introduction to Feedback Circuits, Multivibrators and Oscillators, Digital Electronics: Binary and Hexadecimal System, Logic Gates, Karnaugh Maps, Flip Flops, Shift Registers, Counters, Memories. Practical part: P-N junction application (half-wave rectifier, full-wave rectifier, clampers and limiters, Zener regulation) - Transistors JFET & BJT amplifiers. Amplifiers with 741(Inverting & Non inverting Amplifiers, Active Filters, Wien Oscillator, Astable Multivibrator). Half and Full Adder (7483), Flip Flop (7474-7476), Shift Register (7495-74194), Counters (7493-74193).

**PHYS 452 Quantum Mechanics II (3 + 0) h.**

Dirac notation, Vector space algebra and Hilbert space, Rephrasing wave mechanics and operator methods in abstract view, Angular momentum commutation relations, Raising and lowering operators for angular momentum, Expansion theory in abstract view, Matrix representation of angular momentum operators, General relations in matrix mechanics, Eigen states of spin ½, The intrinsic magnetic moment of spin ½ particles, Addition of two spins, Addition of Spin ½ and orbital angular momentum, Time independent perturbation theory and energy shifts, Degenerate perturbation theory, The Stark effect, Hyperfined splitting, Variational principle and its applications, The WKB approximation, Time-dependent perturbation theory, The interaction of charged particle with electromagnetic field, Two level-system, emission and absorption of radiations, spontaneous emission, Transition rate, selection rule, scattering theory, Partial wave analysis, The Born approximation.

**PHYS 471 Solid State Physics I (3 + 0) h.**

Different states of matter, classification of solids, crystal structure (Bravais lattices & Miller indices), methods of determination of crystal structure (X-ray diffraction, electron and neutron diffraction), crystal defects, crystal binding (interatomic forces, types crystal bonds), Methods of crystal growth, lattice dynamics (crystal vibration modes and phonons), thermal properties of insulators (specific heat of insulators: classical model, Einstein's model, Debye model,-thermal conductivity of insulators), Dependence of thermal conductivity on temperature, Free electron theory (classical model of free electron, Fermi gas of free electrons, Maxwell-Boltzmann distribution, Fermi-Dirac distribution function), band theory (zone theory and tight binding theory).

**PHYS 481 Nuclear Physics I (3 + 0) h.**

Properties of the nucleus: determination of nuclear charge, radius and mass, Nuclear binding energy, Natural Radioactivity: Decay law, Nuclear stability, Radioactivity and theory of transformation .Artificial Radioactivity: Discovery of artificial radionuclides, Transuranium elements, Interaction of radiation with matter: Interaction of heavy elements, interaction of light electrons, interaction of gamma rays with matter, interaction of neutrons with matter, Radiation Detectors: Gas detectors, Scintillation detectors, solid state detectors, Nuclear Reactions: Reactions of matter by gamma rays, reactions by alpha particles, reactions by protons, reactions by neutrons, Nuclear fission: Discovery of Nuclear fission, theory of Nuclear fission, Nuclear fusion: Energy production in stars, control of thermonuclear reactions.

**PHYS 455 Molecular and Atomic Spectra (3 + 0) h.**

Introduction: Comparing between atomic emission spectroscopy and atomic absorption spectroscopy; Optical spectroscopy, Atomic spectrum, Quantization of hydrogen atom, Atomic emission / absorption spectrophotometry Molecular spectroscopy ,

Spectroscopy of inner electrons. Zeemen's effect, Sodium spectrum, Effect of magnetic field on the energy levels of atom. Theory of magnetic energy, Anomalous Zeeman's effect and Lande splitting factor. Molecular Spectra of diatomic molecules, Vibrational energy levels in both classical mechanics and quantum mechanics. Rotational spectra of diatomic molecule in gaseous state and rotational energy levels, Molecular spectra; harmonic Oscillator, Non Rigid Rotator, Infrared Vibration, Rotation spectra, spectrum, IR spectrum, RBS spectra, XRD spectrum, measurements of Absorbance, Transmitting and Reflecting using double beam Spectrophotometers in all ranges of wavelengths (UV-VIS-NIR-IR), Normal modes of vibrations; Natural of infrared absorption, Basic Laser principles, Laser behavior, Properties of laser radiations, Different types of lasers, Laser spectroscopy, The total losses of the laser system, Transmission at the mirrors, Absorption and scattering by the mirrors, Absorption in the laser medium, Diffraction losses at the mirrors, The Ruby Laser, Three Level Laser (Helium-Neon Laser)-Four Level Laser ( Carbon dioxide Laser), Laser applications.

**PHYS 497 Solid State Physics lab (0 + 2) h.**
Studying the characteristics of the solar cell, electron diffraction experiments characteristics curves of an optical (photo) resistor, studying the electron spin resonance (ESR), calculation of the energy gap of germanium by an electrical method determination of the thermal coefficient of resistance of a noble metal (platinum) by computer, the magnetic susceptibility of some materials and its classification, X-ray spectroscopy and calculation of Planck's constant and Miller indices of crystal planes in NaCl single crystal, thermoelectric effect in semiconductors (calculation of Seebeck, Peltier and Thomson coefficients), superconductivity and determination of the transformation temperature TC of YBCO specimen by computer, determination of the absorption coefficient of aluminum for X-ray, Hall effect, studying the crystalline structure by using the field effect microscope.

**PHYS 498 Nuclear Physics Lab (0 + 2) h.**
Statistical nature of Radioactive decay law, Rutherford Scattering, Attenuation of gamma radiation, Absorption of beta radiation passing through different materials, Inverse square law in case of gamma-rays, Determination of the range of beta particles in absorbers by beta gamma source, Backscattering of beta particles, determination of the dead time of GM tube, Effect of a magnetic field on beta particles motion, Assessment of natural radionuclide in NaCl, Compton scattering.

**PHYS 499 Project (2 + 0) h.**
The student carries out a research under the supervision of one of the Staff members in one of the following branches: Theoretical Physics, Nuclear Physics, Solid State Physics, Fiber Optics, Laser, Plasma, Electronics. The student submit a a report about his work, and is evaluated by a committee selected by the department.

## Study Plan of Computer Science:

**Level -3**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC101** | Introduction to Islamic Culture | 2 |
| **Arab101** | Language Skills | 2 |
| **Phys104** | General Physics (2) | 4 |
| **Math105** | Different Calculus | 3 |
| **CEN111** | Logic Design | 4 |
| **CSC152** | Concepts of Algorithms & | 4 |

| | | |
|---|---|---|
| | Computer Programming | |
| | Total | 19 |

**Level-4**

| Course Code | Course Title | Credit |
|---|---|---|
| **Arab103** | Expository Writing | 2 |
| **Math106** | Integral Calculus | 3 |
| **Math109** | Linear Algebra and Analytical Geometry | 3 |
| **IT125** | Database | 4 |
| **CEN126** | Computer Architecture | 3 |
| **CSC153** | Object Oriented Programming | 4 |
| | Total | 19 |

**Level-5**

| Course Code | Course Title | Credit |
|---|---|---|
| **Math203** | Differential and Integral Calculus | 3 |
| **Stat224** | Introduction to Statistics & Probability | 3 |
| **CSC225** | Assembly Language | 3 |
| **CSC244** | Concepts of Algorithms | 3 |
| **CSC276** | Computer Graphics | 4 |
| **CSC283** | Discrete Structures | 4 |
| | Total | 20 |

**Level-6**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC102** | Islamic and Construction of Society | 2 |
| **Math207** | Differential Equations | 3 |
| **CSC214** | Data Structures | 4 |
| **IT224** | Visual Programming | 4 |
| **CSC237** | Programming Language Concepts | 3 |
| **CSC229** | Operating Systems | 4 |
| | Total | 20 |

**Level-7**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN301** | Signals and Systems Analysis | 4 |
| **CEN333** | Microprocessors Systems | 4 |
| **CSC338** | Compiler Design | 3 |
| **CEN345** | Computer Networks | 4 |
| **CSC346** | Software Engineering | 3 |
| | Total | 18 |

**Level-8**

| Course Code | Course Title | Credit |
|---|---|---|

| | | |
|---|---|---|
| **IC103** | The Islamic Economical System | 2 |
| **CSC313** | Algorithms Analysis & Design | 3 |
| **CSC327** | Operations Research and Programming Applications | 3 |
| **CSC357** | Internet Techniques & Web Programming | 3 |
| **CSC392** | Selected Topics in Computer Sciences | 3 |
| **CSC393** | Systems Programming | 3 |
| | Total | 17 |

**Level-9**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC104** | Fundamentals of the Islamic Political System | 2 |
| **CSC414** | Introduction to Unix/Lunix Systems | 3 |
| **IT463** | Knowledge Base Systems Applications | 3 |
| **CSC448** | Optimization Techniques | 3 |
| **IT481** | Communication Skills | 2 |
| **CSC498** | Graduation Project (1) | 2 |
| | Total | 15 |

**Level-10**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC445** | Introduction to Crytopgraphy & Information Security | 3 |
| **IT450** | Multimedia Data Management | 3 |
| **CSC458** | Distributed Systems & Parallel Processing | 3 |
| **CSC463** | Artificial Intelligence | 4 |
| **CSC499** | Graduation Project (2) | 4 |
| | Total | 17 |

## Course Description (Computer Science):

**CEN 111 Logic Design** (4h)

This course discusses the Digital computer and information (numbering systems, Arithmetic operations, Decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, Combinational circuits simplification, CMOS circuits), Combinational logic design (design procedure, decoders, multiplexes, Binary adder and subtracted), Sequential circuits (latches, flip flops, synchronous sequential circuits analysis and design), Analysis and design of synchronous sequential machines, Representation, state reduction and realization; Finite state machines.

**Textbook:** M. Mano, Digital Design, 3rd Ed., 2002.

**IS 125 Database(4h)**

This course discusses the Database definition, Database system, Overview of database management, database system architecture, Introduction to Relational databases, An Introduction to Structured Query Language(SQL), Database Integrity, Views, Normalization, Database design, Practical Applications.

**CEN 126 Computer Architecture (3h)**

This course discusses the Review of logic design principles. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design. System software. Micro-programmed CPU. Comparison between CISC, RISC and VLIW processors. Introduction to memory organization; I/O operations; Introduction to parallel processing techniques.

**CSC 237 Programming Languages Concepts (3h)**

This course discusses the Preliminaries. Evolution of the Major Programming Languages. Describing Syntax and Semantics. Lexical and Syntax Analysis. Names, Binding, Type Checking, and Scopes. Data Types. Expressions and Assignment Statements. Statement-Level Control Structure. Subprograms. Implementing Subprograms. Abstract Data Types. Support for Object-Oriented Programming. Concurrency. Exception Handling and Event Handling. Functional Programming Languages. Logic Programming Languages.

**CSC 283 Discrete Structures (4h)**

**Introduction to Discrete Structures**: This course discusses the algorithmic language. **Logic**: propositions, predicate logic, proofs, mathematical induction. **Sets**: special sets, operations, properties and identities, application of logic to knowledge-based systems. **Relations**: graphical and matrix representations, equivalence and order relations, application to databases **Functions:** types, cardinality, application to functional languages **Undirected Graphs**: Simple graphs, Eulerian paths, Hamiltonian circuits, trees, application to syntax diagrams **Directed Graphs** digraphs, consistent labeling, paths problems, Warshall's algorithm, shortest paths and Dijkstra's algorithm, application to routing in computer networks. **Machines and Computations**: automata as models, finite state automata (FSA) without outputs, FSA as language recognizers and their limits, introduction to Turing Machines, application of FSA to problem-solving.

**CSC 276 Computer Graphics (4h)**

This course discusses the Computer Graphics Applications Survey. **Color models** (chromaticity diagram, RGB, CMY, YIQ, HSV, and HLS color models). **Graphics Output Primitives** (coordinate frames, DDA, Bresenham's algorithm, circle-drawing, fill-area primitives algorithms). **2D Graphics** (2D cartesian coordinates, curves and parametric equations, functions and transformations, inverse functions. **3D Graphics** (vectors in 3D, dot and cross product, homogeneous coordinates, correlation between cartesian and homogeneous coordinates). **Geometric transformations** (2D geometric transformations, matrix representation and homogeneous coordinates, inverse transformations, 2D composite transformations). **Geometric representation** Lagrange polynomials of degree n, Hermite cubic polynomial, Bernstein polynomial, interpolation problem, Spline interpolation, problem of approximation, Bezier-

Bersnstein approximation, Bezier-B-Spline approximation, quadric surfaces.

**CSC 152 Concepts of Algorithms and Computer Programming (4h)**

This course discusses the Problem-solving, algorithmic design, Introduction to Programming, Structured Program Development, Program Control, Functions, Arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.

**IS 224 Visual Programming (3h)**

This course discusses the Selecting a Visual Language, Knowing the concepts and procedures used in Visual Languages, Syntax and semantics of the language used. Types of Data, conditional statements, recursion, data structures, modular programming, review of Object-Oriented Programming concepts and techniques, User Interface Design rules, Materializing an interface into a set of visual objects, File types, File organizing techniques, File usages, Publishing an interface on the web, Basic concepts of Human Computer Interaction, Comparison between the selected language and other visual languages.

**CSC 338 Compiler Design (3h)**

This course discusses the design and implementation of compilers. Compiler organization, algorithms for lexical, syntactic and semantic analysis, top-down and bottom-up parsing (e.g., recursive descent, LL, LR, LALR parsing). Symbol table organization, error detection and recovery, intermediate and object code generation, and code optimization. Student has to implement a compiler for a simple high level language as project.

**CSC 225 Assembly Language (3h)**

This course discusses the Introduction to PC hardware, PC software requirements, assembly language programmers requirements, program logical and control, string operations, arithmetic operations for processing binary data, assembling linking and executing a program.

**CSC 214 Data Structures (4h)**

This course discusses the Functions in C - Structures and pointers - Memory Management functions, Concepts and Definition of abstract data type, Array as ADT, Stack and operations, Queue and operations Linked List and stack as list, Queue as list and applications, Sorting, recursion, Tree Introduction to Graphs, Projects and Exercises.

**CSC 346 Software Engineering (3h)**

This course discusses the Software Engineering Concepts, System Engineering Concepts, Software Process, Analysis Concepts and Principles, Analysis Modeling Design, Real -Time System Design, Software Testing Techniques, Technical Metrics for Software, Project.

**CSC 229 Operating Systems (4h)**

This course discusses the Computer System Structure, Operating System Concepts, Operating System Structure, Procedures, CPU Scheduling, Process Synchronization, Batch Files, Recovery Console, Memory Management, Virtual Memory, File-System Interface, Storage Structure, Data Storage on Disks, File-Systems: Fat,Fat32, NTFS, Distributed Systems, Hardware Protection, The Linux system

**CSC 244 Concepts of Algorithms (3h)**

This course discusses the Growth function and Recurrence, Divide-and-Conquer: (Strassen, Fibonacci, Polynomial Multiplication), Heap Sort, Quick Sort, Bubble Sort, Insertion Sort, Merge Sort, Hash Table, Binary Search Tree, Dynamic Programming, Greedy Algorithms.

**CEN 333 Microprocessor Systems (3h)**

This course discusses the Architecture and Instruction set of different 16 bit microprocessors; Microprocessor chips. **Supporting chips**: Buffers, decoders, system clock generator, reset system. Memory chips and subsystems Interfacing 16-bit Microcomputers. Architecture of Microprocessor based systems, design technique, memory and I/O devices interfacing to the microprocessor, interfacing technique. **I/O techniques**: Interrupts, Direct memory access; **System development and design tools techniques**: hardware and software.

**CSC 153 Object Programming (4h)**

This course discusses the Introduction to Object - Oriented Programming, Program Control Structures, Functions, Arrays, Pointers and Strings, Classes Part I: Classes and data abstraction, Classes Part II: Operator Overloading, Inheritance Virtual Functions and Polymorphism.

**CEN 301 Signals and Systems (4h)**

This course discusses the Time-domain analysis of signals: Mathematical and graphical representation. Classifications. Basic operations. Basic signals. Sampling and aliasing. Time-domain analysis of systems: Block diagram representation. Differential and difference equation representation. Impulse and step responses. Frequency-domain analysis of signals: Spectra of continuous-time and discrete-time signals. Frequency-domain analysis of systems: Frequency response of continuous-time systems: Bode plot, Nyquist plot, feedback and its effects on system stability. Frequency response of discrete-time systems. Laplace transform and its applications. Z-transform and its applications: Relationship with Laplace. Exercises should be solved using MATLAB.

**CEN 345 Computer Networks (4h)**

This course discusses the **Introduction to computer networks**: Network Types, Overview of data transmission, Introduction to network protocols, The Internet protocol. **Network topologies**; Network architecture and the OSI reference model; The physical and Data Link Layer , flow and errors control, ARQ Stop/wait, Sliding window protocols, **DLC standards**: HDLC, PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, Hubs, routers, Ethernet Switches; **Network Layer Services**: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.

**CSC 393 Systems Programming (3h)**

This course discusses the Study of one particular processor, assembly for this processor. Introduction to the assembly language of this processor. Design and implementation of an assembler (translation to machine code). Linkers and loaders: Absolute loaders; Program relocation; Program linking; Data structures; Dynamic loading; Bootstrap loaders. Macro processors: Data structures and logic flow for a simple one-pass macro processor; Concatenation of macro parameters; Generation of labels in macro expansions; Conditional macro expansion; Macro processing within an assembler; General-purpose macro processors. Project.

**CSC392 Selected Topics for Computer science(3h)**

This course discusses the advanced topics in computer sciences are proposed, like: Java Object-Oriented programming, **Object-Oriented Software Engineering,** Application Programs, Operating Systems Design and implementation, Distributed Operating Systems, Distributed Computing, Introduction to Parallel Computing.

**CSC357 Internet Techniques web programming (3h)**

This course discusses the An overview of connecting to and navigating within the Internet system and the World Wide Web: Navigation. Search Engines. Advanced search techniques. Design of web pages using HTML, XML and Java. TCP/IP. Client/Server architectures. Mastering Connectivity. Security.

**CSC 327 Operations Research &Applications programming (3h)**

This course discusses the OR Approach, Methodology And Applications: modeling, constraints, objective and criteria. Problems of multiple criteria optimization, model validation and systems design. Mathematical programming; simulation, gaming; heuristic programming. Examples,: theory of inventory. Production; linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. Theory of games for two-person competitive situations. Project management through PERT-CPM.

**CSC 313 Algorithms Analysis and Design (3h)**

This course discusses the Introduction to Algorithms Analysis and Design, General Algorithms: 1- Greater Common Divisor Algorithm, 2- Smaller Common Multiple Algorithm, 3- Pascal-Triangle Algorithm, 4- Inverse Number Algorithm, 5- Recursive Algorithm), Algorithms And Procedures, Algorithm Analysis: (Algorithm Efficiency, Algorithm Run-time, Algorithm Complexity, Computation Horner Algorithm Complexity Degree, Multiplication Two Polynomials Complexity Degree, Computation Using While Loop Algorithm Complexity Degree), Sorting Algorithms: (Insert Sort Algorithm, Selection Sort Algorithm, Bubble Sort Algorithm, Heap Sort Algorithm, Merge Sort Algorithm, Qsort Algorithm, Files Sorting Algorithms), Searching Algorithms, Backtracking Algorithms: (8-th Queen Problem, Optimal Option Problem).

**CSC 498 Project I (2h)**

Student will study, design and develop an integrated system, and he will be examined at the end of the semester.

**IS 463 Knowledge base systems Application (3h)** This course discusses the Review of first-order logic, relational algebra, and relational calculus. Fundamentals of logic programming. Logic for knowledge representation. Architecture of a knowledge-base system. Fundamentals of deductive databases. Top-down and bottom-up query processing. Some important query processing strategies and their comparison. Project or term paper on current research topics.

**IS 481 Communication skills (3h)**

This course covers written, oral, and interpersonal communication. Students will hand in short pieces of writing each week, will make oral presentations several times in the semester, and will work together in simulated project meetings and other realistic scenarios of pair and small group interaction.

**CSC 448 Optimization Techniques (3h)**

This course discusses the Unconstrained optimization theory. Convex functions and convex sets. Algorithms for unconstrained optimization (Steepest descent Newton methods Conjugate gradient methods). Constrained optimization theory (Kuhn-Tucker conditions). Special problems: (Linear programming Quadratic Programming). Algorithms for constrained optimization. Since this is a course on optimization *techniques* you will need to be able to program with high level programming languages (e.g C/C++, Java, C#).

**CSC 414 introduction to Unix and Linux (3h)**

This course discusses the User/kernel interface, fundamental concepts of Unix, user authentication, basic and advanced I/O, file system, signals, process relationships, and inter-process communication. Fundamental

development and debugging tools such as "make" and "gdb" will also be covered.

**IS 491 Multimedia Data Management (3h)**

This course discusses the Significance and value of multimedia for a variety of end users. Multimedia data storage. Use of multimedia hardware for capture and management of sound, graphics and video. Multimedia development tools programming, scripting and design skills. Use of multimedia authoring tools for producing multimedia applications

**CS 463 Artificial Intelligence (4h)**

Introduction & Definitions. Agent and examples. Uninformed Search. Heuristic Search. Constrained Search Problems CSP). Logical agents. First Order Logic and examples Machine Learning. Project.

**CSC 458 Distributed Systems and Parallel (3h)**

This course discusses the Introduction to distributed systems, processes and processors, parallel architecture (multi-computers, multi-processors), communication in parallel systems, performance of parallel systems, examples of parallel programming, introduction to distributed systems, distributed algorithms, types of distributed systems, compatibility of distributed systems and discovery of the end of processes.

**CSC 445 Introduction to Cryptography and information security (3h)**

This course discusses the Basic concepts of cryptography and secure data: Overview of Cryptography and information security, Mathematical Overview, Shannon and cryptography, Transposition, Substitution Ciphers, Rotor Machine and Poly alphabetic Ciphers, Block Ciphers: symmetric key systems, DES, AES, Public Key Systems, Knapsack System, RSA System, Key Management, Digital Signatures and Authentication, Stream Ciphers, Linear Shift Registers, Non-Linear Shift Registers, Watermarking and Steganography, Applications.

**CSC 499 Project II (4h)**

Student will study, design and develop an integrated system. Examination to be held at the end of the semester.

# College for Science & Arts Bukaieria

## Vision:

A distinctive college educationally, supportive of the continuous learning and community service, qualified for academic accreditation.

## Mission:

Through its educational career the college is committed to provide the students with the best educational opportunities, the necessary skills in addition to the values and behaviors to graduate students who have the ability to deal with the new technology in order to compete in the labor market and pursue graduate studies and scientific research in order to contribute in community development and face the national needs by its developed programs.

## Aims:

1-The Development of the professional performance of faculty members to keep up with the imaginative ways of teaching in the field of education and scientific research and using of the modern methods of copying with global standards.

2-Application of a variety of academic programs according to the quality specifications capable of development of society and proportionate to the needs of labor market.

3-Providing conducive environment for academic excellence.

4-providing the students with the skills necessary for using modern technology and its applications, then qualifying them to pursue their graduate studies and scientific research.

5-Avalability of graduate studies programs in different specializations of the college.

6-Providing training and academic programs to the local community .

7-Providing the graduators with continuous programs which suit the labor market.

8-Availability of good qualified experts of citizens who are qualified scientifically according to the improvement plans of the kingdom.

9-Graduation of students whose high qualification of using new technologies in their majors and capable to compete the students of other universities and capable of pursue of graduate studies and strongly entering the labor market.

10-The cooperation with the governmental and private sectors to benefit of the opportunities and minimizes the threatens.

## About:

The college has three programs in Science stream:

1- Computer

2- Mathematics

3- Physics

In addition to preparatory year and the preparatory year natural Science and intensive course .

All sections cooperate to prepare students in a distinctive academic preparation in the above specializations through the academic programs which suite the new sciences in all majors, also improve their skills of communication and thinking which are very beneficial in their career and competition in labour market.

## Degrees:

- Bachelor

**Faculty Members:**

1. Prof. Magdy Ahmed Ezzat
   PhD
2. Ahlam Abraham Al-Sayed
   PhD . Associate Prof.
3. Farag Elsayed Ragheb Mandour
   PhD . Associate Prof.
4. Rasheda Mohammed Abu Elnasr
   PhD. Associate Prof.
5. Sahar Ramadan Abdel Hady
   PhD. Associate Prof.
6. Samia Hassan Ashmawy
   PhD Assistant Prof.
7. Manal Elsayed Ahmed
   PhD Assistant Prof.
8. Ayman Abd Elkhalek Flfla
   PhD Assistant Prof.
9. Hager Mohammed Said El-Tohamy
   PhD Assistant Prof.
10. Azzah Ahmed A/Hameed
    PhD. Assistant Prof.
11. Aminah Mohammed Ali
    PhD. Assistant Prof.
12. Manal A/Allah Ahmed
    PhD. Assistant Prof.
13. Ahmed Mohammed Ahmed
    PhD. Assistant Prof.
14. Afaf Mohamed Mohamed Eltou
    PhD. Assistant Prof.
15. Moataza Abd Elfattah Mohamed
    PhD. Assistant Prof.
16. Sadia Ali Hessein Mohamed
    PhD. Assistant Prof.
17. Eman Mohamed Ellaithy Mahros
    PhD . Assistant Prof.
18. Maha Abdel Salam ELkhamisy
    PhD . Assistant Prof.
19. Sumiah Al-Tahir AL- Ghadi
    PhD. Assistant Prof.
20. Bahia Abed Al-Majeed Badran
    PhD . Assistant Prof.
21. Nasr Abdelmohdy Meawad
    PhD . Assistant Prof.
22. Hamedah Abdullah Mohammed
    PhD . Assistant Prof.
23. Thuria Hassan Mahmoud Eldok
    PhD. Assistant Prof.
24. Rehab Mostafa Mohammed Elabd
    PhD. Assistant Prof.
25. Kamel Mohamed Gahen
    PhD. Assistant Prof.
26. Imad Ali Jum'a
    PhD. Assistant Prof.
27. Mona Mohammed Abbas.
    PhD. Assistant Prof.
28. Nagah Rahoma Ahmed
    PhD. Assistant Prof.
29. Samah Mansi Hassan Hassan
    PhD. Assistant Prof.
30. Ebtisam Abed Al-Adheem
    PhD. Assistant Prof.
31. Hanan Nabeeh Abd Elgawad
    PhD. Assistant Prof.
32. Safaa A/Sabor A/Wahab
    PhD. Assistant Prof.
33. Huda Helmi Al-Jundi
    PhD. Assistant Prof.
34. Monera Mohamed alabd allah
    M.Sc. Lecturer
35. Farezah Youssef Mahmoud Yonis
    M.Sc. Lecturer
36. Heba Fahmy Elghazaly
    M.Sc. Lecturer

37. Hanan Mohamed Hanafi
M.Sc. Lecturer
38. Shahera Babiker Mohamed
M.Sc. Lecturer
39. Dalal Salem Ayed Almotiri
M.Sc. Lecturer
40. Fouzah sayah Al-Shammry
M.Sc. Lecturer
41. Ahlam Rashed Al-Motery
M.Sc. Lecturer
42. Hoda Bauomy
M.Sc. Lecturer
43. Rnad Muhammad
M .Sc. Lecturer
44. Nahla Al-sayed
M.Sc. Lecturer
45. Mervat Sobhy Mokhtar
M.Sc. Lecturer
46. Hanan Mukhtar al Gadir
M.Sc. Lecturer
47. Mayyada Shikh Othman
M.Sc. Lecturer
48. Amal Hayder Abdullah
M.Sc. Lecturer
49. Abeer Mohamed Abdel moniem
M.Sc. Lecturer
50. Marwa Mostafa Mohie El-Din
M.Sc. Lecturer
51. Shereen Magdy Ezzat
M.Sc. Lecturer
52. Sulafa Ali Ibrahim.
M.Sc. Lecturer
53. Mohammed Sayeed Khan.
M.Sc. Lecturer
54. Akhuwat Shafi Khan.
M.Sc. Lecturer
55. Wafaa Zaki Shareef Suliman
M.Sc. Lecturer
56. Rogeia Fireeh Oglla Al-Oglla
M.Sc. Lecturer
57. Nagla Mohamed al-oriny
BSC. Instructor
58. Reham AL-Thunyan
BSC. Instructor
59. Wafa AL-Twayan
BSC. Instructor
60. Hana Hunidel Al Jammaz
BSC. Instructor
61. Moudy Youssif Al kharraz
BSC. Instructor
62. Azarey Saud Al Mutairi
BSC. Instructor
63. Arwa Abdul-Aziz Al-Freah.
BSC. Instructor
64. Hanan Saleh Al-Khuder.
BSC. Instructor
65. Maha Ibrahim Al-Noshan.
BSC. Instructor
66. Naeemah Jawan Al-Rasheedi.
BSC. Instructor
67. Emtinan A/Aziz AL-Rojh i
BSC. Instructor
68. Rabab A/Allah AL-Dekhil
BSC Instructor

**Programs:**

1- Arabic Language and Literature

2- Mathematics

3- Physics

4- English Language & Translation

5- Computer

## First program:

BA Degree Program: **Computer sciences**
**Level 3**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC101** | Introduction to Islamic Culture | 2 |
| **Arab101** | Language Skills | 2 |
| **Phys104** | General Physics (2) | 4 |
| **Math105** | Differential Calculus | 3 |

| | | |
|---|---|---|
| **CEN111** | Logic Design | 4 |
| **CSC152** | Concepts of Algorithms & Computer Programming | 4 |
| | Total | 19 |

**Level-4**

| Course Code | Course Title | Credit |
|---|---|---|
| **Arab103** | Expository Writing | 2 |
| **Math106** | Integral Calculus | 3 |
| **Math109** | Linear Algebra and Analytical Geometry | 3 |
| **IT125** | Database | 4 |
| **CEN126** | Computer Architecture | 3 |
| **CSC153** | Object Oriented Programming | 4 |
| | Total | 19 |

**Level-5**

| Course Code | Course Title | Credit |
|---|---|---|
| **Math203** | Differential and Integral Calculus | 3 |
| **Stat224** | Introduction to Statistics & Probability | 3 |
| **CSC225** | Assembly Language | 3 |
| **CSC244** | Concepts of Algorithms | 3 |
| **CSC276** | Computer Graphics | 4 |
| **CSC283** | Discrete Structures | 4 |
| | Total | 20 |

**Level-6**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC102** | Islam and Construction of Society | 2 |
| **Math207** | Differential Equations | 3 |
| **CSC214** | Data Structures | 4 |
| **IT224** | Visual Programming | 4 |
| **CSC237** | Programming Languages Concepts | 3 |
| **CSC229** | Operating Systems | 4 |
| | Total | 20 |

**Level-7**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN301** | Signals and Systems Analysis | 4 |
| **CEN333** | Microprocessors Systems | 4 |
| **CSC338** | Compiler Design | 3 |
| **CEN345** | Computer Networks | 4 |
| **CSC346** | Software Engineering | 3 |
| | Total | 18 |

**Level-8**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC103** | The Islamic Economical System | 2 |
| **CSC313** | Algorithms Analysis & Design | 3 |
| **CSC327** | Operations Research and Programming Applications | 3 |
| **CSC357** | Internet Techniques & Web Programming | 3 |
| **CSC392** | Selected Topics in Computer Sciences | 3 |
| **CSC393** | Systems Programming | 3 |
| | Total | 17 |

**Level-9**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC104** | Fundamentals of the Islamic Political Systems | 2 |
| **CSC414** | Introduction to Unix/Lunix Systems | 3 |
| **IT463** | Knowledge Base Systems Applications | 3 |
| **CSC448** | Optimization Techniques | 3 |
| **IT481** | Communication Skills | 2 |
| **CSC498** | Graduation Project (1) | 2 |
| | Total | 15 |

**Level-10**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC445** | Introduction to Cryptography & Information Security | 3 |
| **IT450** | Multimedia Data Management | 3 |
| **CSC458** | Distributed Systems & Parallel Processing | 3 |
| **CSC463** | Artificial Intelligence | 4 |
| **CSC499** | Graduation Project (2) | 4 |
| | Total | 17 |

## Course Description:

**Course Code :** **CSC 152**
**Course Title :** Concepts of Algorithms and Computer Programming
**Prerequisites :** non
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level : 3
**Course description:**
Problem-solving, algorithmic design, Introduction to Programming, Structured Program Development, Program Control, Functions, Arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.
**Textbook :**
C How to program , Deitel & Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004

**Course Code:** **CEN 111**
**Course Title:** Logic Design
**Prerequisites:** non
**Credit Hours**: 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: Level:3
**Course description:**
Digital computer and information (numbering systems, Arithmetic operations, Decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, Combinational circuits simplification, CMOS circuits), Combinational logic design (design procedure, decoders, multiplexes, Binary adder and subtracter), Sequential circuits (latches, flip flops, synchronous sequential circuits analysis and design), Analysis and design of synchronous sequential machines, Representation, state reduction and realization; Finite state machines.
**Textbook:**
M. Mano, Digital Design, 3rd Ed., 2002.

**Course Code :** **IS 125**
**Course Title:** Database
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4
**Prerequisites** : CSC 152
**Course discretion**
Database definition, Database system, Overview of database management, database system architecture, Introduction to Relational databases, An Introduction to Structured Query Language(SQL), Database Integrity, Views, Normalization, Database design, Practical Applications.
**Textbook:**
"An Introduction to Database Systems", Date, 2004, Addison-Wesley.

**Course Code:** **CEN 126**
**Course Title:** Computer Architecture
**Prerequisites:** CEN 111
**Credit Hours**: 3 Lecture Hrs: 3
Lab Hrs:0 Tut. Hrs: 0 Level:4
**Course description:**
Review of logic design principles. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design. System software. Micro-programmed CPU. Comparison between CISC, RISC and VLIW processors. Introduction to memory organization; I/O operations; Introduction to parallel processing techniques.
**Textbook:**
M. Mano, "Computer System Architecture," Prentice Hall, 2004.

**Course Code :** **CSC 153**
**Course Title :** Object Programming
**Prerequisites** : CSC152
**Credit Hours : 4** Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4
**Course description:**
Introduction to Object-Oriented Programming, Program Control Structures, Functions, Arrays, Pointers and Strings, Classes Part I Classes and data abstraction, Classes Part II: Operator Overloading, Inheritance Virtual Functions and Polymorphism.
**Textbook**:
C How to program ,Deitel & Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004.

**Course Code :** **CSC 244**
**Course Title :** Concepts of Algorithms
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:5
**Prerequisites**: CSC 152
**Course description:**
Growth function and Recurrence, Divide-and-Conquer: (Strassen, Fibonacci, Polynomial Multiplication), Heap Sort, Quick Sort, Bubble Sort, Insertion Sort, Merge Sort, Hash Table, Binary Search Tree, Dynamic Programming, Greedy Algorithms,
**Textbook**

Introduction to Algorithms, (Second Edition) Thomas Cormen, Charles Leiserson, Ronald Rivest, and Clifford Stein. MIT Press. ISBN: 0262032937

**Course Code : CSC 276**
**Course Title :** Computer Graphics
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:5
**Prerequisites:** CSC 153
**Course Description:**
Computer Graphics Applications Survey. **Color models** (chromaticity diagram, RGB, CMY, YIQ, HSV, and HLS color models). **Graphics Output Primitives** (coordinate frames, DDA, Bresenham's algorithm, circle-drawing, fill-area primitives algorithms). **2D Graphics**(2D cartesian coordinates, curves and parametric equations, functions and transformations, inverse functions. **3D Graphics** (vectors in 3D, dot and cross product, homogeneous coordinates, correlation between Cartesian and homogeneous coordinates). **Geometric transformations**(2D geometric transformations, matrix representation and homogeneous coordinates, inverse transformations, 2D composite transformations).**Geometric representation** Lagrange polynomials of degree n, Hermit cubic polynomial, Bernstein polynomial, interpolation problem, Spline interpolation problem of approximation, Bezier-Bersnstein approximation, Bezier-B-Splineapproximation, quadric surfaces
**Graphics Lab**: modeling, rendering, animation using 3D Studio Max? from Autodesk?. Use of OpenGL?.
**Textbook:**
Hearn, D. and P. Baker "*Computer Graphics with OpenGL*". Pearson Prentice Hall, Pearson Education Inc., Upper Saddle River NJ07458, USA, 2004. PIE ISBN 0-13-120238-3

**Course Code : CSC 283**
**Course Title :** Discrete Structures
**Credit Hours** : 4 Lecture Hrs:
Lab Hrs: 0 Tut. Hrs: Level:5
**Prerequisites:** CSC 153
**Course description:**
**Introduction to Discrete Structures**: algorithmic language. **Logic**: propositions, predicate logic, proofs, mathematical induction. **Sets**: special sets, operations, properties and identities, application of logic to knowledge-based systems. **Relations**: graphical and matrix representations, equivalence and order relations, application to databases **Functions** types, cardinality, application to functional languages **Undirected Graphs** Simple graphs, Eulerian paths, Hamiltonian circuits, trees, application to syntax diagrams **Directed Graphs** digraphs, consistent labeling, paths problems, Wars hall's algorithm, shortest paths and Dijkstra's algorithm, application to routing in computer networks. **Machines and Computations**: automata as models, finite state automata (FSA) without outputs, FSA as language recognizers and their limits, introduction to Turing Machines, application of FSA to problem-solving.
**Textbook:**
Skvarcius, R. and W.B. Robinson "Discrete Mathematics with Computer Science Applications" The Benjamin / Cummings Publishing Co., 1986.

**Course Code : CSC 225**
**Course Title :** Assembly Language
**Prerequisites :** CEN 126
**Credit Hours :** 3 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:5
**Course description**
Introduction to PC hardware, PC software requirements, assembly language programmers requirements, program logical and control, string operations, arithmetic operations for processing binary data , assembling linking and executing a program.
**Textbook**
Peter Abel. IBM PC Assembly Language and Programming ". 1998

**Course Code : CSC 237**

**Course Title : Programming Languages Concepts**

**Prerequisites**: CSC 283

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0

**Course description:**

Preliminaries. Evolution of the Major Programming Languages. Describing Syntax and Semantics. Lexical and Syntax Analysis. Names, Binding, Type Checking, and Scopes. Data Types. Expressions and Assignment Statements. Statement-Level Control Structure. Subprograms. Implementing Subprograms. Abstract Data Types. Support for Object-Oriented Programming. Concurrency. Exception Handling and Event Handling. Functional Programming Languages. Logic Programming Languages. Project.

**Textbook**

Robert W. Sebesta. Concepts of programming languages, 2008 Addison-Wesley.

**Course Code : CSC 229**

**Course Title :** Operating Systems

**Prerequisites**: CEN 126

**Credit Hours** : 4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:6

**Course description:**

Computer System Structure, Operating System Concepts, Operating System Structure, Procedures, CPU Scheduling, ProcessSynchronization,BatchFiles,RecoveryConsole,MemoryManagement,VirtualMemory,File-System Interface, Storage Structure, Data Storage on Disks, File-Systems : Fat,Fat32, NTFS, Distributed Systems ,Hardware Protection, The Linux system

**Textbook**

Abraham Silberschatz, Peter Baer, Galvin, Greg Gagne. Operating Systems concepts , Pearson Educaion, Sixth Edition.

**Course Code : IS 224**

**Course Title :** Visual Programming

**Prerequisites** : CSC 153

**Credit Hours** : 3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0

**Course Description:**

Selecting a Visual Language, Knowing the concepts and procedures used in Visual Languages, Syntax and semantics of the language used. Types of Data, conditional statements, recursion, data structures, modular programming, review of Object-Oriented Programming concepts and techniques, User Interface Design rules, Materializing an interface into a set of visual objects, File types, File organizing techniques, File usages, Publishing an interface on the web, Basic concepts of Human Computer Interaction, Comparison between the selected language and other visual languages.

**Textbook:**

Diane Zak, Programming with Microsoft Visual Basic .NET 2005, Publisher Course Technology, ISBN 0-619-21718-9

**COURSE CODE : CSC 214**

**Course Title :** Data Structures

**Prerequisites :** CSC 283

**Credit Hours** : 4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:6

**Course description:**

Functions in C - Structures and pointers - Memory Management functions , Concepts and Definition of abstract data type, Array as ADT, Stack and operations, Queue and operations Linked List and stack as list, Queue as list and applications, Sorting, recursion, Tree Introduction to Graphs, Projects and Exercises.

**Textbook :**

Data structures using C and C++. Second edition, YEDIDYAH LANGSAM and others Prentice Hall and others. 1996.

**Course Code: CSC346**

**Course Title:** Software Engineering**.**

**Prerequisites:** CSC 214

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:7

**Course description:**

Software Engineering Concepts, System Engineering Concepts, Software Process, Analysis Concepts and Principles, Analysis Modeling Design, Real-Time System Design, Software Testing Techniques, Technical Metrics for Software, Project

**Textbook:**

Ian Somerville, Software Engineering , Pearson Education, 7-th edition.

**Course Code :** **CSC 338**
**Course Title :** Compiler Design
**Prerequisites:** CSC237
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level: 7

**Course description**

The design and implementation of compilers. Compiler organization, algorithms for lexical, syntactic and semantic analysis, top-down and bottom-up parsing (e.g., recursive descent, LL, LR, LALR parsing). Symbol table organization, error detection and recovery, intermediate and object code generation, and code optimization. Student has to implement a compiler for a simple high level language as project.

**Textbook:**

A. V. Aho, R. Sethi, J. D. Ullman; *"Compilers: Principles, Techniques, and Tools";* 1986; Addison-Wesley; ISBN: 0-201-10088-6; (The dragon book).

**Course Code:** **CEN 333**
**Course Title:** Microprocessor Systems
**Prerequisites:** CEN 126
**Credit Hours**: 3 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level: 7

**Course description:**

Architecture and Instruction set of different 16 bit microprocessors; Microprocessor chips. **Supporting chips**: Buffers, decoders, system clock generator, reset system. Memory chips and subsystems Interfacing 16-bit Microcomputers. Architecture of Microprocessor based systems, design technique, memory and I/O devices interfacing to the microprocessor, interfacing technique. **I/O techniques**: Interrupts, Direct memory access; **System development and design tools techniques**: hardware and software.

**Textbook:**

B. Brey, " The Intel Microprocessors..", Prentice Hall, 5th Edition, 2000

**Course Code :** **CEN 301**
**Course Title:** Signals and Systems
**Prerequisites :** Math 207
**Credit Hours : 4** Lecture Hrs: 4
Lab Hrs: 0 Tut. : 0 Level:7

**Course description:**

Time-domain analysis of signals: Mathematical and graphical representation. Classifications. Basic operations. Basic signals. Sampling and aliasing. Time-domain analysis of systems: Block diagram representation. Differential and difference equation representation. Impulse and step responses. Frequency-domain analysis of signals: Spectra of continuous-time and discrete-time signals. Frequency-domain analysis of systems: Frequency response of continuous-time systems: Bode plot, SyQuest plot, feedback and its effects on system stability. Frequency response of discrete-time systems. Laplace transform and its applications. Z-transform and its applications: Relationship with Laplace. Exercises should be solved using MATLAB

**Textbook:**

A. V. Oppenheim*, Signals and Systems,* Prentice Hall, 2nd edition, 1997

**Course Code:** **CEN 345**
**Course Title :** Computer Networks
Prerequisites: CEN 126
Credit Hours :4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:7

**Course description:**

**Introduction to computer networks**: Network Types, Overview of data transmission, Introduction to network protocols, The Internet protocol. **Network topologies**; Network architecture and the OSI reference model; The physical and Data Link Layer , flow and errors control, ARQ Stop/wait, Sliding window protocols, **DLC standards**: HDLC , PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, Hubs, routers, Ethernet Switches; **Network Layer Services**: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.

**Textbook:**

A. Tanenbaum Computer Networks. 4rd Ed., Prentice-Hall, 2003.

**Course Code : CSC 392**

**Course Title:** Selected Topics for Computer science

**Credit Hours** :3 Lecture Hrs:

Lab Hrs: Tut. Hrs: 0 Level:8

**Prerequisites :**

**Course description:**

In this course, advanced topics in computer sciences are proposed, like: Java Object-Oriented programming, **Object-Oriented Software Engineering,** Application Programs, Operating Systems Design and implementation, Distributed Operating Systems, Distributed Computing, Introduction to Parallel Computing.

**Textbooks:**

The text book depends on the topic of the course.

**Course Code: CSC 393**

**Course Title:** Systems Programming

**Credit Hours** :3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level : 8

**Prerequisites:** CSC338

**Course description**

Study of one particular processor, assembly for this processor. Introduction to the assembly laguage of this processor. Design and implementation of an assembler (translation to machine code).

Linkers and loaders: Absolute loaders; Program relocation; Program linking; Data structures; Dynamic loading; Bootstrap loaders.

Macro processors: Data structures and logic flow for a simple one-pass macro processor; Concatenation of macro parameters; Generation of labels in macro expansions; Conditional macro expansion; Macro processing within an assembler; General-purpose macro processors. Project.

**Textbook :**

Leland Beck "An introduction to Systems programming", Addison Wesley, 1990.

**Course Code: CSC357**

**Course Title:** Internet Techniques web programming**.**

**Credit Hours** : 3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0 Level: 8.

**Prerequisites**: CEN 345

**Course description:**

An overview of connecting to and navigating within the Internet system and the World Wide Web: Navigation. Search Engines. Advanced search techniques. Design of web pages using HTML, XML and Java. TCP/IP. Client/Server architectures. Mastering Connectivity. Security.

**Textbook :**

Gary P. Schneider and Jessica Evans *The Internet -- 3rd Edition*, Course Technology, 2002.

**Course Code: CSC 327**

**Course Title:** Operations Research &Applications programming

**Credit Hours** :3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0 Level:8

**Prerequisites**: CSC 283

**Course description:**

OR Approach, Methodology And Applications : modeling, constraints, objective and criteia. Problems of multiple criteria optimization, model validation and systems design. Mathematical programming; simulation, gaming; heuristic programming. Examples,: theory of inventory. Production; linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. Theory of games for two-person competitive situations. Project management through PERT-CPM

**Textbook:**

Hamdi Taha , Operations Research: An Introduction (7th Edition), ISBN: 0130323748, 2002.

**Course Code :** **CSC 313**

**Course Title :** Algorithms Analysis and Design

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level : 8

**Prerequisites** : CSC 214

**Course description:**

Introduction to Algorithms Analysis and Design, General Algorithms: (1- Greater Common Divisor Algorithm, 2- Smaller Common Multiple Algorithm, 3- Pascal-Triangle Algorithm, 4- Inverse Number Algorithm, 5- Recursive Algorithm), Algorithms And Procedures, Algorithm Analysis: (Algorithm Efficiency, Algorithm Run-time, Algorithm Complexity, Computation Horner Algorithm Complexity Degree, Multiplication Two Polynomials Complexity Degree, Computation Using While Loop Algorithm Complexity Degree), Sorting Algorithms: (Insert Sort Algorithm, Selection Sort Algorithm, Bubble Sort Algorithm, Heap Sort Algorithm, Merge Sort Algorithm, Sort Algorithm, Files Sorting Algorithms), Searching Algorithms, Backtracking Algorithms: (8-th Queen Problem, Optimal Option Problem).

**Textbook**

Michael T.Goodrich, Roberto Tamassia , Algorithm Design: Foundations ,Analysis and Internet Examples, John Wiley & Sons Inc 0-471-38365-1, 2002.

**Course Code :** **IS 463**

**Course Title :** Knowledge base systems Application

**Prerequisites** : CS 214

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:9

**Course Description:**

Review of first-order logic, relational algebra, and relational calculus. Fundamentals of logic programming. Logic for knowledge representation. Architecture of a knowledge-base system. Fundamentals of deductive databases. Top-down and bottom-up query processing. Some important query processing strategies and their comparison. Project or term paper on current research topics.

**Textbook**

Richard A. Frost, Introduction to Knowledge Based Systems.

**Course Code :** **CSC 498**

**Course Title:** Project I

**Credit Hours : 2** Lecture Hrs:

Lab Hrs: Tut. Hrs: Level:9

**Prerequisites : 100 CH**

**Course description:**

Student will study, design and develop an integrated system, and he will be examined at the end of the semester.

**Textbooks**

Selected papers and researches related to the project topic.

**Course Code:** **IS 481**

**Course Title:** Communication skills

**Credit Hours** : Lecture Hrs: 2

Lab Hrs: 0 Tut. Hrs: 0 Level:

**Prerequisites: non**

**Course description**

This course covers written, oral, and interpersonal communication. Students will hand in short pieces of writing each week, will make oral presentations several times in the semester, and will work together in simulated project meetings and other realistic scenarios of pair and small group interaction.

**Course Code:** **CSC 448**

**Course title :** Optimization Techniques

**Perquisites:** CSC 327

**Credit Hours**: 3 Lecture Hrs 2: Lab Hours: 1

Tut. Hrs: 0

**Course description:**

Unconstrained optimization theory. Convex functions and convex sets. Algorithms for

unconstrained optimization (Steepest descent Newton methods Conjugate gradient methods). Constrained optimization theory (Kuhn-Tucker conditions). Special problems: (Linear programming Quadratic Programming). Algorithms for constrained optimization.
Since this is a course on optimization *techniques* you will need to be able to program with high level programming languages (e.g C/C++, Java, C#)

**Textbook :**

Wright, S. and J. Necedah *Numerical Optimization* Springer.

**Course Code:** **CSC 414**
**Course title:** introduction to Unix and Linux
**Prerequisites: CSC 229**
**Credit Hours : 3.** Lecture Hrs:2. Lab Hrs:2. Level:9

**Course description:**

User/kernel interface, fundamental concepts of Unix, user authentication, basic and advanced I/O, file system, signals, process relationships, and inter-process communication. Fundamental development and debugging tools such as "make" and "gdb" will also be covered.

**Textbook:**

W. Richard Stevens, Advanced Programming in the UNIX Environment, Addison Wesley Professional, 1992.

**Course Code :** **IS 491**
**Course Title : Multimedia Data Management**
**Prerequisites** : IS 224
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 1 Level : 10

**Course Description:**

Significance and value of multimedia for a variety of end uses .Multimedia data storage. Use of multimedia hardware for capture and management of sound, graphics and video. Multimedia development tools, programming, scripting and design skills. Use of multimedia authoring tools for producing multimedia applications

**Textbook:**

Boyle, T. .*Design for Multimedia Learning.* London: Prentice Hall, 1997

**Course Code :** **CSC 463**
**Course Title:** Artificial Intelligence
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level : 10
**Prerequisites**: CSC 214

**Course description**

Introduction & Definitions. Agent and examples. Uninformed Search. Heuristic Search. Constrained Search Problems CSP). Logical agents. First Order Logic and examples Machine Learning. Project.

**Textbook**

Russell, S. J. and P. Norvig. Artificial Intelligence, A Modern Approach, Prentice Hall,2003,USA.

**Course Code :** **CSC 458**
**Course Title :** Distributed Systems and Parallel Processing
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0
**Prerequisites** : CSC 229

**Course description:**

Introduction to distributed systems, processes and processors, parallel architecture (multi-computers, multi-processors), communication in parallel systems, performance of parallel systems, examples of parallel programming, introduction to distributed systems, distributed algorithms, types of distributed systems, compatibility of distributed systems and discovery of the end of processes.

**Textbook:**

Coulouris, G., Jean Doll more, and Tim Kind berg Distributed Systems: Concepts and Design, Addison-Wesley, 3rd Edition, 2001-ISBN: 0-201-619180

**Course Code :** **CSC 499**
**Course Title:** Project II
**Credit Hours** :4 Lecture Hrs:
Lab Hrs: Tut. Hrs: Level: 10
**Prerequisites : CSC498**

**Course description:**

Student will study, design and develop an integrated system. Examination to be held at the end of the semester.

**Textbooks:**

Selected papers and researches related to the project topic.

## Second Program:

BA Degree Program: **Information technology**

**Study Plan:**

**Level 3**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC244** | Concepts of Algorithms | 3 |
| **CSC276** | Computer Graphics | 4 |
| **CSC283** | Discrete Structures | 4 |
| **IS226** | Information Systems Fundamentals | 3 |
| **MATH203** | Differential and Integral Calculus | 3 |
| **STAT224** | Introduction to Statistics & Probability | 3 |
| | Total | 20 |

**Level-4**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC214** | Data Structures | 4 |
| **CSC229** | Operating Systems | 4 |
| **CSC237** | Programming Languages Concepts | 3 |
| **IC102** | Islam and Construction of Society | 2 |
| **IS224** | Visual Programming | 4 |
| **MATH207** | Differential Equations | 3 |
| | Total | 20 |

**Level-5**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN345** | Computer Networks | 4 |
| **CSC346** | Software Engineering | 3 |
| **IS326** | Database (2) | 4 |
| **IS340** | Information Systems Analysis and Design | 3 |
| **IS344** | Design and Programming of GUI | 4 |
| | Total | 18 |

**Level-7**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC414** | Introduction to Unix and Linux Systems | 3 |
| **IC104** | Fundamentals of the Islamic Political System | 2 |
| **IS449** | Data Mining | 3 |

| | | |
|---|---|---|
| **IS463** | Knowledge base Systems Application | 3 |
| **IS481** | Communication Skills | 2 |
| **IS498** | Graduation Project-1 | 2 |
| | Total | 15 |

**Level-8**

| Course Code | Course Title | Credit |
|---|---|---|
| **IS450** | Multimedia Data Management | 3 |
| **IS452** | Planning & Management of Information Resources | 3 |
| **IS465** | Decision Support Systems | 3 |
| **IS480** | Electronic Commerce Systems | 3 |
| **IS499** | Graduation Project-II | 4 |
| | Total | 16 |

## Course Description:

**Course Code :** **CSC 152**
**Course Title :** Concepts of Algorithms and Computer Programming
**Prerequisites :** non
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level : 3
**Course description:**
Problem-solving, algorithmic design, Introduction to Programming, Structured Program Development, Program Control, Functions, Arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.
**Textbook :**
C How to program ,Deitel&Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004

**Course Code:** **CEN 111**
**Course Title:** Logic Design
**Prerequisites:** non
**Credit Hours**: 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: Level:3
**Course description:**
Digital computer and information (numbering systems, Arithmetic operations, Decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, Combinational circuits simplification, CMOS circuits), Combinational logic design (design procedure, decoders, multiplexes, Binary adder and subtracted), Sequential circuits (latches, flip flops, synchronous sequential circuits analysis and design), Analysis and design of synchronous sequential machines, Representation, state reduction and realization; Finite state machines.
**Textbook:**
M. Mano, Digital Design, 3rd Ed., 2007.

**Course Code :** **IT 125**
**Course Title :** Database
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4
**Prerequisites** : CSC 152
**Course discretion:**
Database definition, Database system, Overview of database management, database system architecture, Introduction to Relational databases, An Introduction to Structured Query Language(SQL), Database Integrity, Views, Normalization, Database design, Practical Applications.
**Textbook:**
"An Introduction to Database Systems", Date, 2004, Addison-Wesley.

**Course Code:** **CEN 126**

**Course Title:** Computer Architecture
**Prerequisites:** CEN 111
**Credit Hours**: 3 Lecture Hrs: 3
Lab Hrs:0 Tut. Hrs: 0 Level:4
**Course description:**
Review of logic design principles. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design .System software .Micro-programmed CPU .Comparison between CISC, RISC and VLIW processors. Introduction to memory organization; I/O operations; Introduction to parallel processing techniques.
**Textbook:**
M. Mano, "Computer System Architecture," Prentice Hall, 2004.

**Course Code :** **CSC 153**
**Course Title :** Object Programming
**Prerequisites** : CSC152
**Credit Hours : 4** Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4
**Course description:**
Introduction to Object-Oriented Programming, Program Control Structures, Functions, Arrays, Pointers and Strings, Classes Part I Classes and data abstraction, Classes Part II :Operator Overloading, Inheritance Virtual Functions and Polymorphism.
**Textbook**:
C How to program ,Deitel&Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004.

**Course Code :** **CSC 244**
**Course Title :** Concepts of Algorithms
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:5
**Prerequisites**: CSC 152
**Course description:**
Growth function and Recurrence, Divide-and-Conquer: (Strassen, Fibonacci, Polynomial Multiplication), Heap Sort, Quick Sort, Bubble Sort, Insertion Sort, Merge Sort, Hash Table, Binary Search Tree, Dynamic Programming, Greedy Algorithms,
**Textbook**
Introduction to Algorithms, (Second Edition) Thomas Cormen, Charles Leiserson, Ronald Rivest, and Clifford Stein. MIT Press. ISBN: 0262032937

**Course Code :** **CSC 276**
**Course Title :** Computer Graphics
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:5
**Prerequisites:** CSC 153
**Course description:**
Computer Graphics Applications Survey.**Color models** (chromaticity diagram, RGB, CMY, YIQ, HSV, and HLS color models).**Graphics Output Primitives** (coordinate frames, DDA, Bresenham's algorithm, circle-drawing, fill-area primitives algorithms). **2D Graphics** (2D Cartesian coordinates, curves and parametric equations, functions and transformations, inverse functions. **3D Graphics** (vectors in 3D, dot and cross product, homogeneous coordinates, correlation between cartesian and homogeneous coordinates). **Geometric transformations** (2D geometric transformations, matrix representation and homogeneous coordinates, inverse transformations, 2D composite transformations).**Geometric representation** (Lagrange polynomials of degree n, Hermite cubic polynomial, Bernstein polynomial, interpolation problem, Spline interpolation, problem of approximation, Bezier-Bersnstein approximation, Bezier-B-Spline approximation, quadric surfaces).
**Graphics Lab:** modeling, rendering, animation using 3D Studio Max from Autodesk. Use of OpenGL.
**Textbook:**
Hearn, D. and P. Baker "*Computer Graphics with OpenGL*".Pearson Prentice Hall, PearsonEducation Inc., Upper Saddle River, NJ07458, USA, 2004.PIE ISBN 0-13-120238-3.

**Course Code :** **CSC 283**
**Course Title :** Discrete Structures
**Credit Hours** : 4 Lecture Hrs:
Lab Hrs: 0 Tut. Hrs: Level:5
**Prerequisites:** CSC 153
**Course description:**
**Introduction to Discrete Structures**: algorithmic language. **Logic**: propositions, predicate logic, proofs, mathematical induction. **Sets**: special sets, operations, properties and identities, application of logic to knowledge-based systems. **Relations**: graphical and matrix representations, equivalence and order relations, application to databases. **Functions**: types, cardinality, application to functional languages. **Undirected Graphs**: Simple graphs, Eulerian paths, Hamiltonian circuits, trees, application to syntax diagrams. **Directed Graphs**: digraphs, consistent labeling, paths problems, Warshall's algorithm, shortest paths and Dijkstra's algorithm, application to routing in computer networks .**Machines and Computations**: automata as models, finite state automata (FSA) without outputs, FSA as language recognizers and their limits, introduction to Turing Machines, application of FSA to problem-solving.
**Textbook:**
Skvarcius, R. and W.B. Robinson "Discrete Mathematics with Computer Science Applications" The Benjamin / Cummings Publishing Co., 1986.
**Course Code :** **IT 226**
**Course Title :** Information Systems Fundamentals
**Prerequisites** : IT 125
**Credit Hours** :3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level: 5
**Course description:**
Definition of Information Systems ,Philosophy of IT Department, IT Courses Interrelations, Survey of information systems technology, Strategies for IT design, Strategic Role for Information and Information Systems, Organizational Structure and Information Systems, Organizational Modeling, Enterprise-wide computing and networking, Conceptual foundations, The Decision-making process, Information Systems Strategic Planning, Information system requirements, designing the information architecture of an organization, Information systems products and services, Managing of Information Systems.
**Textbook:**
O'Brien, J. A. (2003). Introduction to Information Systems (11th ed.). New York: McGraw Hill

**Course Code :** **CSC 237**
**Course Title :** Programming Languages Concepts
**Prerequisites**: CSC 283
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0
**Course description:**
To present an overview of several different paradigms of programming, To give some experience in writing programs in different languages, To introduce the concepts of syntax-directed translation, programming language semantics, parsing, and others.
**Textbook**
Robert W. Sebesta. Concepts of programming languages, 2008 Addison-Wesley.

**Course Code :** **CSC 229**
**Course Title :** Operating Systems
**Prerequisites**: CEN 126
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:6
**Course description:**
Computer System Structure ,Operating System Concepts ,Operating System Structure ,Procedures, CPU Scheduling, Process Synchronization,BatchFiles,RecoveryConsole,MemoryManagement,VirtualMemory,File-System Interface, Storage Structure, Data Storage on Disks ,File-Systems : Fat,Fat32, NTFS, Distributed Systems ,Hardware Protection ,The Linux system.
**Textbook**

Abraham Silberschatz, Peter Baer, Galvin, Greg Gagne. Operating Systems concepts , Pearson Educaion, Sixth Editio

**Course Code :** **ITS 224**
**Course Title :** Visual Programming
**Prerequisites** : CSC 153
**Credit Hours** : 3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0
**Course Description:**
Selecting a Visual Language, Knowing the concepts and procedures used in Visual Languages, Syntax and semantics of the language used. Types of Data, conditional statements, recursion, data structures, modular programming, review of Object-Oriented Programming concepts and techniques, User Interface Design rules, Materializing an interface into a set of visual objects, File types, File organizing techniques, File usages, Publishing an interface on the web, Basic concepts of Human Computer Interaction, Comparison between the selected language and other visual languages.
**Textbook:**
Diane Zak, Programming with Microsoft Visual Basic .NET 2005, Publisher Course Technology, ISBN 0-619-21718-9

**Course Code :** **CSC 214**
**Course Title :** Data Structures
**Prerequisites :** CSC 283
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:6
**Course description:**
Functions in C - Structures and pointers - Memory Management functions , Concepts and Definition of abstract data type, Array as ADT, Stack and operations, Queue and operations Linked List and stack as list, Queue as list and applications, Sorting, recursion, Tree Introduction to Graphs, Projects and Exercises.
**Textbook :**
Data structures using C and C++. Second edition, YEDIDYAH LANGSAM and others Prentice Hall and others. 1996.

**Course Code :** **IT 326**
**Course Title :** Database (2)
**Prerequisites** : IT 125
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 1 Level : 7
**Course Description:**
DBMS architecture and administration; Centralized and Client-Server approaches, System Catalog, Data Dictionary. Transaction management; Transactions: concepts, characteristics. Recovery techniques, Concurrency control techniques: Serializability, Deadlock, Locking schemes, Time-stamp ordering, Multi-version, Optimistic techniques; DB security; Distributed databases; Distributed DBMS, Data fragmentation and replication, Distributed transactions management. Object-Oriented databases. Introducing to new emerging DB technologies and applications; Web DBs, Multimedia DBs, Data Warehousing and Data Mining
**Textbook:**
Principles of Distributed Database Systems, Ozsu, M. Tamer And Valduriez, Patrick

**Course Code:** **CSC346**
**Course Title:** Software Engineering.
**Prerequisites:** CSC 214
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:7
**Course description:**
Software Engineering Concepts, System Engineering Concepts, Software Process, Analysis Concepts and Principles, Analysis Modeling Design, Real-Time System Design, Software Testing Techniques,Technical Metrics for Software, Project.
**Textbook:**
Ian Somerville, Software Engineering , Pearson Education, 7-th edition.

**Course Code :** **IT 340**
**Course Title :** Information Systems Analysis and Design
**Prerequisites** : IT 226.
**Credit Hours** : 3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0 Level:7

**Course Description:**

fundamental knowledge, methods and skills needed to analyze, design and implement computer-based systems. The role of the systems analyst and the techniques employed. Utilizing the structured software development life cycle approach, the development phases are comprehensively discussed and reviewed.The Modeling Techniques: Process Modeling (DFDs), Data Modeling (ERDs), Architectural System Design Modeling, Unified Modeling language forms and Object-Oriented Modeling. The Course includes an integrated project that covers the whole system analysis and design phases, which the students will fulfill on a groub base manner. The Course also emphasizes on developing and improving the skills of interrelating, documenting, and modeling for the students.

**Textbook:**

Modern System Analysis & Design, 3rd Edition, 2002, J. A. Hoffer, J. F. George, J. S. Valacich, ISBN 0130339903

**Course Code : IT 344**

**Course Title :** Design and programming of GUI

**Prerequisites** : IT 224

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:7

**Course Description:**

Fundamentals of programming and designing of business applications using Visual programming, Common controls and construction of menus in Visual programming, Concepts and applications of data structures and design of graphical user interfaces, adding Database access and Internet access to Visual programming programs.

**Textbook:**

Philip A. Koneman, Visual Basic.NET Programming for Business, Pearson Education, Prentice-Hall

**Course Code: CEN 345**

**Course Title :** Computer Networks

**Prerequisites:** CEN 126

**Credit Hours :**4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:7

**Course description:**

**Introduction to computer networks**: Network Types, Overview of data transmission, Introduction to network protocols, The Internet protocol. **Network topologies**; Network architecture and the OSI reference model; The physical and Data Link Layer , flow and errors control, ARQ Stop/wait, Sliding window protocols, **DLC standards**: HDLC , PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, Hubs, routers, Ethernet Switches; **Network Layer Services**: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.

**Textbook:**

A. Tanenbaum Computer Networks.4rd Ed., Prentice-Hall, 2003.

**Course Code : IT 324**

**Course Title :** Modern Concepts of Application Programming

**Prerequisites** : IT 224

**Credit Hours** : 4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:8

**Course description:**

Modern programming Concepts and how to be used to build real world applications needed by Society Organizations. Understanding a problem and analyzing it, sketching a solution, implementing the solution, documenting it and finally presenting the work in a professional manner. Projects tobe selected in the domain of modern applications, e.g: Health Information Systems, E-Commerce applications, Academic field, … .

This course, however, is intended to develop the talents of students and to encourage the spirit of competition, creation, goodness of work, and prettiness of exposition This course includes 2 or 3 large programming projects per semester.

**Textbook**

To be determined according to the chosen projects.

**Course Code : IT 342**

**Course Title :** Information Systems Engineering

**Prerequisites** : IT 340

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:8

**Course description:**

Application systems implementation, functional testing, user acceptance testing, and installation strategies .The processes of maintaining information systems, types of maintenance, measuring and controlling of maintenance effectiveness.

Software quality assurance, quality concepts, the ISO quality factors, technical metrics for software and examples of function-based, specification quality, testing metrics. Technical metrics for object-oriented systems. Information Systems Development Methodologies. Requirements Gathering Engineering. Software Copying Management.

**Textbook:**

Kees M. van Hee, Information Systems Engineering, A Formal Approach, (ISBN-13: 9780521455145 | ISBN-10: 0521455146)

**Course Code : IT 392**

**Course Title :** Selected Topics in Information Systems

**Prerequisites** :80CH.

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:8

**Course Description:**

Special topics of current trends in information systems. Engineering Tools and Methods, Simulation, Virtual Reality, Internet Security, Data Warehousing and Mining, Geographic Information Systems, Telemedicine and Medical Informatics, Workflow Management, Quantitative and Qualitative Methods in Information Systems, Global Information Systems Management, Intelligent Agent Technology and Applications, Human Computer Interaction, Computer-Based Learning and Training, Philosophical Foundations of Information Systems, Absorbing Continuous IT Developments in Organizations, IT Professional and Organizational Needs, Organizational Learning and Collaborative Technologies, Understanding and Managing Information Users Behavior, Policy, Legal and Security Issues in IT , and Virtual Organizations.

**Course Code: CSC 357**

**Course Title:** Internet Techniques web programming**.**

**Credit Hours** : 3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0 Level: 8.

**Prerequisites**: CEN 345

**Course description:**

An overview of connecting to and navigating within the Internet system and the World Wide Web: Navigation. Search Engines. Advanced search techniques. Design of web pages using HTML, XML and Java.TCP/IP.Client/Server architectures. Mastering Connectivity. Security.

**Textbook :**

Gary P. Schneider and Jessica Evans*The Internet -- 3rd Edition*, Course Technology, 2002.

**Course Code: CSC 327**

**Course Title:** Operations Research &Applications programming

**Credit Hours** :3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0 Level:8

**Prerequisites**: CSC 283

**Course description:**

OR Approach, Methodology And Applications : modeling, constraints, objective and criteia. Problems of multiple criteria optimization, model validation and systems design.Mathematical programming; simulation, gaming; heuristic programming. Examples,: theory of inventory. Production; linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. Theory of games for two-person competitive situations. Project management through PERT-CPM

**Textbook:**

HamdiTaha, Operations Research: An Introduction (7th Edition), ISBN: 0130323748, 2002.

**Course Code :** **IT 449**

**Course Title :** Data Mining

**Prerequisites** : IT 326.

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:9

**Course description:**

Principles, algorithms and applications of data mining, including algorithms, methods, implementations and applications of mining sequential and structured data, text data, Web data, spatiotemporal data, biomedical data and other forms of complex data.

**Textbook:**

Jiawei Han and MichelineKamber *"__Data Mining__: Concepts and Techniques"* 2nd ed., Morgan Kaufmann, 2006

**Course Code:** **IT 481**

**Course Title:** Communication skills

**Credit Hours** :2 Lecture Hrs: 2

Lab Hrs: 0 Tut. Hrs: 0 Level: 9

**Prerequisites: non**

**Course description**

This course covers written, oral, and interpersonal communication. Students will hand in short pieces of writing each week, will make oral presentations several times in the semester, and will work together in simulated project meetings and other realistic scenarios of pair and small group interaction.

**Course Code :** **IT 463**

**Course Title :** Knowledge base systems Application

**Prerequisites** : CSC 214

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:9

**Course Description:**

Review of first-order logic, relational algebra, and relational calculus. Fundamentals of logic programming .Logic for knowledge representation .Architecture of a knowledge-base system .Fundamentals of deductive databases. Top-down and bottom-up query processing. Some important query processing strategies and their comparison .Project or term paper on current research topics.

**Textbook**

Richard A. Frost, Introduction to Knowledge Based Systems.

**Course Code :** **CSC 414**

**Course title:** introduction to Unix and Linux

**Prerequisites: CSC 229**

**Credit Hours** : 3. Lecture Hrs:2.

Lab Hrs:2. Level:9

**Course description:**

User/kernel interface, fundamental concepts of Unix, user authentication, basic and advanced I/O, file system, signals, process relationships, and inter-process communication. Fundamental development and debugging tools such as "make" and "gdb" will also be covered.

**Textbook:**

W. Richard Stevens, Advanced Programming in the UNIX Environment, Addison Wesley Professional, 1992.

**Course Code :** **IT 498**

**Course Title :** Graduation Project-1

**Prerequisites** : 100 CH.

**Credit Hours** : 2.

Level:9

**Course Description:**

The previous courses have provided the IT students with strong and sufficient knowledge to develop information systems. The next logical stage is that the IT student must acquire hands-on experiences on developing real world information systems. In addition, the students should be familiarized with real world problems encounter during the development of real world information systems. Furthermore, the students should be trained to work in teams. In this course, the students will be organized into groups. The number of students in each group should not exceed three students. For each group, a supervisor will be allocated to guide the group in developing a particular information system. In developing an information system, a particular information system development methodology should be used. Each group will develop a real world information system in two stages: The first stage will be carried out in IT 498 and the second stage will be carried out in IT 499. In IT 498, the students of each group must identify a problem domain, define a problem, identify the requirements in details, specify requirements in details, analyze and document the current system, proposed alternative systems, and design a particular system in details which includes the definitions of all the required system models such as the data model and the functional model. At the end of the course, each group must submit a formal report documenting the problem domain, the requirements, specifications, and the system models.

**Course Code :** **IT 450**
**Course Title :** Multimedia Data Management
**Prerequisites** : IT 224
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 1 Level : 10
**Course Description:**
Significance and value of multimedia for a variety of end uses .Multimedia data storage. Use of multimedia hardware for capture and management of sound, graphics and video. Multimedia development tools, programming, scripting and design skills. Use of multimedia authoring tools for producing multimedia applications.
**Textbook:**
Boyle, T. .*Design for Multimedia Learning.* London: Prentice Hall, 1997.

**Course Code :** **IT 452**
**Course Title :** Planning & Management of Information Resources
**Prerequisites** : IT 342
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level: 10
**Course Description:**
Definition of Information Resources and IT Infrastructure, Information Strategy Planning Components (Business Planning, Systems Planning, technical Planning). Strategic Planning Steps, used tools, managing the Feedback, Developing strategic Objectives and Rules. Organizing, Managing, and Developing of Information Resources for the Information Systems Departments, Cost Analysis, Outsourcing Management, IT Contingency Planning and Resources Safety. Human Factors and Performance Measurements. Security issues, Internal auditing, Standards and procedures of the Information Center, Continuous Improvement of IT Resources. Standards of Computer Networks, Planning of Networks, Business Requirements to Construct Networks, Requirements Analysis, Design of Networks, Choosing Network Technologies, Managing Networks, Measuring and continuous Evaluation of Network Performance, Network Maintenance and Development, Economical and Legal Issues of Managing Networks, Network effects on the performance and Productivity of the Organization, Computer Networks and the Organization, Network Management Tools.
**Textbook:**

**Course Code :** **IT 465**
**Course Title :** Decision Support Systems
**Prerequisites** : IT 326
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 level:10
**Course description:**
Decision-making process, systems modeling and support .Categorization of problem-solving techniques .Data management and concepts of the data warehousing .**Modeling of managerial problems**; linear programming models, simulation models, heuristics and forecasting

models. Model-base management systems. DSS user interface design and management. Decision support system construction methods.DSS Hardware, software, and technology Levels. Knowledge-based and expert systems, expert system architecture; representation of knowledge; forward and backward chaining; inferences making process; Applications of expert systems in decision making Group, distributed, and executive decision support systems.

**Textbook:**

Turban, E. & Aronson J. E., Decision Support Systems & Intelligent Systems, Seventh Edition. Upper Saddle River, NJ: Prentice Hall. ISBN: 0-13-046106-7

**Course Code :** **IT 480**
**Course Title :** Electronic Commerce Systems
**Prerequisites** : IT 340
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:10

**Course description:**

Strategic planning for EC adoption; Business design and architecture for EC applications; Web-based marketing strategies and models; E-Commerce Project Management; Public Policy and Legal Issues of Privacy; Socio-Technical Infrastructure for E-Commerce; Risk Management in E-Commerce Initiatives; E-Transformation; Measuring Effectiveness of E-Commerce Projects; EC and organizational change management; EC and competitiveness; Success and failure in EC implementation; Retailing in E-Commerce; E-Commerce in Banking; Advertisement in E-Commerce; E-Commerce and Online Publishing; E-Commerce in Manufacturing; E-Commerce and Supply Chain Management; E-Commerce and Customer Asset Management; Electronic Payment Systems; Mobile E-Commerce; Modern trends in developing E-commerce systems.

**Textbook:**

Daniel Amor. (1999). *The E-business (R)evoltion: Living and Working in an Interconnected World*. Upper Saddle River, NJ: Prentice Hall.

**Course Code :** **IT 499**
**Course Title :** Graduation Project-II
**Prerequisites** : IT 498
**Credit Hours** : 4

**Course description:**

In this course, each group will continue developing the information systems that started in IT 498. Each group must use a particular tool to implement its information system in a good programming practice. This implementation tool must be new and the students have not been experienced in the previous courses. Furthermore, the students must generate a user manual for their information system in an appropriate format. At the end of the term, each group must submit a final report, which documents completely the information system from the problem definition phase to the test and implementation phase and contains a user manual for the information system.

## Program: Mathematic

**Study plan:**

**The first and second level is the nature science preparation**

**Level 3**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration(2)** | Math.202 | 4 |
| **Principal of Probability Distribution Theorem** | Stat212 | 4 |
| **Basics of Mathematics** | Math.231 | 3 |
| **Introduction to** | Math.273 | 3 |

| Geometry | | |
| --- | --- | --- |

**Level 4**

| Course name | Course code & number | Studying Hours |
| --- | --- | --- |
| **Differentiation & Integration in many variables** | Math.203 | 4 |
| **Mathematical applications on computers** | Math.251 | 2 |
| **Vectors** | Math.204 | 3 |
| **Linear algebra** | Math.242 | 4 |
| **Theory of numbers** | Math.243 | 3 |

**Level 5**

| Course name | Course code & number | Studying Hours |
| --- | --- | --- |
| **Linear Programming** | Math.213 | 4 |
| **History of Mathematics** | Math.232 | 3 |
| **Introduction to Differential Equations** | Math.321 | 4 |
| **Numerical analysis** | Math.351 | 4 |

**Level 6**

| Course name | Course code & number | Studying Hours |
| --- | --- | --- |
| **Mathematical Methods** | Math.326 | 4 |
| **Group Theory** | Math.343 | 4 |
| **Real Analysis (1)** | Math.382 | 4 |

**Level 7**

| Course name | Course code & number | Studying Hours |
| --- | --- | --- |
| **Rings and Fields** | Math.444 | 4 |
| **Introduction to Topology** | Math.471 | 4 |
| **Real Analysis (2)** | Math.483 | 4 |
| **Project** | Math.499 | 4 |

**Level 8**

| Course name | Course code & number | Studying Hours |
| --- | --- | --- |
| **Introduction to Partial Differential Equations** | Math.422 | 4 |
| **Introduction to Differential Geometry** | Math.472 | 4 |

| | | |
|---|---|---|
| **Complex Analysis** | Math.484 | 4 |

## COURSE DESCRIPTION:

**Level 3**

**Math .202 Differentiation & Integration(2) :** This course aims at giving students definite integral and its properties , mean value theorem of integral and the fundamental theorem of calculus. It also discusses indefinite integral , standard integrals, derivatives & integrals of hyperbolic and inverse hyperbolic functions, integration methods such as: integration by substitution , integration by parts , integration by partial fractions and other substitutions. Also L'Hospitals Rule , evaluation of area and volume of revolution, arc length, Numerical integration (Trapezoidal rule), Polar coordinates, Polar curves graphs and areas using polar coordinates.

**Stat212 Principal of probability distribution theorem:**
This course discusses the discrete and continuous probability distributions (The mass and density probability functions and their properties, expectation, variance, standard deviation and the moment generating functions) . The discrete and continuous bi variety random variables and their properties (expectation, covariance, correlation coefficient, variance of sum or difference of two random variables and the moment generating
functions of bi variety random variables) . Bi variety distributions (marginal and conditional distributions ,independence of random variables , conditional expectation) .Also distribution functions of random vectors and random samples (distribution of sample mean – law of large number – central limit theorem) are discussed.

**Math.231 Basics of mathematics :**

This course aims at introducing mathematical logic, methods of proofs, mathematical induction, set theory, the product of sets, binary operations, equivalence relations , equivalence classes and partitions ,
mappings , the images and inverse images of sets under mappings , equivalence sets, countable and finite sets. Binary operations, morphisms, definition and examples of groups- definition and examples of rings and fields, polynomials and partial fractions.

**Math.273 Introduction to geometry:**
This course provides students with the main concepts of plane Euclidean geometry such as: coordinates, transformation, reflections ,translation, isometrics and similarity. Theorems on triangles, circles, tangents and angles. Polygons, polyhedral, regular polyhedral, their classification, and properties. Spherical geometry such as: sum of angle formula for spherical triangles, projection, conservative functions. Affine geometry : linear and affine transformation, isometrics, finite affine planes.

**Level 4**

**Math.203 Differentiation & integration in many variables:**This course studies the functions in two or more variables, domain of the function, three dimension rectangular coordinates, limits, continuity, partial derivative, higher-order partial derivatives, differentiation of composed function, maxima and minima- method of Lagrange multipliers for maxima and minima. Double integrals in Cartesian and polar coordinates , triple integrals in spherical and cylindrical coordinates,

infinite series, convergence tests, representations of functions by power series, Taylor , Maclaurin, and the binomial series.

**Math.251 Mathematical applications on computers**

This course provides an introduction to mathematics software as Mathematica, Mat lap and solving some problems in calculus and linear algebra by mathematica and Mat lap. Applications: modeling , simulation and visualization , internet research . Writing mathematical reports and projects using scientific work place.

**Math.204 Vectors:**

Students studies vectors in two and three dimensions, scalar and vector products, equations of lines and planes in 3-dimensional space. Surfaces of revolution and their equations in cylindrical and spherical Coordinates. Vector valued functions of a real variable, curves in space, curvature, rates of change in tangent and normal directions, directional derivatives and gradient of a function. Application to equations of normal and tangent space to a surface at a point. Vector fields, divergence, curl of a vector, line and surface integrals, Green's theorem, Gauss' divergence theorem and Stock's theorem.

**Math.242 Linear algebra**

This course studies matrices and their operations, types of matrices, elementary transformations, determinants, elementary properties of determinants, inverse of a matrix, rank of matrix, linear systems of equations, vector spaces, linear independence , finite dimensional spaces , linear subspaces, inner product spaces, linear mappings, Kernel and image of a linear mapping- Eigen values and Eigen vectors of a matrix and of a linear operator mapping.

**Math.243 Theory of numbers:**

Students study the first and second principle of mathematical induction, well-ordering principle , divisibility, Euclidean algorithm, prime numbers and their properties, linear Diophantine equations, congruencies and their properties, linear congruencies- the Chinese remainder theorem, Fermat's little theorem, Euler's theorem, Wilson's theorem, arithmetic functions and Pythagorean triples.

**Level 5**

**Math. 213 Linear programming:**

This course gives introduction to operations research, mathematical model for some real problems and mathematical formulation of linear programming problem. Graphical method for solving linear programming problems, convex sets, polygons, extreme point and optimality theorem. Analytical method (Simplex method) , big-M method , Two-phase method, formulation mistakes, dual problem, sensitivity analysis, application to transportation and network problems.

**Math.232 History of mathematics:**

This course aims at giving students some knowledge about the evolution of some mathematical concepts ,facts and algorithms in arithmetic , algebra, trigonometry ,Euclidean geometry, analytic geometry and calculus through early civilizations such as ancient Egyptian , Babylonians, Greeks, Indians, Chinese, Muslims and Europeans . Evolution of solutions of some conjectures and open problems.

**Math.321 Introduction to differential equations**:

This course gives basic definitions and construction of an ordinary differential equation. Methods of solving ordinary differential equations of first order . Orthogonal trajectories, ordinary differential equations of high orders with constant coefficients and with variable coefficients, types of solutions, linear systems of ordinary differential equations, series solutions of a linear ordinary differential equation of second

order with polynomial coefficient and Laplace transform.

**Math. 351 Numerical analysis:**

Students study numerical methods for solving nonlinear equations (bisection – iteration – Newton – false position … ), errors and rates of convergence. Direct methods for solving linear systems (Gauss

elimination, LU decomposition) and iterative methods (Jacobi –Gauss Seidel – Relaxation). Errors iteration matrices and convergence of iterative methods, polynomial interpolation (Lagrange-
Newton's methods: divided differences- forward and backward differences) and analysis of errors. Numerical differentiation and integration, errors and accuracy. Gaussian integration formulas.

**Level 6**

**Math.326 Mathematical Methods :**

This course discusses series solutions of ordinary differential equations with variable coefficients, inner product space of functions, self- ad joint operator, Sturm-Lowville theory, orthogonal polynomials and special

functions( Legendre, Hermit, gamma, beta, Bessel). Generalized theory of Fourier series and Fourier integrals.

**Math.343 Group Theory:**

This course studies the axioms of group theory and some examples of groups. Subgroups, cyclic groups, Lagrange theorem, normal subgroup, factor group, homomorphism, fundamental theorems of isomorphism, auto morphisms, Caley theorem and its generalization, simple groups, permutation groups, class equation, group action on a set, p-groups, Cauchy theorem- Sylow's theorems, external and internal direct product of group, Burnside theorem, dihedral- quaternion, groups of

auto morphisms on finite and infinite cyclic groups.

**Math.382 Real Analysis (1):**

This course introduces basic properties of the field of real numbers , completeness axiom , series and their convergence ,

monotone sequence , Bolzano-Weirstrass theorem , Cauchy criterion, basic topological properties of the real numbers, limit of a function , continuous functions and their properties . Uniform continuity , compact sets and its properties. The derivative of a function ,mean value theorem and Lupital rule and Taylor theorem.

**Level 7**

**Math.444 Ring and Fields:**

Students study rings, group of units, group of auto morphisms of a ring , ideals and factor rings and principal ring. They also study prime and maximal ideals, field of quotient of integral domain, characteristic of a ring, direct sum of rings, modules, Euclidean rings, ring of polynomials, roots of polynomials over a field, fields extensions, finite and simple extensions of fields, algebraic closure of a field, splitting fields and finite fields.

**Math.471 Introduction to Topology:**

This course introduces topological spaces, examples, closure of a set, derived set, topological subspaces, bases ,finite product topology, sub-bases, metric spaces , examples, metrizability, continuous functions , characterization of continuous functions on topological and metric spaces, homeomorphisms and examples. Topological property, compact spaces, examples , limit point and sequentially compact spaces.

**Math.483 Real Analysis (2):**

This course studies definition of Riemann integral, Darboux theorem , Riemann sums , properties and the principle theorem in calculus. Series of functions, point twice convergence , uniform convergence, algebra
and σ – algebra (sigma algebra), finite additivity and countable additivity, main extension theorem and outer measure. Measurable sets , measure , Lebesgue measure and its properties, simple functions, measurable functions, Lebesgue integral, theorems of convergence, the relation between Lebesgue and Riemann integral.

**Math.499 Project:**

A student prepares a research project in one of the Math. topics under the supervision of the staff.
The student should submit a report for an oral exam.

**Level 8**

**Math.422 Introduction to partial differential equations:**

This course discusses classification and formation of partial differential equation , first order linear partial differential equation , solution
using Lagrange's method , Cauchy problem , second order linear partial differential equation in several variables , physical application using separation of variables , classifications of partial differential equation , some boundary value problems and Green’s function.

**Math.472 Introduction to differential geometry:**

This course discusses theory of curves in $R^3$, regular curves , arc length and reparameterization , natural parameterization, Serret-Frenet apparatus, existence and uniqueness theorem for space curves, Bertrand curves. Involutes and evolutes, local theory of surfaces, simple surfaces, coordinate transformations, tangent vectors & tangent spaces . First and second fundamental forms, normal and geodesic curvature , Weingarten map, principal Gaussian and mean curvatures, geodesics, equations of Gauss and Godazzi-Mainardi.

**Math.484 Complex Analysis:**

This course discusses complex numbers, Cartesian and polar representation of complex numbers, powers and roots of complex numbers, limits and continuity of complex functions, analytic functions , Cauchy-Riemann equations. Harmonic functions, exponential, trigonometric , hyperbolic functions and logarithmic functions. Complex integration, contour integral , Cauchy's theorem, Cauchy's integral
Formula, bounds on analytic functions ,Taylor and Laurent series, power series, zeros and singularities. Residue theory and applications to real and improper integrals.

## BA Degree Program : Physics

The first year for these program is the preparatory year of natural Science

**Level 1**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 101** | Language Skills | 2 | - |
| **CHEM101** | General Chemistry (1) | 4 | - |
| **ENG101** | English | 3 | - |

| | | | |
|---|---|---|---|
| | Language | | |
| **IC101** | Introduction to Islamic Culture | 2 | - |
| **MATH101** | Calculus (1) | 4 | - |
| **PSY101** | Thinking Skills | 2 | - |
| **Total** | 17 | | |

**Level 2**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 103** | Arabic Editing | 2 | - |
| **CSC101** | Introduction to Computers and Programming | 3 | - |
| **ENG103** | English Language (2) | 3 | ENG101 |
| **IC102** | Islamic and Society Building | 2 | IC101 |
| **PHYS101** | General Physics (1) | 4 | - |
| **STAT101** | Statistical Probability | 3 | - |
| **Total** | 17 | | |

**Level 3**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC103** | Economic System in Islam | 2 | IC101 |
| **MATH201** | Calculus for Science (2) | 3 | MATH101 |
| **PHYS243** | General Physics (2) | 4 | PHYS101 |
| **PHYS211** | Classical Mechanics (1) | 3 | MATH101 PHYS101 |
| **PHYS231** | Vibrations and Waves | 2 | MATH101 PHYS101 |
| **PHYS243** | Thermodynamics | 3 | PHYS101 |
| **Total** | 17 | | |

**Level 4**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **MATH205** | Calculus for Physics (3) | 3 | MATH201 |
| **PHYS232** | Physical Optics | 3 | Phys231 |
| **PHYS234** | Health Physics | 2 | - |
| **PHYS203** | Mathematical Physics (1) | 3 | MATH201 |
| **PHYS212** | Classical Mechanics (2) | 3 | PHYS211 |
| **PHYS221** | Electromagnetism (1) | 3 | PHYS202 |
| **Total** | 17 | | |

**Level 5**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **BUS103** | Communication Skills | 2 | - |
| **MATH210** | Differential Equations | 3 | MATH205 |
| **PHYS302** | Mathematical | 3 | PHYS203 |

| | | | |
|---|---|---|---|
| | Physics (2) | | |
| **PHYS321** | Electromagnetism (2) | 3 | PHYS212 |
| **PHYS351** | Modern Physics | 3 | PHYS232 |
| **PHYS393** | Optics Physics | 3 | PHYS232 |
| **BIO314** | Healthy Culture | 2 | - |
| **Total** | 18 | | |

**Level 6**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC104** | Political System in Islam | 2 | IC101 |
| **PHYS303** | Mathematical Physics (3) | 3 | PHYS30 |
| **PHYS350** | Quantum Mechanics (1) | 3 | PHYS212 PHYS351 |
| **PHYS391** | Electromagnetism Lab | 2 | PHYS221 |
| **PHYS393** | Modern Physics Lab | 2 | PHYS351 |
| **PHYS342** | Statistical Physics | 3 | PHYS243 |
| **PQUR126** | Islamic Morals | 2 | |
| **Total** | 17 | | |

**Level 7**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS422** | Electronics | 4 | PHYS243 |
| **PHYS452** | Quantum Mechanics (2) | 3 | PHYS350 |
| **PHYS471** | Solid State Physics (1) | 3 | PHYS350 |
| **PHYS481** | Nuclear Physics (1) | 3 | PHYS351 |
| | Selective Course (Faculty) | 2 | - |
| **Total** | 16 | | |

**Level 8**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS455** | Molecular and Atomic Spectra | 3 | PHYS452 |
| **PHYS495** | Solid State Lab | 2 | PHYS471 |
| **PHYS497** | Nuclear Physics Lab | 2 | PHYS481 |
| **PHYS498** | Project | 2 | PHYS497 PHYS495 |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course | 2 | - |
| **Total** | 17 | | |

**Course Description:**

**CHEM 10 : General Chemistry**

Theoretical part : Chemical calculations, gasea, liquid state, thermochemistry, solutions, chemical kinetics, chemical and ionic equilibria Bohr Theory and electronic configuration of atoms and periodic table . An Introduction to types of chemical bonds .

Practical part : some experiments on properties of matter : density , viscosity, qualitative analysis : identification of acidic and basic radicals for inorganic salts .

**Course Number : CSC 101 Introductions to Computer and Programming**

Credit Hours ( lecture and Lab ) : 3 (2+ 1)

Level : Second

Theoretical parts : Introduction to programming , structured program development, program control, functions, array. Assignments in algorithm design and translation of algorithms in high level language like C language

Practical part: Excercices on the theoretical part.

**Course Number :** ENG **101 - English Language**

The course aims to introduce students to :

An awareness of the basics of the English language in general .

An understanding of the basics of English grammar .

The basics of English pronunciation.

Specialized academic topics in the students, respective disciplines.

Proposed Teaching Methods

The course will be conducted via lectures in the main seminar, workshops and group discussions will also be used .

**Course Number : Math 101 - Calculus -1**

Real number and real line – Inequality. Function – The graph of a function- even and odd functions- composite of functions- Review of Trigonometric functions – inverse functions- Limits – The definition of a limit – Properties of Limits- Techniques for Evaluaring Limits – Infinites Limits. Continuity at a point on an open interval - one sided limits and continuity on a closed interval – Properties of continuity . The Derivative of a function – Differentiability and continuity – chain Rule – Derivatives of Trigonometric function – Logarithmic and Exponential functios ( Differentiation ) - Hyperbolic functions – inverse Trigonometric functions Differentiation . Exterma on an interval- Rolle,s Theorem and mean value theorem – Increasing and Decreasing functions and the first derivative test – concavity and second derivative test- related rates .

**PHYS 101 General Physics (1) (3 + 1) h.**

Theoretical part: Physics and measurements, Units and dimensions, Dynamics of particle in one dimension (displacement, average velocity, instantaneous velocity, acceleration, free fall), vector algebra and geometry, Motion in two dimensions, Projectile motion, Uniform circular motion, Tangential and radial accelerations, Newton's first law and inertial frames, Mass and weight, Newton's second law, Newton's third law, Friction, Work and energy, Vector scalar products, Work of variable forces, Kinetic energy and work-energy theorem, Conservative and non-conservative forces and potential energy, Power, Conservation of mechanical energy, The conservation law of linear momentum, Impulse, Collisions, Collision in one and two dimensions, Rotational motion with constant angular acceleration, Angular quantities, Moment of inertia, Torque and angular momentum, Work of rotational motion, Properties of matter: Elasticity, Stress, Strain, Modulus's, Strain energy, Fluid mechanics: Density and relative density, the concept of pressure, Pascal law, Archimedes principle, Fluid flow, Bernoulli's equation and its applications. State of matters, heat and Temperature and zero law of thermodynamics, Phase transitions, Latent heats, Ideal gases.

Practical part: Error and measurements, Force table, Hook’s Law, Free fall, Projectile motion, Boyle’s Law, Young’s Modulus, Specific Heat of a Solid, Coefficient of Thermal expansion, Surface tension in capillary tube, viscosity, Newton's law of cooling, Determination of the Paraffin wax fusion temperature.

**PHYS 202 General Physics (2) (3 + 1) h.**

Theoretical part: Electric Charge, Insulators and conductors, Coulomb's law, Point charge, The electric field, Electric field of multiple point charges, The electric field of continuous charge distribution, examples of various shapes (disks, rings, spheres, planes), The parallel plate capacitor, Electric dipole, motion of point charge and electric dipole in electric field, Electric flux, Gauss's law, Applications of Gauss's law, Conductor in electrostatic equilibrium, Electric potential, The potential of point charges, The potential of dipole, The electric potential of many charges, Capacitance and capacitors, Energy stored in a capacitor, Fundamental circuits, The electric current, Batteries, current density, Conductivity and resistivity, Ohm's law, Series resistors, Parallel resistors, Kirchhoff's laws, RC circuits, Magnetism and magnetic force, source of magnetic fields, Magnetic field of a current, Magnetic dipoles, Ampere's law and solenoids, The magnetic force on a moving charge, The magnetic force on a current-carrying wire, Forces and torques on current loops, Induced current, Motional emf, Magnetic flux, Lenz's law, Faraday's law, Induced fields and EM waves, Inductors, LC circuits, LR circuits, AC circuits and phase, Capacitors in AC circuits, RC filter circuits, Inductor circuits, The RLC circuits, Power in AC circuits, Wave phenomena, geometrical optics, speed of light, Longitudinal and transverse waves, Sound, The nature of light and the laws of geometric optics, reflection and refraction, Fermat's principle, Snell's law, Image formation.

Practical part: Verification of Ohm's Law, Metric bridge, Charge and discharge of capacitors, Inductive Reactance, Capacitive Reactance, RCL circuits, Transformers, Speed of sound in air , Refractive Index of a Prism, Focal length of Lenses, Focal Length of Mirrors.

**PHYS 211 Classical Mechanics (1) (3 + 0) h.**

Space time, Review of Newton's law and conservation of linear momentum in Cartesian and polar coordinate system, applications on projectile motion in a linear air resistance medium, Quadratic air resistance. Motion of charges in a uniform magnetic field, The center of mass, angular momentum of several particles, Kinetic energy and work, Potential energy and conservative forces, Gradient relation, Time dependent potential energy, Energy for one dimensional linear system, Curvilinear one-dimensional systems, Central forces, The energy of interaction of two particles, The energy of multi-particle systems, CM and relative coordinates, The equation of the orbit, Kepler orbits, The unbound Kepler orbits, Change of orbits, Mechanics in non inertial frames, The tides, Rotating frames and angular velocity vector. Newton's second law in rotating frame, The centrifugal force, Coriolis force, Coriolis force and

free fall, The Foucault pendulum, Coriolis acceleration.

**PHYS 231 Vibration and Waves (2 +0) h.**

Periodic motion, Simple harmonic oscillation, Damped oscillation, Forced oscillation, Application of damped and forced oscillations, Superposition of simple harmonic oscillations, traveling waves, standing, Beats, Transverse wave in wires, Longitudinal wave in rods, Application of longitudinal wave in open and closed air columns, Fourier analysis, Doppler effect.

**PHYS 243 Thermodynamics (3 + 0) h.**

Fundamental concept in heat and thermodynamics, Thermal Equilibrium and zeroth law of thermodynamics, Ideal gases, Kinetic theory of gases, First law of thermodynamic, Application of first law of thermodynamic, isothermal and adiabatic processes. Irreversible process and reversible processes, Carrnot cycle, Otto cycle-cleapeyron latent heat equation, Second law of thermodynamic, Heat Engines, Refrigerators, Entropy, Thermodynamic functions, Maxwell relations, Third law of thermodynamic, Phase change, Applications on thermodynamic laws.

**PHYS 203 Mathematical Physics I (3 + 0) h.**

Determinants, Matrices, Solving linear equations and differential equations by matrices, Application on the motion of the rotation of the rigid body, Vector Algebra: Vector products, Position, Displacement, Vector transformation, Gradient, The Divergence, The Curl, Laplace operator, Line, Surface, and Volume Integrals, Gauss theorem, Stock's theorem, Green's theorem, Spherical polar coordinates, Cylindrical coordinates.

**PHYS 212 Classical Mechanics II (3 + 0) h.**

Calculus of variations, The Euler-Lagrange equation and applications, Lagrange's equations for Unconstrained motion, Constrained systems, Generalized momenta and Ignorable coordinates, Lagrange multipliers and constraint forces, Rotational motion of rigid body, The inertial tensor, Principal axes of Inertia, Precession of a top by weak torque, Euler's equations, Euler's angles, Coupled oscillations and normal modes, The double pendulum, Three coupled pendulum, Hamiltonian mechanics for one dimensional systems, Hamiltonian mechanics in several dimensions, Ignorable
coordinates, Phase space orbits, Liouville's Theorem.

**PHYS 221 Electromagnetism I (3 + 0) h.**

Review of vector Operations and algebra, Linear and rotational transformation of vectors, Vector field, Review of vector differential calculus: (gradient, the divergence, the curl, product rules of algebra , Second Derivatives,), Review of integral Calculus: (linear, surface, and volume integrals of vector functions), The fundamental theorem for: (calculus, gradient, divergence, curl), Curvilinear Coordinates: (spherical polar and cylindrical coordinates), The Dirac delta function in one and three dimension, The divergence of reciprocal square of radial distance, The Helmholtz theorem, Coulomb's law, The electric field, Continuous charge distributions, Divergence and curl of electrostatic field, Field lines and flux, Gauss's law and its applications, Electric potential, The potential of a localized charge distribution, The work done to move a charge, The energy of a point charge distribution, The energy of a continuous charge distribution, Properties of conductors and induced charges, Surface charge and the force on a conductor, Capacitors, Poisson's equation, Laplace's equation in one, two and three dimensions, Boundary conditions and uniqueness theorems, Conductors and the second uniqueness theorem, The Method of images and induced surface charge and calculating force and energy, Multipole expansion and approximate potentials at large distances, The monopole and dipole terms, The electric field of a dipole, Polarization, Field of a polarized object, Induced dipole and dielectrics, Polar molecules, Bound charges, The field inside a dielectric and the electric displacement, Gauss's law in the presence of dielectrics, Boundary conditions, Linear Dielectrics: (susceptibility, permittivity, dielectric constant), Boundary value problems with linear dielectrics, Force and energy in dielectric systems, Magnetostatics and the Lorentz law , Magnetic fields and magnetic forces, The Biot-Savart law, The magnetic field of a steady current, The divergence and curl of the magnetic field, Ampere's law and its applications, Magnetic vector potential, Magnetostatic boundary conditions, Multipole expansion of the vector potential, Magnetic fields in matter and the magnetization, Magnetic materials: (diamagnets, paramagnets, ferromagnets), Torques and forces on magnetic dipoles, Effect of magnetic field on atomic orbits, The field of a magnetized object, Bound currents, The magnetic field inside matter and the auxiliary field, Ampere's law in magnetized materials, Boundary Conditions, Linear and nonlinear media, Magnetic susceptibility and permeability, Ferromagnetism.

**PHYS 232 Physical Optics (3 + 0) h.**

The nature of light , The superposition of waves, Interference of two-beams of light (division of the wave front & division of amplitude) Interferometers( Young , Fresnel's biprism , loyed mirror, Fresnel's double mirrors , wedge interferometer , Newton rings , Michelson interferometer , Jamin & Mach-Zehnder refractometers ), Interference of multiple beams , Fabry-Perot interferometer , Applications of interferometry, Diffraction , Fraunhofer diffraction (single slit, two slits, multiple slits) – diffraction grating - Fresnel diffraction (circular aperture & circular Obstacle ), Polarization - polarization by absorption , reflection , refraction & double refraction, Optical active materials & polarometer .Interference of polarized light , Analysis of polarized light , Electro-optics (Kerr effect & Pockels effect ) , Magneto- optics (Faraday effect).

**PHYS 302 Mathematical Physics II (3 + 0) h.**

Complex numbers, Analytic functions, Limits and Continuity, Analyticity, The Cauchy, Riemann Equations, Elementary Functions, Complex Integration, Contoursm, Independence of path-Cauchy integral theorem- Bounds for analytic Functions, Series representations for analytic functions, Residue Theory, Conformal Mapping, Invariance of Laplace's Equation, Geometric Considerations, Bilinear Transformations, The Schwartz, Christoffel Transformations.

**PHYS 321 Electromagnetism II (3+0) h.**

Electromotive force, Ohm's law, Motional electromotive force, Electromagnetic induction, Faraday's law, The induced electric field, Inductance, Energy stored in magnetic fields, The modified Ampere's law, Maxwell's equations in vacuum, Maxwell's equations in matter, Boundary conditions, Conservation laws and the continuity equation, Poynting's theorem, Newton's third law in electrodynamics and momentum, Maxwell's stress tensor, Conservation of momentum, Angular momentum, Electromagnetic waves in one dimension, The wave equation, Sinusoidal waves, Boundary conditions: reflection and transmission, Polarization, Electromagnetic waves in vacuum, Monochromatic plane waves, Energy and momentum in electromagnetic waves, Electromagnetic waves in matter, Propagation in linear media, Reflection and transmission at normal incidence, Reflection and transmission at oblique incidence, Absorption and dispersion, Electromagnetic waves in conductors, Reflection at a conducting surface, The frequency dependence of permittivity, Guided waves and wave guides, TE waves in a rectangular wave guide, The coaxial transmission lines, Electric dipole radiation, Magnetic dipole radiation, Radiation from an arbitrary source, Power radiated by a point charge, Radiation reaction with matter.

**PHYS 351 Modern Physics (3 + 0) h.**

Special Theory of Relativity: wave propagation, Michelson Morley experiment, Galilean transformation, Lorentz transformations, Relative velocity, Lorentz contraction, Time Dilation, relativity of mass, Mass and energy, Applications, The particle like properties of Electromagnetic radiation: Electromagnetic waves, The photoelectric effect, black body radition, The Compton Effect, X-rays Waves like properties of particles: De-Broglie hypothesis, Electron diffraction experiment of Davison and Germer, Electron microscope, Uncertainity principle, quantum theory, Atomic Structure: atomic properties, The Thomson model, Rutherford Model for atomic nuclei, alpha particle scattering, Atomic Spectra, Bohr theory of the hydrogen atom, Sommerfeld's Model, Failure of the Bohr theory Frank-Hertz experiment, The basic ideas of the Quantum Mechanics.

**PHYS 393 Optics Lab (0 + 2) h.**

Prism spectrometer (refractive index and dispersion), Grating spectrometer, Fresnel's biprism with He-Ne laser, Fresnel's double mirrors with He-Ne laser, Newton's rings, Michelson interferometer, Mach-Zehnder-interferometer, Diffraction at a single slit, Diffraction at double slits, Diffraction at one-and two dimensional gratings, Diffraction at a single slit measuring and evaluating with Video Com, Polarimter and optical activity, Abbe's refractometer, Inverse square law of light radiation and absorption coefficient of glass or plastic materials, Polarization of light.

**PHYS 303 Mathematical Physics III (3+0) h.**

Series Method for solving linear differential equations, Fuch's theorem, Second solution, Legendre polynomials, Hermite polynomials, Lagurre polynomials, Bessel Functions, Fourier transformation and its application, Laplace transformation and its application, Eigenvalue problem, Differentional equations of Boundary value problem.

**PHYS 342 Statistical Physics (3 + 0) h.**

Probability, One random variable, Some important probability distributions, Many random variables, Sums of random variables and the central limit theorem, Rules for large numbers, entropy, Kinetic theory of gases, Maxwell's distribution of the velocities of gas molecules and its applications, Distribution function of the energy of molecules, Liouville's theorem, Equilibrium properties, The microcanonical ensemble, Two-level systems, The ideal gas, Mixing entropy and the Gibbs paradox, The canonical ensemble, Canonical examples, The Gibbs canonical ensemblem, The grand canonical ensemble, Quantum statistical mechanics, Maxwell-Boltzmann distribution, Bose Einstein distribution, Fermi-Dirac distribution, Vibrations of a solid, Black-body radiation, Quantum microstates, Quantum macrostates, Ideal quantum gases, Hilbert space of identical particles, Canonical formulation, Grand canonical formulation, The degenerate fermi gas, The degenerate bose gas.

**PHYS 352 Quantum Mechanics (3 + 0) h.**

Reviews of the fundamental experiments in modern physics, the need for quantum mechanics. Wave packet and uncertainty principle, Schrödinger equation for free particle, Continuity relation, The dynamical variables and calculating the expectation values, Schrödinger equation with a potential in one dimension, Dynamical variables and calculating the expectation values in momentum space, Commutation relations, Hermitian operators, Linear operators, Completeness relation and orthonormality, Schrödinger equation in three dimensions, The fundamental postulates of quantum mechanics, Particle in an infinite well, Spectral expansion theory, The parity, Constants of motion and conservation laws, Momentum eigen functions and free body, One-dimensional potentials:(The potential step, The finite potential well at scattering and bound states, The potential barrier, The delta function potential at Scattering and Bound states, Simple harmonic oscillator, Oscillator eigen functions and eigen values, Ladder operators and dynamical variables, Schrödinger equation in three dimensions in Cartesian coordinates, Schrödinger equation in three dimension curvilinear coordinate system, Angular momentum and its eigen functions and eigen values, The addition of angular momentum, The central potentials.

**PHYS 392 Electromagnetism Lab (0 + 2) h.**

Measurement of e/m of the electron, Verification of Biot - Savart law , Verification of Faraday's law, Transformers , Measuring the force on current carrying conductors in a homogenous magnetic fields, RLC circuits, Generators, Motors, Transformers, Magnetic moment of magnetized rod, Helmholtz coils, Magnetic induction.

**PHYS 395 Modern Physics lab (0 + 2) h.**

Characteristics of microwaves, Franck- Hertz experiment, Stefan-Boltzmann law for heat radiation, Determination of Planck's constant by means of the photoelectric effect using the compact arrangement, Faraday effect, Fabry – Perot interferometer, Kerr effect, The Balmer series of hydrogen and determination of Rydbergs constant, Pockels effect, Zeeman effect.

**PHYS 422 Electronics (3 + 1) h.**

Theoretical part: Analog Electronics: The P-N junction diode and Zener diode with their applications Junction Field effect transistor - Bipolar junction transistor (Bias and amplifiers: JFET & BJT) – Differential and Operational Amplifiers, Introduction to Feedback Circuits, Multivibrators and Oscillators, Digital Electronics: Binary and Hexadecimal System, Logic Gates, Karnaugh Maps, Flip Flops, Shift Registers, Counters, Memories. Practical part: P-N junction application (half-wave rectifier, full-wave rectifier, clampers and limiters, Zener regulation) - Transistors JFET & BJT amplifiers. Amplifiers with 741(Inverting & Non inverting Amplifiers, Active Filters, Wien Oscillator, Astable Multivibrator). Half and Full Adder (7483), Flip Flop (7474-7476), Shift Register (7495-74194), Counters (7493-74193).

**PHYS 452 Quantum Mechanics II (3 + 0) h.**

Dirac notation, Vector space algebra and Hilbert space, Rephrasing wave mechanics and operator methods in abstract view, Angular momentum commutation relations, Raising and lowering operators for angular momentum, Expansion theory in abstract view, Matrix representation of angular momentum operators, General relations in matrix mechanics, Eigen states of spin ½, The intrinsic magnetic moment of spin ½ particles, Addition of two spins, Addition of Spin ½ and orbital angular momentum, Time independent perturbation theory and energy shifts, Degenerate perturbation theory, The Stark effect, Hyperfined splitting, Variational principle and its applications, The WKB approximation, Time-dependent perturbation theory, The interaction of charged particle with electromagnetic field, Two level-system, emission and absorption of radiations, spontaneous emission, Transition rate, selection rule, scattering theory, Partial wave analysis, The Born approximation.

**PHYS 471 Solid State Physics I (3 + 0) h.**

Different states of matter, classification of solids, crystal structure (Bravais lattices & Miller indices), methods of determination of crystal structure (X-ray diffraction, electron and neutron diffraction), crystal defects, crystal binding (interatomic forces, types crystal bonds), Methods of crystal growth, lattice dynamics (crystal vibration modes and phonons), thermal properties of insulators (specific heat of insulators: classical model, Einstein's model, Debye model,-thermal conductivity of insulators), Dependence of thermal conductivity on temperature, Free electron theory (classical model of free electron, Fermi gas of free electrons, Maxwell-Boltzmann distribution, Fermi-Dirac distribution function), band theory (zone theory and tight binding theory).

**PHYS 481 Nuclear Physics I (3 + 0) h.**

Properties of the nucleus: determination of nuclear charge, radius and mass, Nuclear binding energy, Natural Radioactivity: Decay law, Nuclear stability, Radioactivity and theory of transformation .Artificial Radioactivity: Discovery of artificial radionuclides, Transuranium elements, Interaction of radiation with matter: Interaction of heavy elements, interaction of light electrons, interaction of gamma rays with matter, interaction of neutrons with matter, Radiation Detectors: Gas detectors, Scintillation detectors, solid state detectors, Nuclear Reactions: Reactions of matter by gamma rays, reactions by alpha particles, reactions by protons, reactions by neutrons, Nuclear fission: Discovery of Nuclear fission, theory of Nuclear fission, Nuclear fusion: Energy production in stars, control of thermonuclear reactions.

**PHYS 455 Molecular and Atomic Spectra (3 + 0) h.**

Introduction: Comparing between atomic emission spectroscopy and atomic absorption spectroscopy; Optical spectroscopy, Atomic spectrum, Quantization of hydrogen atom, Atomic emission / absorption spectrophotometry Molecular spectroscopy , Spectroscopy of inner electrons. Zeemen's effect, Sodium spectrum, Effect of magnetic field on the energy levels of atom. Theory of magnetic energy, Anomalous Zeeman's effect and Lande splitting factor. Molecular Spectra of diatomic molecules, Vibrational energy levels in both classical mechanics and quantum mechanics. Rotational spectra of diatomic molecule in gaseous state and rotational energy levels, Molecular spectra; harmonic Oscillator, Non Rigid Rotator, Infrared Vibration, Rotation spectra, spectrum, IR spectrum, RBS spectra, XRD spectrum, measurements of Absorbance, Transmitting and Reflecting using double beam Spectrophotometers in all ranges of wavelengths (UV-VIS-NIR-IR), Normal modes of vibrations; Natural of infrared absorption, Basic Laser principles, Laser behavior, Properties of laser radiations, Different types of lasers, Laser spectroscopy, The total losses of the laser system, Transmission at the mirrors, Absorption and scattering by the mirrors, Absorption in the laser medium, Diffraction losses at the mirrors, The Ruby Laser, Three Level Laser (Helium-Neon Laser)-Four Level Laser ( Carbon dioxide Laser), Laser applications.

**PHYS 497 Solid State Physics lab (0 + 2) h.**

Studying the characteristics of the solar cell, electron diffraction experiments characteristics curves of an optical (photo) resistor, studying the electron spin resonance (ESR), calculation of the energy gap of germanium by an electrical method determination of the thermal coefficient of resistance of a noble metal (platinum) by computer, the magnetic susceptibility of some materials and its classification, X-ray spectroscopy and calculation of Planck's constant and Miller indices of crystal planes in NaCl single crystal, thermoelectric effect in semiconductors (calculation of Seebeck, Peltier and Thomson coefficients), superconductivity and determination of the transformation temperature TC of YBCO specimen by computer, determination of the absorption coefficient of aluminum for X-ray, Hall effect, studying the crystalline structure by using the field effect microscope.

**PHYS 498 Nuclear Physics Lab (0 + 2) h.**

Statistical nature of Radioactive decay law, Rutherford Scattering, Attenuation of gamma radiation, Absorption of beta radiation passing through different materials, Inverse square law in case of gamma-rays, Determination of the range of beta particles in absorbers by beta gamma source, Backscattering of beta particles, determination of the dead time of GM tube, Effect of a magnetic field on beta particles motion, Assessment of natural radionuclide in NaCl, Compton scattering.

**PHYS 499 Project (2 + 0) h.**

The student carries out a research under the supervision of one of the Staff members in one of the following branches: Theoretical Physics, Nuclear Physics, Solid State Physics, Fiber Optics, Laser, Plasma, Electronics. The student submit a a report about his work, and is evaluated by a committee selected by the department.

# College of Science in Buraidah

## Vision:

The College of Science seeks to become a leader in educational and technological innovation, scientific discovery and creativity amounting the other local and international colleges of science. This happens through fostering an atmosphere of intellectual inspiration and partnership for the prosperity of society.

## Mission:

The idea of establishing the colleges of Science in Qassim came as a natural response to the educational revival the Kingdom enjoyed since its foundation to respond to the local community requirements by identifying and diagnosing the problems the community is facing in order to find the answers. It also aspires to meet the educational and development needs of society by providing high-quality academic programs, pioneering innovative research and creative articulation, and through active involvement in the community for the prosperous culture and economic development of the country. In addition, it aims at qualifying its students to face the rapid global changes while preserving our identity and principles which emanate from our glorious religion.

## Values:

The College of Science in Buraidah is a newly established college, which is affiliated to Qassim University. It follows the same curriculum as the the College in the main campus. It is committed to excellence on all levels of the educational and creative experience, to the success of all its students and to the development of their capacity to arrive at sound and perceptive conclusions that respect differences and diversity in ideas. It is also dedicated to lifelong learning, which encourages the continual use of the mind. The college plays a vital role in the life of the surrounding community, in society as a whole and as a catalyst for economic development.

## Aims:

The College aims to make valuable contributions to the Kingdom's scientific, technological, and economic sectors through the research activities of faculty and graduates. More specifically, the objectives include:

- To provide advanced teaching programs in the various basic sciences and supply the community with competencies and trained specialists in the modern scientific techniques.
- To conduct studies and researches in order to build a technological research database to serve the needs and to solve the community's problems.
- To spread knowledge within the college and the community and to achieve publications and translation work.
- To offer scientific and experimental services in the field of preserving the environments and community service.
- To participate in the development of the university education and to establish the scientific and academic ties with the higher education institutions inside and outside the kingdom to serve the strategic

development in the Kingdom of Saudi Arabia.

- To incite to use instructional technology in the field of teaching in order to improve the graduates performances.
- To participate in the intellectual development and the thinking maturity of the specialized Saudi cadres and to qualify them with analytical skills to enable them to fully participate in the achievement of the objectives of the total economic development.
- To encourages the creation of new knowledge and the preparation of students to have a positive influence on national and international levels.
- To promote lifelong learning inside and outside the college community, to guarantee continued growth and welfare of the society.

## About:

The College of Science was established in 1997, and the college proved to be another building block in establishing Qassim University as a modern institution of higher education. Students began studying at the college in AY1997–1998. The first class of students completed their studies and graduated in AY2001–2002. The college awards a bachelor's degree in science. The college aims to increase the students' knowledge in a wide range of scientific fields and to develop the skills they need to be an expert in individual areas of specialization. In addition, the college provides the students with an education foundation in computer programming and English, as required by the country's labor market.

## Degrees:

Bachelor
Master

## Programs:

The college awards bachelor's degrees in the following majors:

- Mathematics,
- Physics and Chemistry
- Computer Science

## Study Plan:

**Program: Mathematic**

**Study plan:**

**The first and second level is the nature science preparation**

**Level 3**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration(2)** | Math.202 | 4 |
| **Principal of Probability Distribution Theorem** | Stat212 | 4 |
| **Basics of Mathematics** | Math.231 | 3 |
| **Introduction to Geometry** | Math.273 | 3 |

**Level 4**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration in many** | Math.203 | 4 |

| | | |
|---|---|---|
| **variables** | | |
| **Mathematical applications on computers** | Math.251 | 2 |
| **Vectors** | Math.204 | 3 |
| **Linear algebra** | Math.242 | 4 |
| **Theory of numbers** | Math.243 | 3 |

**Level 5**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Linear Programming** | Math.213 | 4 |
| **History of Mathematics** | Math.232 | 3 |
| **Introduction to Differential Equations** | Math.321 | 4 |
| **Numerical analysis** | Math.351 | 4 |

**Level 6**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Mathematical Methods** | Math.326 | 4 |
| **Group Theory** | Math.343 | 4 |
| **Real Analysis (1)** | Math.382 | 4 |

**Level 7**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Rings and Fields** | Math.444 | 4 |
| **Introduction to Topology** | Math.471 | 4 |
| **Real Analysis (2)** | Math.483 | 4 |
| **Project** | Math.499 | 4 |

**Level 8**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Introduction to Partial Differential Equations** | Math.422 | 4 |
| **Introduction to Differential Geometry** | Math.472 | 4 |
| **Complex Analysis** | Math.484 | 4 |

## COURSE DESCRIPTION:

**Level 3**

**Math .202 Differentiation & Integration(2) :** This course aims at giving students definite integral and its properties , mean value theorem of integral and the fundamental theorem of

calculus. It also discusses indefinite integral , standard integrals, derivatives & integrals of hyperbolic and inverse hyperbolic functions, integration methods such as: integration by substitution , integration by parts , integration by partial fractions and other substitutions. Also L'Hospitals Rule , evaluation of area and volume of revolution, arc length, Numerical integration (Trapezoidal rule), Polar coordinates, Polar curves graphs and areas using polar coordinates.

**Stat212 Principal of probability distribution theorem:**
This course discusses the discrete and continuous probability distributions (The mass and density probability functions and their properties, expectation, variance, standard deviation and the moment generating functions) . The discrete and continuous bi variety random variables and their properties (expectation, covariance, correlation coefficient, variance of sum or difference of two random variables and the moment generating
functions of bi variety random variables) . Bi variety distributions (marginal and conditional distributions ,independence of random variables , conditional expectation) .Also distribution functions of random vectors and random samples (distribution of sample mean – law of large number – central limit theorem) are discussed.

**Math.231 Basics of mathematics :**
This course aims at introducing mathematical logic, methods of proofs, mathematical induction, set theory, the product of sets, binary operations, equivalence relations, equivalence classes and partitions ,
mappings , the images and inverse images of sets under mappings , equivalence sets, countable and finite sets. Binary operations, morphisms, definition and examples of groups-definition and examples of rings and fields, polynomials and partial fractions.

**Math.273 Introduction to geometry:**

This course provides students with the main concepts of plane Euclidean geometry such as: coordinates, transformation, reflections ,translation, isometrics and similarity. Theorems on triangles, circles, tangents and angles. Polygons, polyhedral, regular polyhedral, their classification, and properties. Spherical geometry such as: sum of angle formula for spherical triangles, projection, conservative functions. Affine geometry : linear and affine transformation, isometrics, finite affine planes.

**Level 4**

**Math.203 Differentiation & integration in many variables:**This course studies the functions in two or more variables, domain of the function, three dimension rectangular coordinates, limits, continuity, partial derivative, higher-order partial derivatives, differentiation of composed function, maxima and minima-method of Lagrange multipliers for maxima and minima. Double integrals in Cartesian and polar coordinates , triple integrals in spherical and cylindrical coordinates,

infinite series, convergence tests, representations of functions by power series, Taylor , Maclaurin, and the binomial series.

**Math.251 Mathematical applications on computers**

This course provides an introduction to mathematics software as Mathematica, Mat lap and solving some problems in calculus and linear

algebra by mathematica and Mat lap. Applications: modeling , simulation and visualization , internet research . Writing mathematical reports and projects using scientific work place.

**Math.204 Vectors:**

Students studies vectors in two and three dimensions, scalar and vector products,

equations of lines and planes in 3-dimensional space. Surfaces of revolution and their equations in cylindrical and spherical Coordinates. Vector valued functions of a real variable, curves in space, curvature, rates of change in tangent and normal directions, directional derivatives and gradient of a function. Application to equations of normal and tangent space to a surface at a point. Vector fields, divergence, curl of a vector, line and surface integrals, Green's theorem, Gauss' divergence theorem and Stock's theorem.

**Math.242 Linear algebra**

This course studies matrices and their operations, types of matrices, elementary transformations, determinants, elementary properties of determinants, inverse of a matrix, rank of matrix, linear systems of

equations, vector spaces, linear independence , finite dimensional spaces , linear subspaces, inner product spaces, linear mappings, Kernel and image of a linear mapping- Eigen values and Eigen vectors of a matrix and of a linear operator mapping.

**Math.243 Theory of numbers:**

Students study the first and second principle of mathematical induction, well-ordering principle , divisibility, Euclidean algorithm, prime numbers and their properties, linear Diophantine equations, congruencies and their properties, linear congruencies- the Chinese remainder theorem, Fermat's

little theorem, Euler's theorem, Wilson's theorem, arithmetic functions and Pythagorean triples.

**Level 5**

**Math. 213 Linear programming:**

This course gives introduction to operations research, mathematical model for some real problems and mathematical formulation of linear programming problem. Graphical method for solving linear programming problems, convex sets, polygons, extreme point and optimality theorem. Analytical method (Simplex method) , big-M method , Two-phase method, formulation mistakes, dual problem, sensitivity

analysis, application to transportation and network problems.

**Math.232 History of mathematics:**

This course aims at giving students some knowledge about the evolution of some mathematical concepts ,facts and algorithms in arithmetic , algebra, trigonometry ,Euclidean geometry, analytic geometry and calculus through early civilizations such as ancient Egyptian , Babylonians, Greeks, Indians, Chinese, Muslims and Europeans . Evolution of solutions of some conjectures and open problems.

**Math.321 Introduction to differential equations**:

This course gives basic definitions and construction of an ordinary differential equation. Methods of solving ordinary differential equations of first order . Orthogonal trajectories, ordinary differential equations of high orders with constant coefficients and with variable coefficients, types of solutions, linear systems of ordinary differential equations, series solutions of a linear ordinary differential equation of second

order with polynomial coefficient and Laplace transform.

**Math. 351 Numerical analysis:**

Students study numerical methods for solving nonlinear equations (bisection – iteration – Newton – false position … ), errors and rates of convergence. Direct methods for solving linear systems (Gauss

elimination,LU decomposition) and iterative methods (Jacobi –Gauss Seidel – Relaxation). Errors iteration matrices and convergence of iterative methods, polynomial interpolation (Lagrange-
Newton's methods: divided differences- forward and backward differences) and analysis of errors. Numerical differentiation and integration, errors and accuracy. Gaussian integration formulas.

**Level 6**

**Math.326 Mathematical Methods :**

This course discusses series solutions of ordinary differential equations with variable coefficients, inner product space of functions, self- ad joint operator, Sturm-Lowville theory, orthogonal polynomials and special

functions( Legendre, Hermit, gamma, beta, Bessel). Generalized theory of Fourier series and Fourier integrals.

**Math.343 Group Theory:**

This course studies the axioms of group theory and some examples of groups. Subgroups, cyclic groups, Lagrange theorem, normal subgroup, factor group, homomorphism, fundamental theorems of isomorphism, auto morphisms, Caley theorem and its generalization, simple groups, permutation groups, class equation, group action on a set, p-groups, Cauchy theorem- Sylow's theorems, external and internal direct product of group, Burnside theorem, dihedral- quaternion, groups of

auto morphisms on finite and infinite cyclic groups.

**Math.382 Real Analysis (1):**

This course introduces basic properties of the field of real numbers , completeness axiom , series and their convergence , monotone sequence , Bolzano-Weirstrass theorem , Cauchy criterion, basic topological properties of the real numbers, limit of a function , continuous functions and their properties . Uniform continuity , compact sets and its properties. The derivative of a function ,mean value theorem and Lupital rule and Taylor theorem.

**Level 7**

**Math.444 Ring and Fields:**

Students study rings, group of units, group of auto morphisms of a ring , ideals and factor rings and principal ring. They also study prime and maximal ideals, field of quotient of integral domain, characteristic of a ring, direct sum of rings, modules, Euclidean rings, ring of polynomials, roots of polynomials over a field, fields extensions, finite and simple extensions of fields, algebraic closure of a field, splitting fields and finite fields.

**Math.471 Introduction to Topology:**

This course introduces topological spaces, examples, closure of a set, derived set, topological subspaces, bases ,finite product topology, sub-bases, metric spaces, examples, metrizability, continuous functions, characterization of continuous functions on topological and metric spaces, homeomorphisms and examples. Topological property, compact spaces, examples , limit point and sequentially compact spaces.

**Math.483 Real Analysis (2):**

This course studies definition of Riemann integral, Darboux theorem , Riemann sums , properties and the principle theorem in calculus. Series of functions, point twice convergence , uniform convergence, algebra
and σ – algebra (sigma algebra), finite additivity and countable additivity, main extension theorem and outer measure. Measurable sets , measure , Lebesgue measure and its properties,

simple functions, measurable functions, Lebesgue integral, theorems of convergence, the relation between Lebesgue and Riemann integral.

**Math.499 Project:**

A student prepares a research project in one of the Math. topics under the supervision of the staff.
The student should submit a report for an oral exam.

**Level 8**

**Math.422 Introduction to partial differential equations:**

This course discusses classification and formation of partial differential equation , first order linear partial differential equation , solution
using Lagrange's method , Cauchy problem , second order linear partial differential equation in several variables , physical application using separation of variables , classifications of partial differential equation , some boundary value problems and Green's function.

**Math.472 Introduction to differential geometry:**

This course discusses theory of curves in $R^3$, regular curves , arc length and reparameterization , natural parameterization, Serret-Frenet apparatus, existence and uniqueness theorem for space curves, Bertrand curves. Involutes and evolutes, local theory of surfaces, simple surfaces, coordinate transformations, tangent vectors & tangent spaces . First and second fundamental forms, normal and geodesic curvature , Weingarten map, principal Gaussian and mean curvatures, geodesics, equations of Gauss and Godazzi-Mainardi.

**Math.484 Complex Analysis:**

This course discusses complex numbers, Cartesian and polar representation of complex numbers, powers and roots of complex numbers, limits and continuity of complex functions, analytic functions , Cauchy-Riemann equations. Harmonic functions, exponential, trigonometric , hyperbolic functions and logarithmic functions. Complex integration, contour integral , Cauchy's theorem, Cauchy's integral
Formula, bounds on analytic functions ,Taylor and Laurent series, power series, zeros and singularities. Residue theory and applications to real and improper integrals.

**BA Degree Program : Physics**

The first year for these program is the preparatory year of natural Science

**Level 1**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 101** | Language Skills | 2 | - |
| **CHEM101** | General Chemistry (1) | 4 | - |
| **ENG101** | English Language | 3 | - |
| **IC101** | Introduction to Islamic Culture | 2 | - |
| **MATH101** | Calculus (1) | 4 | - |
| **PSY101** | Thinking Skills | 2 | - |
| **Total** | 17 | | |

**Level 2**

| Course | Course Title | Credit | Pre- |
|---|---|---|---|

| Code | | | Course |
|---|---|---|---|
| **ARAB 103** | Arabic Editing | 2 | - |
| **CSC101** | Introduction to Computers and Programming | 3 | - |
| **ENG103** | English Language (2) | 3 | ENG101 |
| **IC102** | Islamic and Society Building | 2 | IC101 |
| **PHYS101** | General Physics (1) | 4 | - |
| **STAT101** | Statistical Probability | 3 | - |
| **Total** | 17 | | |

**Level 3**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC103** | Economic System in Islam | 2 | IC101 |
| **MATH201** | Calculus for Science (2) | 3 | MATH101 |
| **PHYS243** | General Physics (2) | 4 | PHYS101 |
| **PHYS211** | Classical Mechanics (1) | 3 | MATH101 PHYS101 |
| **PHYS231** | Vibrations and Waves | 2 | MATH101 PHYS101 |
| **PHYS243** | Thermodynamics | 3 | PHYS101 |
| **Total** | 17 | | |

**Level 4**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **MATH205** | Calculus for Physics (3) | 3 | MATH201 |
| **PHYS232** | Physical Optics | 3 | Phys231 |
| **PHYS234** | Health Physics | 2 | - |
| **PHYS203** | Mathematical Physics (1) | 3 | MATH201 |
| **PHYS212** | Classical Mechanics (2) | 3 | PHYS211 |
| **PHYS221** | Electromagnetism (1) | 3 | PHYS202 |
| **Total** | 17 | | |

**Level 5**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **BUS103** | Communication Skills | 2 | - |
| **MATH210** | Differential Equations | 3 | MATH205 |
| **PHYS302** | Mathematical Physics (2) | 3 | PHYS203 |
| **PHYS321** | Electromagnetism (2) | 3 | PHYS212 |
| **PHYS351** | Modern Physics | 3 | PHYS232 |
| **PHYS393** | Optics Physics | 3 | PHYS232 |
| **BIO314** | Healthy Culture | 2 | - |
| **Total** | 18 | | |

**Level 6**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC104** | Political System in Islam | 2 | IC101 |
| **PHYS303** | Mathematical Physics (3) | 3 | PHYS30 |
| **PHYS350** | Quantum Mechanics (1) | 3 | PHYS212<br>PHYS351 |
| **PHYS391** | Electromagnetism Lab | 2 | PHYS221 |
| **PHYS393** | Modern Physics Lab | 2 | PHYS351 |
| **PHYS342** | Statistical Physics | 3 | PHYS243 |
| **PQUR126** | Islamic Morals | 2 | |
| **Total** | 17 | | |

**Level 7**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS422** | Electronics | 4 | PHYS243 |
| **PHYS452** | Quantum Mechanics (2) | 3 | PHYS350 |
| **PHYS471** | Solid State Physics (1) | 3 | PHYS350 |
| **PHYS481** | Nuclear Physics (1) | 3 | PHYS351 |
| | Selective Course (Faculty) | 2 | - |
| **Total** | 16 | | |

**Level 8**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS455** | Molecular and Atomic Spectra | 3 | PHYS452 |
| **PHYS495** | Solid State Lab | 2 | PHYS471 |
| **PHYS497** | Nuclear Physics Lab | 2 | PHYS481 |
| **PHYS498** | Project | 2 | PHYS497<br>PHYS495 |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course | 2 | - |
| **Total** | 17 | | |

## Course Description:

**CHEM 10 : General Chemistry**

Theoretical part : Chemical calculations, gasea, liquid state, thermochemistry, solutions, chemical kinetics, chemical and ionic equilibria Bohr Theory and electronic configuration of atoms and periodic table . An Introduction to types of chemical bonds .

Practical part : some experiments on properties of matter : density , viscosity, qualitative

analysis : identification of acidic and basic radicals for inorganic salts .

**Course Number : CSC 101 Introductions to Computer and Programing**

Credit Hours ( lecture and Lab ) : 3 (2+ 1)

Level : Second

Theoretical parts : Introduction to programming , structured program development, program control, functions, array. Assignments in algorithm design and translation of algorithms in high level language like C language

Practical part: Excercices on the theoretical part.

**Course Number :** ENG **101 - English Language**

The course aims to introduce students to :

An awarenss of the basics of the English language in general .

An understanding of the basics of English grammar .

The basics of English pronunciation.

Specialized academic topics in the students, respective disciplines.

Proposed Teaching Methods

The course will be conducted via lectures in the main seminar, workshops and group discussions will also be used .

**Course Number : Math 101 - Calculus -1**

Real number and real line – Inequality. Function – The graph of a function- even and odd functions- composite of functions- Review of Trigonometric functions – inverse functions- Limits – The definition of a limit – Properties of Limits- Techniques for Evaluaring Limits – Infinites Limits. Continuity at a point on an open interval - one sided limits and continuity on a closed interval – Properties of continuity . The Derivative of a function – Differentiability and continuity – chain Rule – Derivatives of Trigonometric function – Logarithmic and Exponential functios ( Differentiation ) - Hyperbolic functions – inverse Trigonometric functions Differentiation . Exterma on an interval- Rolle,s Theorem and mean value theorem – Increasing and Decreasing functions and the first derivative test – concavity and second derivative test- related rates .

**PHYS 101 General Physics (1) (3 + 1) h.**

Theoretical part: Physics and measurements, Units and dimensions, Dynamics of particle in one dimension (displacement, average velocity, instantaneous velocity, acceleration, free fall), vector algebra and geometry, Motion in two dimensions, Projectile motion, Uniform circular motion, Tangential and radial accelerations, Newton's first law and inertial frames, Mass and weight, Newton's second law, Newton's third law, Friction, Work and energy, Vector scalar products, Work of variable forces, Kinetic energy and work-energy theorem, Conservative and non-conservative forces and potential energy, Power, Conservation of mechanical energy, The conservation law of linear momentum, Impulse, Collisions, Collision in one and two dimensions, Rotational motion with constant angular acceleration, Angular quantities, Moment of inertia, Torque and angular momentum, Work of rotational motion, Properties of matter: Elasticity, Stress, Strain, Modulus's, Strain energy, Fluid mechanics: Density and relative density, the concept of pressure, Pascal law, Archimedes principle, Fluid flow, Bernoulli's equation and its applications. State of matters, heat and Temperature and zero law of thermodynamics, Phase transitions, Latent heats, Ideal gases.

Practical part: Error and measurements, Force table, Hook’s Law, Free fall, Projectile motion, Boyle’s Law, Young’s Modulus, Specific Heat of a Solid, Coefficient of Thermal expansion, Surface tension in capillary tube, viscosity, Newton's law of cooling, Determination of the Paraffin wax fusion temperature.

**PHYS 202 General Physics (2) (3 + 1) h.**

Theoretical part: Electric Charge, Insulators and conductors, Coulomb's law, Point charge, The electric field, Electric field of multiple point charges, The electric field of continuous charge distribution, examples of various shapes (disks, rings, spheres, planes), The parallel plate capacitor, Electric dipole, motion of point charge and electric dipole in electric field, Electric flux, Gauss's law, Applications of Gauss's law, Conductor in electrostatic equilibrium, Electric potential, The potential of point charges, The potential of dipole, The electric potential of many charges, Capacitance and capacitors, Energy stored in a capacitor, Fundamental circuits, The electric current, Batteries, current density, Conductivity and resistivity, Ohm's law, Series resistors, Parallel resistors, Kirchhoff's laws, RC circuits, Magnetism and magnetic force, source of magnetic fields, Magnetic field of a current, Magnetic dipoles, Ampere's law and solenoids, The magnetic force on a moving charge, The magnetic force on a current-carrying wire, Forces and torques on current loops, Induced current, Motional emf, Magnetic flux, Lenz's law, Faraday's law, Induced fields and EM waves, Inductors, LC circuits, LR circuits, AC circuits and phase, Capacitors in AC circuits, RC filter circuits, Inductor circuits, The RLC circuits, Power in AC circuits, Wave phenomena, geometrical optics, speed of light, Longitudinal and transverse waves, Sound, The nature of light and the laws of geometric optics, reflection and refraction, Fermat's principle, Snell's law, Image formation.

Practical part: Verification of Ohm's Law, Metric bridge, Charge and discharge of capacitors, Inductive Reactance, Capacitive Reactance, RCL circuits, Transformers, Speed of sound in air , Refractive Index of a Prism, Focal length of Lenses, Focal Length of Mirrors.

**PHYS 211 Classical Mechanics (1) (3 + 0) h.**

Space time, Review of Newton's law and conservation of linear momentum in Cartesian and polar coordinate system, applications on projectile motion in a linear air resistance medium, Quadratic air resistance. Motion of charges in a uniform magnetic field, The center of mass, angular momentum of several particles, Kinetic energy and work, Potential energy and conservative forces, Gradient relation, Time dependent potential energy, Energy for one dimensional linear system, Curvilinear one-dimensional systems, Central forces, The energy of interaction of two particles, The energy of multi-particle systems, CM and relative coordinates, The equation of the orbit, Kepler orbits, The unbound Kepler orbits, Change of orbits, Mechanics in non inertial frames, The tides, Rotating frames and angular velocity vector. Newton's second law in rotating frame, The centrifugal force, Coriolis force, Coriolis force and

free fall, The Foucault pendulum, Coriolis acceleration.

**PHYS 231 Vibration and Waves (2 +0) h.**

Periodic motion, Simple harmonic oscillation, Damped oscillation, Forced oscillation, Application of damped and forced oscillations, Superposition of simple harmonic oscillations, traveling waves, standing, Beats, Transverse wave in wires, Longitudinal wave in rods, Application of longitudinal wave in open and closed air columns, Fourier analysis, Doppler effect.

**PHYS 243 Thermodynamics (3 + 0) h.**

Fundamental concept in heat and thermodynamics, Thermal Equilibrium and zeroth law of thermodynamics, Ideal gases, Kinetic theory of gases, First law of thermodynamic, Application of first law of thermodynamic, isothermal and adiabatic processes. Irreversible process and reversible processes, Carrnot cycle, Otto cycle-cleapeyron latent heat equation, Second law of thermodynamic, Heat Engines, Refrigerators, Entropy, Thermodynamic functions, Maxwell relations, Third law of thermodynamic, Phase change, Applications on thermodynamic laws.

**PHYS 203 Mathematical Physics I (3 + 0) h.**

Determinants, Matrices, Solving linear equations and differential equations by matrices, Application on the motion of the rotation of the

rigid body, Vector Algebra: Vector products, Position, Displacement, Vector transformation, Gradient, The Divergence, The Curl, Laplace operator, Line, Surface, and Volume Integrals, Gauss theorem, Stock's theorem, Green's theorem, Spherical polar coordinates, Cylindrical coordinates.

**PHYS 212 Classical Mechanics II (3 + 0) h.**

Calculus of variations, The Euler-Lagrange equation and applications, Lagrange's equations for Unconstrained motion, Constrained systems, Generalized momenta and Ignorable coordinates, Lagrange multipliers and constraint forces, Rotational motion of rigid body, The inertial tensor, Principal axes of Inertia, Precession of a top by weak torque, Euler's equations, Euler's angles, Coupled oscillations and normal modes, The double pendulum, Three coupled pendulum, Hamiltonian mechanics for one dimensional systems, Hamiltonian mechanics in several dimensions, Ignorable
coordinates, Phase space orbits, Liouville's Theorem.

**PHYS 221 Electromagnetism I (3 + 0) h.**

Review of vector Operations and algebra, Linear and rotational transformation of vectors, Vector field, Review of vector differential calculus: (gradient, the divergence, the curl, product rules of algebra , Second Derivatives,), Review of integral Calculus: (linear, surface, and volume integrals of vector functions), The fundamental theorem for: (calculus, gradient, divergence, curl), Curvilinear Coordinates: (spherical polar and cylindrical coordinates), The Dirac delta function in one and three dimension, The divergence of reciprocal square of radial distance, The Helmholtz theorem, Coulomb's law, The electric field, Continuous charge distributions, Divergence and curl of electrostatic field, Field lines and flux, Gauss's law and its applications, Electric potential, The potential of a localized charge distribution, The work done to move a charge, The energy of a point charge distribution, The energy of a continuous charge distribution, Properties of conductors and induced charges, Surface charge and the force on a conductor, Capacitors, Poisson's equation, Laplace's equation in one, two and three dimensions, Boundary conditions and uniqueness theorems, Conductors and the second uniqueness theorem, The Method of images and induced surface charge and calculating force and energy, Multipole expansion and approximate potentials at large distances, The monopole and dipole terms, The electric field of a dipole, Polarization, Field of a polarized object, Induced dipole and dielectrics, Polar molecules, Bound charges, The field inside a dielectric and the electric displacement, Gauss's law in the presence of dielectrics, Boundary conditions, Linear Dielectrics: (susceptibility, permittivity, dielectric constant), Boundary value problems with linear dielectrics, Force and energy in dielectric systems, Magnetostatics and the Lorentz law , Magnetic fields and magnetic forces, The Biot-Savart law, The magnetic field of a steady current, The divergence and curl of the magnetic field, Ampere's law and its applications, Magnetic vector potential, Magnetostatic boundary conditions, Multipole expansion of the vector potential, Magnetic fields in matter and the magnetization, Magnetic materials: (diamagnets, paramagnets, ferromagnets), Torques and forces on magnetic dipoles, Effect of magnetic field on atomic orbits, The field of a magnetized object, Bound currents, The magnetic field inside matter and the auxiliary field, Ampere's law in magnetized materials, Boundary Conditions, Linear and nonlinear media, Magnetic susceptibility and permeability, Ferromagnetism.

**PHYS 232 Physical Optics (3 + 0) h.**

The nature of light , The superposition of waves, Interference of two-beams of light (division of the wave front & division of amplitude) Interferometers( Young , Fresnel's biprism , loyed mirror, Fresnel's double mirrors , wedge interferometer , Newton rings , Michelson

interferometer , Jamin & Mach-Zehnder refractometers ), Interference of multiple beams , Fabry-Perot interferometer , Applications of interferometry, Diffraction , Fraunhofer diffraction (single slit, two slits, multiple slits) – diffraction grating - Fresnel diffraction (circular aperture & circular Obstacle ), Polarization - polarization by absorption , reflection , refraction & double refraction, Optical active materials & polarometer .Interference of polarized light , Analysis of polarized light , Electro-optics (Kerr effect & Pockels effect ) , Magneto- optics (Faraday effect).

**PHYS 302 Mathematical Physics II (3 + 0) h.**

Complex numbers, Analytic functions, Limits and Continuity, Analyticity, The Cauchy, Riemann Equations, Elementary Functions, Complex Integration, Contoursm, Independence of path-Cauchy integral theorem- Bounds for analytic Functions, Series representations for analytic functions, Residue Theory, Conformal Mapping, Invariance of Laplace's Equation, Geometric Considerations, Bilinear Transformations, The Schwartz, Christoffel Transformations.

**PHYS 321 Electromagnetism II (3+0) h.**

Electromotive force, Ohm's law, Motional electromotive force, Electromagnetic induction, Faraday's law, The induced electric field, Inductance, Energy stored in magnetic fields, The modified Ampere's law, Maxwell's equations in vacuum, Maxwell's equations in matter, Boundary conditions, Conservation laws and the continuity equation, Poynting's theorem, Newton's third law in electrodynamics and momentum, Maxwell's stress tensor, Conservation of momentum, Angular momentum, Electromagnetic waves in one dimension, The wave equation, Sinusoidal waves, Boundary conditions: reflection and transmission, Polarization, Electromagnetic waves in vacuum, Monochromatic plane waves, Energy and momentum in electromagnetic waves, Electromagnetic waves in matter, Propagation in linear media, Reflection and transmission at normal incidence, Reflection and transmission at oblique incidence, Absorption and dispersion, Electromagnetic waves in conductors, Reflection at a conducting surface, The frequency dependence of permittivity, Guided waves and wave guides, TE waves in a rectangular wave guide, The coaxial transmission lines, Electric dipole radiation, Magnetic dipole radiation, Radiation from an arbitrary source, Power radiated by a point charge, Radiation reaction with matter.

**PHYS 351 Modern Physics (3 + 0) h.**

Special Theory of Relativity: wave propagation, Michelson Morley experiment, Galilean transformation, Lorentz transformations, Relative velocity, Lorentz contraction, Time Dilation, relativity of mass, Mass and energy, Applications, The particle like properties of Electromagnetic radiation: Electromagnetic waves, The photoelectric effect, black body radition, The Compton Effect, X-rays Waves like properties of particles: De-Broglie hypothesis, Electron diffraction experiment of Davison and Germer, Electron microscope, Uncertainity principle, quantum theory, Atomic Structure: atomic properties, The Thomson model, Rutherford Model for atomic nuclei, alpha particle scattering, Atomic Spectra, Bohr theory of the hydrogen atom, Sommerfeld’s Model, Failure of the Bohr theory Frank-Hertz experiment, The basic ideas of the Quantum Mechanics.

**PHYS 393 Optics Lab (0 + 2) h.**

Prism spectrometer (refractive index and dispersion), Grating spectrometer, Fresnel's biprism with He-Ne laser, Fresnel's double mirrors with He-Ne laser, Newton's rings, Michelson interferometer, Mach-Zehnder-interferometer, Diffraction at a single slit, Diffraction at double slits, Diffraction at one-and two dimensional gratings, Diffraction at a single slit measuring and evaluating with Video Com, Polarimter and optical activity, Abbe's refractometer, Inverse square law of light

radiation and absorption coefficient of glass or plastic materials, Polarization of light.

**PHYS 303 Mathematical Physics III (3+0) h.**
Series Method for solving linear differential equations, Fuch's theorem, Second solution, Legendre polynomials, Hermite polynomials, Lagurre polynomials, Bessel Functions, Fourier transformation and its application, Laplace transformation and its application, Eigenvalue problem, Differentional equations of Boundary value problem.

**PHYS 342 Statistical Physics (3 + 0) h.**
Probability, One random variable, Some important probability distributions, Many random variables, Sums of random variables and the central limit theorem, Rules for large numbers, entropy, Kinetic theory of gases, Maxwell's distribution of the velocities of gas molecules and its applications, Distribution function of the energy of molecules, Liouville's theorem, Equilibrium properties, The microcanonical ensemble, Two-level systems, The ideal gas, Mixing entropy and the Gibbs paradox, The canonical ensemble, Canonical examples, The Gibbs canonical ensemblem, The grand canonical ensemble, Quantum statistical mechanics, Maxwell-Boltzmann distribution, Bose Einstein distribution, Fermi-Dirac distribution, Vibrations of a solid, Black-body radiation, Quantum microstates, Quantum macrostates, Ideal quantum gases, Hilbert space of identical particles, Canonical formulation, Grand canonical formulation, The degenerate fermi gas, The degenerate bose gas.

**PHYS 352 Quantum Mechanics (3 + 0) h.**
Reviews of the fundamental experiments in modern physics, the need for quantum mechanics. Wave packet and uncertainty principle, Schrödinger equation for free particle, Continuity relation, The dynamical variables and calculating the expectation values, Schrödinger equation with a potential in one dimension, Dynamical variables and calculating the expectation values in momentum space, Commutation relations, Hermitian operators, Linear operators, Completeness relation and orthonormality, Schrödinger equation in three dimensions, The fundamental postulates of quantum mechanics, Particle in an infinite well, Spectral expansion theory, The parity, Constants of motion and conservation laws, Momentum eigen functions and free body, One-dimensional potentials:(The potential step, The finite potential well at scattering and bound states, The potential barrier, The delta function potential at Scattering and Bound states, Simple harmonic oscillator, Oscillator eigen functions and eigen values, Ladder operators and dynamical variables, Schrödinger equation in three dimensions in Cartesian coordinates, Schrödinger equation in three dimension curvilinear coordinate system, Angular momentum and its eigen functions and eigen values, The addition of angular momentum, The central potentials.

**PHYS 392 Electromagnetism Lab (0 + 2) h.**
Measurement of e/m of the electron, Verification of Biot - Savart law , Verification of Faraday's law, Transformers , Measuring the force on current carrying conductors in a homogenous magnetic fields, RLC circuits, Generators, Motors, Transformers, Magnetic moment of magnetized rod, Helmholtz coils, Magnetic induction.

**PHYS 395 Modern Physics lab (0 + 2) h.**
Characteristics of microwaves, Franck- Hertz experiment, Stefan-Boltzmann law for heat radiation, Determination of Planck's constant by means of the photoelectric effect using the compact arrangement, Faraday effect, Fabry – Perot interferometer, Kerr effect, The Balmer series of hydrogen and determination of Rydbergs constant, Pockels effect, Zeeman effect.

**PHYS 422 Electronics (3 + 1) h.**

Theoretical part: Analog Electronics: The P-N junction diode and Zener diode with their applications Junction Field effect transistor - Bipolar junction transistor (Bias and amplifiers: JFET & BJT) – Differential and Operational Amplifiers, Introduction to Feedback Circuits, Multivibrators and Oscillators, Digital Electronics: Binary and Hexadecimal System, Logic Gates, Karnaugh Maps, Flip Flops, Shift Registers, Counters, Memories. Practical part: P-N junction application (half-wave rectifier, full-wave rectifier, clampers and limiters, Zener regulation) - Transistors JFET & BJT amplifiers. Amplifiers with 741(Inverting & Non inverting Amplifiers, Active Filters, Wien Oscillator, Astable Multivibrator). Half and Full Adder (7483), Flip Flop (7474-7476), Shift Register (7495-74194), Counters (7493-74193).

**PHYS 452 Quantum Mechanics II (3 + 0) h.**

Dirac notation, Vector space algebra and Hilbert space, Rephrasing wave mechanics and operator methods in abstract view, Angular momentum commutation relations, Raising and lowering operators for angular momentum, Expansion theory in abstract view, Matrix representation of angular momentum operators, General relations in matrix mechanics, Eigen states of spin ½, The intrinsic magnetic moment of spin ½ particles, Addition of two spins, Addition of Spin ½ and orbital angular momentum, Time independent perturbation theory and energy shifts, Degenerate perturbation theory, The Stark effect, Hyperfined splitting, Variational principle and its applications, The WKB approximation, Time-dependent perturbation theory, The interaction of charged particle with electromagnetic field, Two level-system, emission and absorption of radiations, spontaneous emission, Transition rate, selection rule, scattering theory, Partial wave analysis, The Born approximation.

**PHYS 471 Solid State Physics I (3 + 0) h.**

Different states of matter, classification of solids, crystal structure (Bravais lattices & Miller indices), methods of determination of crystal structure (X-ray diffraction, electron and neutron diffraction), crystal defects, crystal binding (interatomic forces, types crystal bonds), Methods of crystal growth, lattice dynamics (crystal vibration modes and phonons), thermal properties of insulators (specific heat of insulators: classical model, Einstein's model, Debye model,-thermal conductivity of insulators), Dependence of thermal conductivity on temperature, Free electron theory (classical model of free electron, Fermi gas of free electrons, Maxwell-Boltzmann distribution, Fermi-Dirac distribution function), band theory (zone theory and tight binding theory).

**PHYS 481 Nuclear Physics I (3 + 0) h.**

Properties of the nucleus: determination of nuclear charge, radius and mass, Nuclear binding energy, Natural Radioactivity: Decay law, Nuclear stability, Radioactivity and theory of transformation .Artificial Radioactivity: Discovery of artificial radionuclides, Transuranium elements, Interaction of radiation with matter: Interaction of heavy elements, interaction of light electrons, interaction of gamma rays with matter, interaction of neutrons with matter, Radiation Detectors: Gas detectors, Scintillation detectors, solid state detectors, Nuclear Reactions: Reactions of matter by gamma rays, reactions by alpha particles, reactions by protons, reactions by neutrons, Nuclear fission: Discovery of Nuclear fission, theory of Nuclear fission, Nuclear fusion: Energy production in stars, control of thermonuclear reactions.

**PHYS 455 Molecular and Atomic Spectra (3 + 0) h.**

Introduction: Comparing between atomic emission spectroscopy and atomic absorption spectroscopy; Optical spectroscopy, Atomic spectrum, Quantization of hydrogen atom, Atomic emission / absorption spectrophotometry Molecular spectroscopy ,

Spectroscopy of inner electrons. Zeemen's effect, Sodium spectrum, Effect of magnetic field on the energy levels of atom. Theory of magnetic energy, Anomalous Zeeman's effect and Lande splitting factor. Molecular Spectra of diatomic molecules, Vibrational energy levels in both classical mechanics and quantum mechanics. Rotational spectra of diatomic molecule in gaseous state and rotational energy levels, Molecular spectra; harmonic Oscillator, Non Rigid Rotator, Infrared Vibration, Rotation spectra, spectrum, IR spectrum, RBS spectra, XRD spectrum, measurements of Absorbance, Transmitting and Reflecting using double beam Spectrophotometers in all ranges of wavelengths (UV-VIS-NIR-IR), Normal modes of vibrations; Natural of infrared absorption, Basic Laser principles, Laser behavior, Properties of laser radiations, Different types of lasers, Laser spectroscopy, The total losses of the laser system, Transmission at the mirrors, Absorption and scattering by the mirrors, Absorption in the laser medium, Diffraction losses at the mirrors, The Ruby Laser, Three Level Laser (Helium-Neon Laser)-Four Level Laser ( Carbon dioxide Laser), Laser applications.

**PHYS 497 Solid State Physics lab (0 + 2) h.**
Studying the characteristics of the solar cell, electron diffraction experiments characteristics curves of an optical (photo) resistor, studying the electron spin resonance (ESR), calculation of the energy gap of germanium by an electrical method determination of the thermal coefficient of resistance of a noble metal (platinum) by computer, the magnetic susceptibility of some materials and its classification, X-ray spectroscopy and calculation of Planck's constant and Miller indices of crystal planes in NaCl single crystal, thermoelectric effect in semiconductors (calculation of Seebeck, Peltier and Thomson coefficients), superconductivity and determination of the transformation temperature TC of YBCO specimen by computer, determination of the absorption coefficient of aluminum for X-ray, Hall effect, studying the crystalline structure by using the field effect microscope.

**PHYS 498 Nuclear Physics Lab (0 + 2) h.**
Statistical nature of Radioactive decay law, Rutherford Scattering, Attenuation of gamma radiation, Absorption of beta radiation passing through different materials, Inverse square law in case of gamma-rays, Determination of the range of beta particles in absorbers by beta gamma source, Backscattering of beta particles, determination of the dead time of GM tube, Effect of a magnetic field on beta particles motion, Assessment of natural radionuclide in NaCl, Compton scattering.

**PHYS 499 Project (2 + 0) h.**
The student carries out a research under the supervision of one of the Staff members in one of the following branches: Theoretical Physics, Nuclear Physics, Solid State Physics, Fiber Optics, Laser, Plasma, Electronics. The student submit a a report about his work, and is evaluated by a committee selected by the department.

## Study Plan of Computer Science:

**Level -3**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC101** | Introduction to Islamic Culture | 2 |
| **Arab101** | Language Skills | 2 |
| **Phys104** | General Physics (2) | 4 |
| **Math105** | Different Calculus | 3 |
| **CEN111** | Logic Design | 4 |
| **CSC152** | Concepts of Algorithms & | 4 |

| | | |
|---|---|---|
| | Computer Programming | |
| | Total | 19 |

**Level-4**

| Course Code | Course Title | Credit |
|---|---|---|
| **Arab103** | Expository Writing | 2 |
| **Math106** | Integral Calculus | 3 |
| **Math109** | Linear Algebra and Analytical Geometry | 3 |
| **IT125** | Database | 4 |
| **CEN126** | Computer Architecture | 3 |
| **CSC153** | Object Oriented Programming | 4 |
| | Total | 19 |

**Level-5**

| Course Code | Course Title | Credit |
|---|---|---|
| **Math203** | Differential and Integral Calculus | 3 |
| **Stat224** | Introduction to Statistics & Probability | 3 |
| **CSC225** | Assembly Language | 3 |
| **CSC244** | Concepts of Algorithms | 3 |
| **CSC276** | Computer Graphics | 4 |
| **CSC283** | Discrete Structures | 4 |
| | Total | 20 |

**Level-6**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC102** | Islamic and Construction of Society | 2 |
| **Math207** | Differential Equations | 3 |
| **CSC214** | Data Structures | 4 |
| **IT224** | Visual Programming | 4 |
| **CSC237** | Programming Language Concepts | 3 |
| **CSC229** | Operating Systems | 4 |
| | Total | 20 |

**Level-7**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN301** | Signals and Systems Analysis | 4 |
| **CEN333** | Microprocessors Systems | 4 |
| **CSC338** | Compiler Design | 3 |
| **CEN345** | Computer Networks | 4 |
| **CSC346** | Software Engineering | 3 |
| | Total | 18 |

**Level-8**

| Course Code | Course Title | Credit |
|---|---|---|

| | | |
|---|---|---|
| **IC103** | The Islamic Economical System | 2 |
| **CSC313** | Algorithms Analysis & Design | 3 |
| **CSC327** | Operations Research and Programming Applications | 3 |
| **CSC357** | Internet Techniques & Web Programming | 3 |
| **CSC392** | Selected Topics in Computer Sciences | 3 |
| **CSC393** | Systems Programming | 3 |
| | Total | 17 |

**Level-9**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC104** | Fundamentals of the Islamic Political System | 2 |
| **CSC414** | Introduction to Unix/Lunix Systems | 3 |
| **IT463** | Knowledge Base Systems Applications | 3 |
| **CSC448** | Optimization Techniques | 3 |
| **IT481** | Communication Skills | 2 |
| **CSC498** | Graduation Project (1) | 2 |
| | Total | 15 |

**Level-10**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC445** | Introduction to Crytopgraphy & Information Security | 3 |
| **IT450** | Multimedia Data Management | 3 |
| **CSC458** | Distributed Systems & Parallel Processing | 3 |
| **CSC463** | Artificial Intelligence | 4 |
| **CSC499** | Graduation Project (2) | 4 |
| | Total | 17 |

## Course Description (Computer Science):

**CEN 111 Logic Design** (4h)

This course discusses the Digital computer and information (numbering systems, Arithmetic operations, Decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, Combinational circuits simplification, CMOS circuits), Combinational logic design (design procedure, decoders, multiplexes, Binary adder and subtracted), Sequential circuits (latches, flip flops, synchronous sequential circuits analysis and design), Analysis and design of synchronous sequential machines, Representation, state reduction and realization; Finite state machines.

**Textbook:** M. Mano, Digital Design, 3rd Ed., 2002.

**IS 125 Database(4h)**

This course discusses the Database definition, Database system, Overview of database management, database system architecture, Introduction to Relational databases, An Introduction to Structured Query Language(SQL), Database Integrity, Views, Normalization, Database design, Practical Applications.

**CEN 126 Computer Architecture (3h)**

This course discusses the Review of logic design principles. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design. System software. Micro-programmed CPU. Comparison between CISC, RISC and VLIW processors. Introduction to memory organization; I/O operations; Introduction to parallel processing techniques.

**CSC 237 Programming Languages Concepts (3h)**

This course discusses the Preliminaries. Evolution of the Major Programming Languages. Describing Syntax and Semantics. Lexical and Syntax Analysis. Names, Binding, Type Checking, and Scopes. Data Types. Expressions and Assignment Statements. Statement-Level Control Structure. Subprograms. Implementing Subprograms. Abstract Data Types. Support for Object-Oriented Programming. Concurrency. Exception Handling and Event Handling. Functional Programming Languages. Logic Programming Languages.

**CSC 283 Discrete Structures (4h)**

**Introduction to Discrete Structures**: This course discusses the algorithmic language. **Logic**: propositions, predicate logic, proofs, mathematical induction. **Sets**: special sets, operations, properties and identities, application of logic to knowledge-based systems. **Relations**: graphical and matrix representations, equivalence and order relations, application to databases **Functions:** types, cardinality, application to functional languages **Undirected Graphs**: Simple graphs, Eulerian paths, Hamiltonian circuits, trees, application to syntax diagrams **Directed Graphs** digraphs, consistent labeling, paths problems, Warshall's algorithm, shortest paths and Dijkstra's algorithm, application to routing in computer networks. **Machines and Computations**: automata as models, finite state automata (FSA) without outputs, FSA as language recognizers and their limits, introduction to Turing Machines, application of FSA to problem-solving.

**CSC 276 Computer Graphics (4h)**

This course discusses the Computer Graphics Applications Survey. **Color models** (chromaticity diagram, RGB, CMY, YIQ, HSV, and HLS color models). **Graphics Output Primitives** (coordinate frames, DDA, Bresenham's algorithm, circle-drawing, fill-area primitives algorithms). **2D Graphics** (2D cartesian coordinates, curves and parametric equations, functions and transformations, inverse functions. **3D Graphics** (vectors in 3D, dot and cross product, homogeneous coordinates, correlation between cartesian and homogeneous coordinates). **Geometric transformations** (2D geometric transformations, matrix representation and homogeneous coordinates, inverse transformations, 2D composite transformations). **Geometric representation** Lagrange polynomials of degree n, Hermite cubic polynomial, Bernstein polynomial, interpolation problem, Spline interpolation, problem of approximation, Bezier-

Bersnstein approximation, Bezier-B-Spline approximation, quadric surfaces.

**CSC 152 Concepts of Algorithms and Computer Programming (4h)**

This course discusses the Problem-solving, algorithmic design, Introduction to Programming, Structured Program Development, Program Control, Functions, Arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.

**IS 224 Visual Programming (3h)**

This course discusses the Selecting a Visual Language, Knowing the concepts and procedures used in Visual Languages, Syntax and semantics of the language used. Types of Data, conditional statements, recursion, data structures, modular programming, review of Object-Oriented Programming concepts and techniques, User Interface Design rules, Materializing an interface into a set of visual objects, File types, File organizing techniques, File usages, Publishing an interface on the web, Basic concepts of Human Computer Interaction, Comparison between the selected language and other visual languages.

**CSC 338 Compiler Design (3h)**

This course discusses the design and implementation of compilers. Compiler organization, algorithms for lexical, syntactic and semantic analysis, top-down and bottom-up parsing (e.g., recursive descent, LL, LR, LALR parsing). Symbol table organization, error detection and recovery, intermediate and object code generation, and code optimization. Student has to implement a compiler for a simple high level language as project.

**CSC 225 Assembly Language (3h)**

This course discusses the Introduction to PC hardware, PC software requirements, assembly language programmers requirements, program logical and control, string operations, arithmetic operations for processing binary data, assembling linking and executing a program.

**CSC 214 Data Structures (4h)**

This course discusses the Functions in C - Structures and pointers - Memory Management functions, Concepts and Definition of abstract data type, Array as ADT, Stack and operations, Queue and operations Linked List and stack as list, Queue as list and applications, Sorting, recursion, Tree Introduction to Graphs, Projects and Exercises.

**CSC 346 Software Engineering (3h)**

This course discusses the Software Engineering Concepts, System Engineering Concepts, Software Process, Analysis Concepts and Principles, Analysis Modeling Design, Real -Time System Design, Software Testing Techniques, Technical Metrics for Software, Project.

**CSC 229 Operating Systems (4h)**

This course discusses the Computer System Structure, Operating System Concepts, Operating System Structure, Procedures, CPU Scheduling, Process Synchronization, Batch Files, Recovery Console, Memory Management, Virtual Memory, File-System Interface, Storage Structure, Data Storage on Disks, File-Systems: Fat,Fat32, NTFS, Distributed Systems, Hardware Protection, The Linux system

**CSC 244 Concepts of Algorithms (3h)**

This course discusses the Growth function and Recurrence, Divide-and-Conquer: (Strassen, Fibonacci, Polynomial Multiplication), Heap Sort, Quick Sort, Bubble Sort, Insertion Sort, Merge Sort, Hash Table, Binary Search Tree, Dynamic Programming, Greedy Algorithms.

**CEN 333 Microprocessor Systems (3h)**

This course discusses the Architecture and Instruction set of different 16 bit microprocessors; Microprocessor chips. **Supporting chips**: Buffers, decoders, system clock generator, reset system. Memory chips and subsystems Interfacing 16-bit Microcomputers. Architecture of Microprocessor based systems, design technique, memory and I/O devices interfacing to the microprocessor, interfacing technique. **I/O techniques**: Interrupts, Direct memory access; **System development and design tools techniques**: hardware and software.

**CSC 153 Object Programming (4h)**

This course discusses the Introduction to Object - Oriented Programming, Program Control Structures, Functions, Arrays, Pointers and Strings, Classes Part I: Classes and data abstraction, Classes Part II: Operator Overloading, Inheritance Virtual Functions and Polymorphism.

**CEN 301 Signals and Systems (4h)**

This course discusses the Time-domain analysis of signals: Mathematical and graphical representation. Classifications. Basic operations. Basic signals. Sampling and aliasing. Time-domain analysis of systems: Block diagram representation. Differential and difference equation representation. Impulse and step responses. Frequency-domain analysis of signals: Spectra of continuous-time and discrete-time signals. Frequency-domain analysis of systems: Frequency response of continuous-time systems: Bode plot, Nyquist plot, feedback and its effects on system stability. Frequency response of discrete-time systems. Laplace transform and its applications. Z-transform and its applications: Relationship with Laplace. Exercises should be solved using MATLAB.

**CEN 345 Computer Networks (4h)**

This course discusses the **Introduction to computer networks**: Network Types, Overview of data transmission, Introduction to network protocols, The Internet protocol. **Network topologies**; Network architecture and the OSI reference model; The physical and Data Link Layer , flow and errors control, ARQ Stop/wait, Sliding window protocols, **DLC standards**: HDLC, PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, Hubs, routers, Ethernet Switches; **Network Layer Services**: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.

**CSC 393 Systems Programming (3h)**

This course discusses the Study of one particular processor, assembly for this processor. Introduction to the assembly language of this processor. Design and implementation of an assembler (translation to machine code). Linkers and loaders: Absolute loaders; Program relocation; Program linking; Data structures; Dynamic loading; Bootstrap loaders. Macro processors: Data structures and logic flow for a simple one-pass macro processor; Concatenation of macro parameters; Generation of labels in macro expansions; Conditional macro expansion; Macro processing within an assembler; General-purpose macro processors. Project.

**CSC392 Selected Topics for Computer science(3h)**

This course discusses the advanced topics in computer sciences are proposed, like: Java Object-Oriented programming, **Object-Oriented Software Engineering,** Application Programs, Operating Systems Design and implementation, Distributed Operating Systems, Distributed Computing, Introduction to Parallel Computing.

**CSC357 Internet Techniques web programming (3h)**

This course discusses the An overview of connecting to and navigating within the Internet system and the World Wide Web: Navigation. Search Engines. Advanced search techniques. Design of web pages using HTML, XML and Java. TCP/IP. Client/Server architectures. Mastering Connectivity. Security.

**CSC 327 Operations Research &Applications programming (3h)**

This course discusses the OR Approach, Methodology And Applications: modeling, constraints, objective and criteria. Problems of multiple criteria optimization, model validation and systems design. Mathematical programming; simulation, gaming; heuristic programming. Examples,: theory of inventory. Production; linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. Theory of games for two-person competitive situations. Project management through PERT-CPM.

**CSC 313 Algorithms Analysis and Design (3h)**

This course discusses the Introduction to Algorithms Analysis and Design, General Algorithms: 1- Greater Common Divisor Algorithm, 2- Smaller Common Multiple Algorithm, 3- Pascal-Triangle Algorithm, 4- Inverse Number Algorithm, 5- Recursive Algorithm), Algorithms And Procedures, Algorithm Analysis: (Algorithm Efficiency, Algorithm Run-time, Algorithm Complexity, Computation Horner Algorithm Complexity Degree, Multiplication Two Polynomials Complexity Degree, Computation Using While Loop Algorithm Complexity Degree), Sorting Algorithms: (Insert Sort Algorithm, Selection Sort Algorithm, Bubble Sort Algorithm, Heap Sort Algorithm, Merge Sort Algorithm, Qsort Algorithm, Files Sorting Algorithms), Searching Algorithms, Backtracking Algorithms: (8-th Queen Problem, Optimal Option Problem).

**CSC 498 Project I (2h)**

Student will study, design and develop an integrated system, and he will be examined at the end of the semester.

**IS 463 Knowledge base systems Application (3h)** This course discusses the Review of first-order logic, relational algebra, and relational calculus. Fundamentals of logic programming. Logic for knowledge representation. Architecture of a knowledge-base system. Fundamentals of deductive databases. Top-down and bottom-up query processing. Some important query processing strategies and their comparison. Project or term paper on current research topics.

**IS 481 Communication skills (3h)**

This course covers written, oral, and interpersonal communication. Students will hand in short pieces of writing each week, will make oral presentations several times in the semester, and will work together in simulated project meetings and other realistic scenarios of pair and small group interaction.

**CSC 448 Optimization Techniques (3h)**

This course discusses the Unconstrained optimization theory. Convex functions and convex sets. Algorithms for unconstrained optimization (Steepest descent Newton methods Conjugate gradient methods). Constrained optimization theory (Kuhn-Tucker conditions). Special problems: (Linear programming Quadratic Programming). Algorithms for constrained optimization. Since this is a course on optimization *techniques* you will need to be able to program with high level programming languages (e.g C/C++, Java, C#).

**CSC 414 introduction to Unix and Linux (3h)**

This course discusses the User/kernel interface, fundamental concepts of Unix, user authentication, basic and advanced I/O, file system, signals, process relationships, and inter-process communication. Fundamental

development and debugging tools such as "make" and "gdb" will also be covered.

**IS 491 Multimedia Data Management (3h)**

This course discusses the Significance and value of multimedia for a variety of end users. Multimedia data storage. Use of multimedia hardware for capture and management of sound, graphics and video. Multimedia development tools programming, scripting and design skills. Use of multimedia authoring tools for producing multimedia applications

**CS 463 Artificial Intelligence (4h)**

Introduction & Definitions. Agent and examples. Uninformed Search. Heuristic Search. Constrained Search Problems CSP). Logical agents. First Order Logic and examples Machine Learning. Project.

**CSC 458 Distributed Systems and Parallel (3h)**

This course discusses the Introduction to distributed systems, processes and processors, parallel architecture (multi-computers, multi-processors), communication in parallel systems, performance of parallel systems, examples of parallel programming, introduction to distributed systems, distributed algorithms, types of distributed systems, compatibility of distributed systems and discovery of the end of processes.

**CSC 445 Introduction to Cryptography and information security (3h)**

This course discusses the Basic concepts of cryptography and secure data: Overview of Cryptography and information security, Mathematical Overview, Shannon and cryptography, Transposition, Substitution Ciphers, Rotor Machine and Poly alphabetic Ciphers, Block Ciphers: symmetric key systems, DES, AES, Public Key Systems, Knapsack System, RSA System, Key Management, Digital Signatures and Authentication, Stream Ciphers, Linear Shift Registers, Non-Linear Shift Registers, Watermarking and Steganography, Applications.

**CSC 499 Project II (4h)**

Student will study, design and develop an integrated system. Examination to be held at the end of the semester.

# College of Science in Al Dhariyya

## Vision:

The College of Science seeks to become a leader in educational and technological innovation, scientific discovery and creativity amounting the other local and international colleges of science. This happens through fostering an atmosphere of intellectual inspiration and partnership for the prosperity of society.

## Mission:

The idea of establishing the colleges of Science in Qassim came as a natural response to the educational revival the Kingdom enjoyed since its foundation to respond to the local community requirements by identifying and diagnosing the problems the community is facing in order to find the answers. It also aspires to meet the educational and development needs of society by providing high-quality academic programs, pioneering innovative research and creative articulation, and through active involvement in the community for the prosperous culture and economic development of the country. In addition, it aims at qualifying its students to face the rapid global changes while preserving our identity and principles which emanate from our glorious religion.

## Values:

The College of Science in Al Dhariyya is a newly established college, which is affiliated to Qassim University. It follows the same curriculum as the the College in the main campus. It is committed to excellence on all levels of the educational and creative experience, to the success of all its students and to the development of their capacity to arrive at sound and perceptive conclusions that respect differences and diversity in ideas. It is also dedicated to lifelong learning, which encourages the continual use of the mind. The college plays a vital role in the life of the surrounding community, in society as a whole and as a catalyst for economic development.

## Aims:

The College aims to make valuable contributions to the Kingdom's scientific, technological, and economic sectors through the research activities of faculty and graduates. More specifically, the objectives include:

- To provide advanced teaching programs in the various basic sciences and supply the community with competencies and trained specialists in the modern scientific techniques.
- To conduct studies and researches in order to build a technological research database to serve the needs and to solve the community's problems.
- To spread knowledge within the college and the community and to achieve publications and translation work.
- To offer scientific and experimental services in the field of preserving the environments and community service.
- To participate in the development of the university education and to establish the scientific and academic

ties with the higher education institutions inside and outside the kingdom to serve the strategic development in the Kingdom of Saudi Arabia.

- To incite to use instructional technology in the field of teaching in order to improve the graduates performances.
- To participate in the intellectual development and the thinking maturity of the specialized Saudi cadres and to qualify them with analytical skills to enable them to fully participate in the achievement of the objectives of the total economic development.
- To encourages the creation of new knowledge and the preparation of students to have a positive influence on national and international levels.
- To promote lifelong learning inside and outside the college community, to guarantee continued growth and welfare of the society.

## About:

The College of Science was established in 1997, and the college proved to be another building block in establishing Qassim University as a modern institution of higher education. Students began studying at the college in AY1997–1998. The first class of students completed their studies and graduated in AY2001–2002. The college awards a bachelor's degree in science. The college aims to increase the students' knowledge in a wide range of scientific fields and to develop the skills they need to be an expert in individual areas of specialization. In addition, the college provides the students with an education foundation in computer programming and English, as required by the country's labor market.

## Degrees:

Bachelor

Master

## Programs:

The college awards bachelor's degrees in the following majors:

- Mathematics,
- Physics and Chemistry

## Study Plan:

**Program: Mathematic**

**Study plan:**

**The first and second level is the nature science preparation**

**Level 3**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration(2)** | Math.202 | 4 |
| **Principal of Probability Distribution Theorem** | Stat212 | 4 |
| **Basics of Mathematics** | Math.231 | 3 |
| **Introduction to Geometry** | Math.273 | 3 |

**Level 4**

| Course name | Course code & number | Studying Hours |
|---|---|---|

| | | |
|---|---|---|
| **Differentiation & Integration in many variables** | Math.203 | 4 |
| **Mathematical applications on computers** | Math.251 | 2 |
| **Vectors** | Math.204 | 3 |
| **Linear algebra** | Math.242 | 4 |
| **Theory of numbers** | Math.243 | 3 |

**Level 5**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Linear Programming** | Math.213 | 4 |
| **History of Mathematics** | Math.232 | 3 |
| **Introduction to Differential Equations** | Math.321 | 4 |
| **Numerical analysis** | Math.351 | 4 |

**Level 6**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Mathematical Methods** | Math.326 | 4 |
| **Group Theory** | Math.343 | 4 |
| **Real Analysis (1)** | Math.382 | 4 |

**Level 7**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Rings and Fields** | Math.444 | 4 |
| **Introduction to Topology** | Math.471 | 4 |
| **Real Analysis (2)** | Math.483 | 4 |
| **Project** | Math.499 | 4 |

**Level 8**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Introduction to Partial Differential Equations** | Math.422 | 4 |
| **Introduction to Differential Geometry** | Math.472 | 4 |
| **Complex Analysis** | Math.484 | 4 |

## COURSE DESCRIPTION:

**Level 3**

**Math .202 Differentiation & Integration(2) :** This course aims at giving students definite integral and its properties , mean value theorem of integral and the fundamental theorem of calculus. It also discusses indefinite integral , standard integrals, derivatives & integrals of hyperbolic and inverse hyperbolic functions, integration methods such as: integration by substitution , integration by parts , integration by partial fractions and other substitutions. Also L'Hospitals Rule , evaluation of area and volume of revolution, arc length, Numerical integration (Trapezoidal rule), Polar coordinates, Polar curves graphs and areas using polar coordinates.

**Stat212 Principal of probability distribution theorem:**

This course discusses the discrete and continuous probability distributions (The mass and density probability functions and their properties, expectation, variance, standard deviation and the moment generating functions) . The discrete and continuous bi variety random variables and their properties (expectation, covariance, correlation coefficient, variance of sum or difference of two random variables and the moment generating

functions of bi variety random variables) . Bi variety distributions (marginal and conditional distributions ,independence of random variables , conditional expectation) .Also distribution functions of random vectors and random samples (distribution of sample mean – law of large number – central limit theorem) are discussed.

**Math.231 Basics of mathematics :**

This course aims at introducing mathematical logic, methods of proofs, mathematical induction, set theory, the product of sets, binary operations, equivalence relations, equivalence classes and partitions ,

mappings , the images and inverse images of sets under mappings , equivalence sets, countable and finite sets. Binary operations, morphisms, definition and examples of groups-definition and examples of rings and fields, polynomials and partial fractions.

**Math.273 Introduction to geometry:**

This course provides students with the main concepts of plane Euclidean geometry such as: coordinates, transformation, reflections ,translation, isometrics and similarity. Theorems on triangles, circles, tangents and angles. Polygons, polyhedral, regular polyhedral, their classification, and properties. Spherical geometry such as: sum of angle formula for spherical triangles, projection, conservative functions. Affine geometry : linear and affine transformation, isometrics, finite affine planes.

**Level 4**

**Math.203 Differentiation & integration in many variables:**This course studies the functions in two or more variables, domain of the function, three dimension rectangular coordinates, limits, continuity, partial derivative, higher-order partial derivatives, differentiation of composed function, maxima and minima-method of Lagrange multipliers for maxima and minima. Double integrals in Cartesian and polar coordinates , triple integrals in spherical and cylindrical coordinates,

infinite series, convergence tests, representations of functions by power series, Taylor , Maclaurin, and the binomial series.

**Math.251 Mathematical applications on computers**

This course provides an introduction to mathematics software as Mathematica, Mat lap and solving some problems in calculus and linear

algebra by mathematica and Mat lap. Applications: modeling , simulation and visualization , internet research . Writing mathematical reports and projects using scientific work place.

**Math.204 Vectors:**

Students studies vectors in two and three dimensions, scalar and vector products, equations of lines and planes in 3-dimensional space. Surfaces of revolution and their equations in cylindrical and spherical Coordinates. Vector valued functions of a real variable, curves in space, curvature, rates of change in tangent and normal directions, directional derivatives and gradient of a function. Application to equations of normal and tangent space to a surface at a point. Vector fields, divergence, curl of a vector, line and surface integrals, Green's theorem, Gauss' divergence theorem and Stock's theorem.

**Math.242 Linear algebra**

This course studies matrices and their operations, types of matrices, elementary transformations, determinants, elementary properties of determinants, inverse of a matrix, rank of matrix, linear systems of equations, vector spaces, linear independence , finite dimensional spaces , linear subspaces, inner product spaces, linear mappings, Kernel and image of a linear mapping- Eigen values and Eigen vectors of a matrix and of a linear operator mapping.

**Math.243 Theory of numbers:**

Students study the first and second principle of mathematical induction, well-ordering principle , divisibility, Euclidean algorithm, prime numbers and their properties, linear Diophantine equations, congruencies and their properties, linear congruencies- the Chinese remainder theorem, Fermat's little theorem, Euler's theorem, Wilson's theorem, arithmetic functions and Pythagorean triples.

**Level 5**

**Math. 213 Linear programming:**

This course gives introduction to operations research, mathematical model for some real problems and mathematical formulation of linear programming problem. Graphical method for solving linear programming problems, convex sets, polygons, extreme point and optimality theorem. Analytical method (Simplex method) , big-M method , Two-phase method, formulation mistakes, dual problem, sensitivity analysis, application to transportation and network problems.

**Math.232 History of mathematics:**

This course aims at giving students some knowledge about the evolution of some mathematical concepts ,facts and algorithms in arithmetic , algebra, trigonometry ,Euclidean geometry, analytic geometry and calculus through early civilizations such as ancient Egyptian , Babylonians, Greeks, Indians, Chinese, Muslims and Europeans . Evolution of solutions of some conjectures and open problems.

**Math.321 Introduction to differential equations**:

This course gives basic definitions and construction of an ordinary differential equation. Methods of solving ordinary differential equations of first order . Orthogonal trajectories, ordinary differential equations of high orders with constant coefficients and with variable coefficients, types of solutions, linear systems of ordinary differential equations, series solutions of a linear ordinary differential equation of second order with polynomial coefficient and Laplace transform.

**Math. 351 Numerical analysis:**

Students study numerical methods for solving nonlinear equations (bisection – iteration – Newton – false position … ), errors and rates of convergence. Direct methods for solving linear systems (Gauss

elimination,LU decomposition) and iterative methods (Jacobi –Gauss Seidel – Relaxation). Errors iteration matrices and convergence of iterative methods, polynomial interpolation (Lagrange-
Newton's methods: divided differences- forward and backward differences) and analysis of errors. Numerical differentiation and integration, errors and accuracy. Gaussian integration formulas.

**Level 6**

**Math.326 Mathematical Methods :**

This course discusses series solutions of ordinary differential equations with variable coefficients, inner product space of functions, self- ad joint operator, Sturm-Lowville theory, orthogonal polynomials and special

functions( Legendre, Hermit, gamma, beta, Bessel). Generalized theory of Fourier series and Fourier integrals.

**Math.343 Group Theory:**

This course studies the axioms of group theory and some examples of groups. Subgroups, cyclic groups, Lagrange theorem, normal subgroup, factor group, homomorphism, fundamental theorems of isomorphism, auto morphisms, Caley theorem and its generalization, simple groups, permutation groups, class equation, group action on a set, p-groups, Cauchy theorem- Sylow's theorems, external and internal direct product of group, Burnside theorem, dihedral- quaternion, groups of

auto morphisms on finite and infinite cyclic groups.

**Math.382 Real Analysis (1):**

This course introduces basic properties of the field of real numbers , completeness axiom , series and their convergence ,

monotone sequence , Bolzano-Weirstrass theorem , Cauchy criterion, basic topological properties of the real numbers, limit of a function , continuous functions and their properties . Uniform continuity , compact sets and its properties. The derivative of a function ,mean value theorem and Lupital rule and Taylor theorem.

**Level 7**

**Math.444 Ring and Fields:**

Students study rings, group of units, group of auto morphisms of a ring , ideals and factor rings and principal ring. They also study prime and maximal ideals, field of quotient of integral domain, characteristic of a ring, direct sum of rings, modules, Euclidean rings, ring of polynomials, roots of polynomials over a field, fields extensions, finite and simple extensions of fields, algebraic closure of a field, splitting fields and finite fields.

**Math.471 Introduction to Topology:**

This course introduces topological spaces, examples, closure of a set, derived set, topological subspaces, bases ,finite product topology, sub-bases, metric spaces, examples, metrizability, continuous functions, characterization of continuous functions on topological and metric spaces, homeomorphisms and examples. Topological property, compact spaces, examples , limit point and sequentially compact spaces.

**Math.483 Real Analysis (2):**

This course studies definition of Riemann integral, Darboux theorem , Riemann sums , properties and the principle theorem in calculus.

Series of functions, point twice convergence , uniform convergence, algebra
and σ – algebra (sigma algebra), finite additivity and countable additivity, main extension theorem and outer measure. Measurable sets , measure , Lebesgue measure and its properties, simple functions, measurable functions, Lebesgue integral, theorems of convergence, the relation between Lebesgue and Riemann integral.

**Math.499 Project:**

A student prepares a research project in one of the Math. topics under the supervision of the staff.
The student should submit a report for an oral exam.

**Level 8**

**Math.422 Introduction to partial differential equations:**

This course discusses classification and formation of partial differential equation , first order linear partial differential equation , solution
using Lagrange's method , Cauchy problem , second order linear partial differential equation in several variables , physical application using separation of variables , classifications of partial differential equation , some boundary value problems and Green's function.

**Math.472 Introduction to differential geometry:**

This course discusses theory of curves in $R^3$, regular curves , arc length and reparameterization , natural parameterization, Serret-Frenet apparatus, existence and uniqueness theorem for space curves, Bertrand curves. Involutes and evolutes, local theory of surfaces, simple surfaces, coordinate transformations, tangent vectors & tangent spaces . First and second fundamental forms, normal and geodesic curvature , Weingarten map, principal Gaussian and mean curvatures, geodesics, equations of Gauss and Godazzi-Mainardi.

**Math.484 Complex Analysis:**

This course discusses complex numbers, Cartesian and polar representation of complex numbers, powers and roots of complex numbers, limits and continuity of complex functions, analytic functions , Cauchy-Riemann equations. Harmonic functions, exponential, trigonometric , hyperbolic functions and logarithmic functions. Complex integration, contour integral , Cauchy's theorem, Cauchy's integral
Formula, bounds on analytic functions ,Taylor and Laurent series, power series, zeros and singularities. Residue theory and applications to real and improper integrals.

**BA Degree Program : Physics**

The first year for these program is the preparatory year of natural Science

**Level 1**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 101** | Language Skills | 2 | - |
| **CHEM101** | General Chemistry (1) | 4 | - |
| **ENG101** | English Language | 3 | - |
| **IC101** | Introduction to Islamic Culture | 2 | - |
| **MATH101** | Calculus (1) | 4 | - |
| **PSY101** | Thinking Skills | 2 | - |

| | |
|---|---|
| **Total** | 17 |

**Level 2**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 103** | Arabic Editing | 2 | - |
| **CSC101** | Introduction to Computers and Programming | 3 | - |
| **ENG103** | English Language (2) | 3 | ENG101 |
| **IC102** | Islamic and Society Building | 2 | IC101 |
| **PHYS101** | General Physics (1) | 4 | - |
| **STAT101** | Statistical Probability | 3 | - |
| **Total** | 17 | | |

**Level 3**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC103** | Economic System in Islam | 2 | IC101 |
| **MATH201** | Calculus for Science (2) | 3 | MATH101 |
| **PHYS243** | General Physics (2) | 4 | PHYS101 |
| **PHYS211** | Classical Mechanics (1) | 3 | MATH101 PHYS101 |
| **PHYS231** | Vibrations and Waves | 2 | MATH101 PHYS101 |
| **PHYS243** | Thermodynamics | 3 | PHYS101 |
| **Total** | 17 | | |

**Level 4**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **MATH205** | Calculus for Physics (3) | 3 | MATH201 |
| **PHYS232** | Physical Optics | 3 | Phys231 |
| **PHYS234** | Health Physics | 2 | - |
| **PHYS203** | Mathematical Physics (1) | 3 | MATH201 |
| **PHYS212** | Classical Mechanics (2) | 3 | PHYS211 |
| **PHYS221** | Electromagnetism (1) | 3 | PHYS202 |
| **Total** | 17 | | |

**Level 5**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **BUS103** | Communication Skills | 2 | - |
| **MATH210** | Differential Equations | 3 | MATH205 |
| **PHYS302** | Mathematical Physics (2) | 3 | PHYS203 |
| **PHYS321** | Electromagnetism (2) | 3 | PHYS212 |
| **PHYS351** | Modern Physics | 3 | PHYS232 |
| **PHYS393** | Optics Physics | 3 | PHYS232 |

| | | | |
|---|---|---|---|
| **BIO314** | Healthy Culture | 2 | - |
| **Total** | 18 | | |

**Level 6**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC104** | Political System in Islam | 2 | IC101 |
| **PHYS303** | Mathematical Physics (3) | 3 | PHYS30 |
| **PHYS350** | Quantum Mechanics (1) | 3 | PHYS212 PHYS351 |
| **PHYS391** | Electromagnetism Lab | 2 | PHYS221 |
| **PHYS393** | Modern Physics Lab | 2 | PHYS351 |
| **PHYS342** | Statistical Physics | 3 | PHYS243 |
| **PQUR126** | Islamic Morals | 2 | |
| **Total** | 17 | | |

**Level 7**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS422** | Electronics | 4 | PHYS243 |
| **PHYS452** | Quantum Mechanics (2) | 3 | PHYS350 |
| **PHYS471** | Solid State Physics (1) | 3 | PHYS350 |
| **PHYS481** | Nuclear Physics (1) | 3 | PHYS351 |
| | Selective Course (Faculty) | 2 | - |
| **Total** | 16 | | |

**Level 8**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS455** | Molecular and Atomic Spectra | 3 | PHYS452 |
| **PHYS495** | Solid State Lab | 2 | PHYS471 |
| **PHYS497** | Nuclear Physics Lab | 2 | PHYS481 |
| **PHYS498** | Project | 2 | PHYS497 PHYS495 |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course | 2 | - |
| **Total** | 17 | | |

## Course Description:

**CHEM 10 : General Chemistry**

Theoretical part : Chemical calculations, gasea, liquid state, thermochemistry, solutions, chemical kinetics, chemical and ionic equilibria Bohr Theory and electronic configuration of atoms and periodic table . An Introduction to types of chemical bonds .

Practical part : some experiments on properties of matter : density , viscosity, qualitative analysis : identification of acidic and basic radicals for inorganic salts .

**Course Number : CSC 101 Introductions to Computer and Programing**

Credit Hours ( lecture and Lab ) : 3 (2+ 1)

Level : Second

Theoretical parts : Introduction to programming , structured program development, program control, functions, array. Assignments in algorithm design and translation of algorithms in high level language like C language

Practical part: Excercices on the theoretical part.

**Course Number :** ENG **101 - English Language**

The course aims to introduce students to :

An awarenss of the basics of the English language in general .

An understanding of the basics of English grammar .

The basics of English pronunciation.

Specialized academic topics in the students, respective disciplines.

Proposed Teaching Methods

The course will be conducted via lectures in the main seminar, workshops and group discussions will also be used .

**Course Number : Math 101 - Calculus -1**

Real number and real line – Inequality. Function – The graph of a function- even and odd functions- composite of functions- Review of Trigonometric functions – inverse functions- Limits – The definition of a limit – Properties of Limits- Techniques for Evaluaring Limits – Infinites Limits. Continuity at a point on an open interval - one sided limits and continuity on a closed interval – Properties of continuity . The Derivative of a function – Differentiability and continuity – chain Rule – Derivatives of Trigonometric function – Logarithmic and Exponential functios ( Differentiation ) - Hyperbolic functions – inverse Trigonometric functions Differentiation . Exterma on an interval- Rolle,s Theorem and mean value theorem – Increasing and Decreasing functions and the first derivative test – concavity and second derivative test- related rates .

**PHYS 101 General Physics (1) (3 + 1) h.**

<u>Theoretical part:</u> Physics and measurements, Units and dimensions, Dynamics of particle in one dimension (displacement, average velocity, instantaneous velocity, acceleration, free fall), vector algebra and geometry, Motion in two dimensions, Projectile motion, Uniform circular motion, Tangential and radial accelerations, Newton's first law and inertial frames, Mass and weight, Newton's second law, Newton's third law, Friction, Work and energy, Vector scalar products, Work of variable forces, Kinetic energy and work-energy theorem, Conservative and non-conservative forces and potential energy, Power, Conservation of mechanical energy, The conservation law of linear momentum, Impulse, Collisions, Collision in one and two dimensions, Rotational motion with constant angular acceleration, Angular quantities, Moment of inertia, Torque and angular momentum, Work of rotational motion, Properties of matter: Elasticity, Stress, Strain, Modulus's, Strain energy, Fluid mechanics: Density and relative density, the concept of pressure, Pascal law, Archimedes principle, Fluid flow, Bernoulli's equation and its applications. State of matters, heat and Temperature and zero law of thermodynamics, Phase transitions, Latent heats, Ideal gases.

<u>Practical part:</u> Error and measurements, Force table, Hook’s Law, Free fall, Projectile motion, Boyle’s Law, Young’s Modulus, Specific Heat of a Solid, Coefficient of Thermal expansion, Surface tension in capillary tube, viscosity, Newton's law of cooling, Determination of the Paraffin wax fusion temperature.

**PHYS 202 General Physics (2) (3 + 1) h.**

Theoretical part: Electric Charge, Insulators and conductors, Coulomb's law, Point charge, The electric field, Electric field of multiple point charges, The electric field of continuous charge distribution, examples of various shapes (disks, rings, spheres, planes), The parallel plate capacitor, Electric dipole, motion of point charge and electric dipole in electric field, Electric flux, Gauss's law, Applications of Gauss's law, Conductor in electrostatic equilibrium, Electric potential, The potential of point charges, The potential of dipole, The electric potential of many charges, Capacitance and capacitors, Energy stored in a capacitor, Fundamental circuits, The electric current, Batteries, current density, Conductivity and resistivity, Ohm's law, Series resistors, Parallel resistors, Kirchhoff's laws, RC circuits, Magnetism and magnetic force, source of magnetic fields, Magnetic field of a current, Magnetic dipoles, Ampere's law and solenoids, The magnetic force on a moving charge, The magnetic force on a current-carrying wire, Forces and torques on current loops, Induced current, Motional emf, Magnetic flux, Lenz's law, Faraday's law, Induced fields and EM waves, Inductors, LC circuits, LR circuits, AC circuits and phase, Capacitors in AC circuits, RC filter circuits, Inductor circuits, The RLC circuits, Power in AC circuits, Wave phenomena, geometrical optics, speed of light, Longitudinal and transverse waves, Sound, The nature of light and the laws of geometric optics, reflection and refraction, Fermat’s principle, Snell’s law, Image formation.

Practical part: Verification of Ohm’s Law, Metric bridge, Charge and discharge of capacitors, Inductive Reactance, Capacitive Reactance, RCL circuits, Transformers, Speed of sound in air , Refractive Index of a Prism, Focal length of Lenses, Focal Length of Mirrors.

**PHYS 211 Classical Mechanics (1) (3 + 0) h.**

Space time, Review of Newton's law and conservation of linear momentum in Cartesian and polar coordinate system, applications on projectile motion in a linear air resistance medium, Quadratic air resistance. Motion of charges in a uniform magnetic field, The center of mass, angular momentum of several particles, Kinetic energy and work, Potential energy and conservative forces, Gradient relation, Time dependent potential energy, Energy for one dimensional linear system, Curvilinear one-dimensional systems, Central forces, The energy of interaction of two particles, The energy of multi-particle systems, CM and relative coordinates, The equation of the orbit, Kepler orbits, The unbound Kepler orbits, Change of orbits, Mechanics in non inertial frames, The tides, Rotating frames and angular velocity vector. Newton's second law in rotating frame, The centrifugal force, Coriolis force, Coriolis force and
free fall, The Foucault pendulum, Coriolis acceleration.

**PHYS 231 Vibration and Waves (2 +0) h.**

Periodic motion, Simple harmonic oscillation, Damped oscillation, Forced oscillation, Application of damped and forced oscillations, Superposition of simple harmonic oscillations, traveling waves, standing, Beats, Transverse wave in wires, Longitudinal wave in rods, Application of longitudinal wave in open and closed air columns, Fourier analysis, Doppler effect.

**PHYS 243 Thermodynamics (3 + 0) h.**

Fundamental concept in heat and thermodynamics, Thermal Equilibrium and zeroth law of thermodynamics, Ideal gases, Kinetic theory of gases, First law of thermodynamic, Application of first law of thermodynamic, isothermal and adiabatic processes. Irreversible process and reversible processes, Carrnot cycle, Otto cycle-cleapeyron latent heat equation, Second law of thermodynamic, Heat Engines, Refrigerators, Entropy, Thermodynamic functions, Maxwell relations, Third law of thermodynamic, Phase change, Applications on thermodynamic laws.

**PHYS 203 Mathematical Physics I (3 + 0) h.**

Determinants, Matrices, Solving linear equations and differential equations by matrices, Application on the motion of the rotation of the rigid body, Vector Algebra: Vector products, Position, Displacement, Vector transformation, Gradient, The Divergence, The Curl, Laplace operator, Line, Surface, and Volume Integrals, Gauss theorem, Stock's theorem, Green's theorem, Spherical polar coordinates, Cylindrical coordinates.

**PHYS 212 Classical Mechanics II (3 + 0) h.**

Calculus of variations, The Euler-Lagrange equation and applications, Lagrange's equations for Unconstrained motion, Constrained systems, Generalized momenta and Ignorable coordinates, Lagrange multipliers and constraint forces, Rotational motion of rigid body, The inertial tensor, Principal axes of Inertia, Precession of a top by weak torque, Euler's equations, Euler's angles, Coupled oscillations and normal modes, The double pendulum, Three coupled pendulum, Hamiltonian mechanics for one dimensional systems, Hamiltonian mechanics in several dimensions, Ignorable
coordinates, Phase space orbits, Liouville's Theorem.

**PHYS 221 Electromagnetism I (3 + 0) h.**

Review of vector Operations and algebra, Linear and rotational transformation of vectors, Vector field, Review of vector differential calculus: (gradient, the divergence, the curl, product rules of algebra , Second Derivatives,), Review of integral Calculus: (linear, surface, and volume integrals of vector functions), The fundamental theorem for: (calculus, gradient, divergence, curl), Curvilinear Coordinates: (spherical polar and cylindrical coordinates), The Dirac delta function in one and three dimension, The divergence of reciprocal square of radial distance, The Helmholtz theorem, Coulomb's law, The electric field, Continuous charge distributions, Divergence and curl of electrostatic field, Field lines and flux, Gauss's law and its applications, Electric potential, The potential of a localized charge distribution, The work done to move a charge, The energy of a point charge distribution, The energy of a continuous charge distribution, Properties of conductors and induced charges, Surface charge and the force on a conductor, Capacitors, Poisson's equation, Laplace's equation in one, two and three dimensions, Boundary conditions and uniqueness theorems, Conductors and the second uniqueness theorem, The Method of images and induced surface charge and calculating force and energy, Multipole expansion and approximate potentials at large distances, The monopole and dipole terms, The electric field of a dipole, Polarization, Field of a polarized object, Induced dipole and dielectrics, Polar molecules, Bound charges, The field inside a dielectric and the electric displacement, Gauss's law in the presence of dielectrics, Boundary conditions, Linear Dielectrics: (susceptibility, permittivity, dielectric constant), Boundary value problems with linear dielectrics, Force and energy in dielectric systems, Magnetostatics and the Lorentz law , Magnetic fields and magnetic forces, The Biot-Savart law, The magnetic field of a steady current, The divergence and curl of the magnetic field, Ampere's law and its applications, Magnetic vector potential, Magnetostatic boundary conditions, Multipole expansion of the vector potential, Magnetic fields in matter and the magnetization, Magnetic materials: (diamagnets, paramagnets, ferromagnets), Torques and forces on magnetic dipoles, Effect of magnetic field on atomic orbits, The field of a magnetized object, Bound currents, The magnetic field inside matter and the auxiliary field, Ampere's law in magnetized materials, Boundary Conditions, Linear and nonlinear media, Magnetic susceptibility and permeability, Ferromagnetism.

**PHYS 232 Physical Optics (3 + 0) h.**

The nature of light , The superposition of waves, Interference of two-beams of light (division of the wave front & division of amplitude) Interferometers( Young , Fresnel's biprism , loyed mirror, Fresnel's double mirrors , wedge interferometer , Newton rings , Michelson interferometer , Jamin & Mach-Zehnder refractometers ), Interference of multiple beams , Fabry-Perot interferometer , Applications of interferometry, Diffraction , Fraunhofer diffraction (single slit, two slits, multiple slits) – diffraction grating - Fresnel diffraction (circular aperture & circular Obstacle ), Polarization - polarization by absorption , reflection , refraction & double refraction, Optical active materials & polarometer .Interference of polarized light , Analysis of polarized light , Electro-optics (Kerr effect & Pockels effect ) , Magneto- optics (Faraday effect).

**PHYS 302 Mathematical Physics II (3 + 0) h.**

Complex numbers, Analytic functions, Limits and Continuity, Analyticity, The Cauchy, Riemann Equations, Elementary Functions, Complex Integration, Contoursm, Independence of path-Cauchy integral theorem- Bounds for analytic Functions, Series representations for analytic functions, Residue Theory, Conformal Mapping, Invariance of Laplace's Equation, Geometric Considerations, Bilinear Transformations, The Schwartz, Christoffel Transformations.

**PHYS 321 Electromagnetism II (3+0) h.**

Electromotive force, Ohm's law, Motional electromotive force, Electromagnetic induction, Faraday's law, The induced electric field, Inductance, Energy stored in magnetic fields, The modified Ampere's law, Maxwell's equations in vacuum, Maxwell's equations in matter, Boundary conditions, Conservation laws and the continuity equation, Poynting's theorem, Newton's third law in electrodynamics and momentum, Maxwell's stress tensor, Conservation of momentum, Angular momentum, Electromagnetic waves in one dimension, The wave equation, Sinusoidal waves, Boundary conditions: reflection and transmission, Polarization, Electromagnetic waves in vacuum, Monochromatic plane waves, Energy and momentum in electromagnetic waves, Electromagnetic waves in matter, Propagation in linear media, Reflection and transmission at normal incidence, Reflection and transmission at oblique incidence, Absorption and dispersion, Electromagnetic waves in conductors, Reflection at a conducting surface, The frequency dependence of permittivity, Guided waves and wave guides, TE waves in a rectangular wave guide, The coaxial transmission lines, Electric dipole radiation, Magnetic dipole radiation, Radiation from an arbitrary source, Power radiated by a point charge, Radiation reaction with matter.

**PHYS 351 Modern Physics (3 + 0) h.**

Special Theory of Relativity: wave propagation, Michelson Morley experiment, Galilean transformation, Lorentz transformations, Relative velocity, Lorentz contraction, Time Dilation, relativity of mass, Mass and energy, Applications, The particle like properties of Electromagnetic radiation: Electromagnetic waves, The photoelectric effect, black body radition, The Compton Effect, X-rays Waves like properties of particles: De-Broglie hypothesis, Electron diffraction experiment of Davison and Germer, Electron microscope, Uncertainity principle, quantum theory, Atomic Structure: atomic properties, The Thomson model, Rutherford Model for atomic nuclei, alpha particle scattering, Atomic Spectra, Bohr theory of the hydrogen atom, Sommerfeld’s Model, Failure of the Bohr theory Frank-Hertz experiment, The basic ideas of the Quantum Mechanics.

**PHYS 393 Optics Lab (0 + 2) h.**

Prism spectrometer (refractive index and dispersion), Grating spectrometer, Fresnel's biprism with He-Ne laser, Fresnel's double mirrors with He-Ne laser, Newton's rings, Michelson interferometer, Mach-Zehnder-interferometer, Diffraction at a single slit, Diffraction at double slits, Diffraction at one-and two dimensional gratings, Diffraction at a single slit measuring and evaluating with Video Com, Polarimter and optical activity, Abbe's refractometer, Inverse square law of light radiation and absorption coefficient of glass or plastic materials, Polarization of light.

**PHYS 303 Mathematical Physics III (3+0) h.**
Series Method for solving linear differential equations, Fuch's theorem, Second solution, Legendre polynomials, Hermite polynomials, Lagurre polynomials, Bessel Functions, Fourier transformation and its application, Laplace transformation and its application, Eigenvalue problem, Differentional equations of Boundary value problem.

**PHYS 342 Statistical Physics (3 + 0) h.**
Probability, One random variable, Some important probability distributions, Many random variables, Sums of random variables and the central limit theorem, Rules for large numbers, entropy, Kinetic theory of gases, Maxwell's distribution of the velocities of gas molecules and its applications, Distribution function of the energy of molecules, Liouville's theorem, Equilibrium properties, The microcanonical ensemble, Two-level systems, The ideal gas, Mixing entropy and the Gibbs paradox, The canonical ensemble, Canonical examples, The Gibbs canonical ensemblem, The grand canonical ensemble, Quantum statistical mechanics, Maxwell-Boltzmann distribution, Bose Einstein distribution, Fermi-Dirac distribution, Vibrations of a solid, Black-body radiation, Quantum microstates, Quantum macrostates, Ideal quantum gases, Hilbert space of identical particles, Canonical formulation, Grand canonical formulation, The degenerate fermi gas, The degenerate bose gas.

**PHYS 352 Quantum Mechanics (3 + 0) h.**
Reviews of the fundamental experiments in modern physics, the need for quantum mechanics. Wave packet and uncertainty principle, Schrödinger equation for free particle, Continuity relation, The dynamical variables and calculating the expectation values, Schrödinger equation with a potential in one dimension, Dynamical variables and calculating the expectation values in momentum space, Commutation relations, Hermitian operators, Linear operators, Completeness relation and orthonormality, Schrödinger equation in three dimensions, The fundamental postulates of quantum mechanics, Particle in an infinite well, Spectral expansion theory, The parity, Constants of motion and conservation laws, Momentum eigen functions and free body, One-dimensional potentials:(The potential step, The finite potential well at scattering and bound states, The potential barrier, The delta function potential at Scattering and Bound states, Simple harmonic oscillator, Oscillator eigen functions and eigen values, Ladder operators and dynamical variables, Schrödinger equation in three dimensions in Cartesian coordinates, Schrödinger equation in three dimension curvilinear coordinate system, Angular momentum and its eigen functions and eigen values, The addition of angular momentum, The central potentials.

**PHYS 392 Electromagnetism Lab (0 + 2) h.**
Measurement of e/m of the electron, Verification of Biot - Savart law , Verification of Faraday's law, Transformers , Measuring the force on current carrying conductors in a homogenous magnetic fields, RLC circuits, Generators, Motors, Transformers, Magnetic moment of magnetized rod, Helmholtz coils, Magnetic induction.

**PHYS 395 Modern Physics lab (0 + 2) h.**
Characteristics of microwaves, Franck- Hertz experiment, Stefan-Boltzmann law for heat radiation, Determination of Planck's constant by means of the photoelectric effect using the compact arrangement, Faraday effect, Fabry – Perot interferometer, Kerr effect, The Balmer series of hydrogen and determination of

Rydbergs constant, Pockels effect, Zeeman effect.

**PHYS 422 Electronics (3 + 1) h.**

Theoretical part: Analog Electronics: The P-N junction diode and Zener diode with their applications Junction Field effect transistor - Bipolar junction transistor (Bias and amplifiers: JFET & BJT) – Differential and Operational Amplifiers, Introduction to Feedback Circuits, Multivibrators and Oscillators, Digital Electronics: Binary and Hexadecimal System, Logic Gates, Karnaugh Maps, Flip Flops, Shift Registers, Counters, Memories. Practical part: P-N junction application (half-wave rectifier, full-wave rectifier, clampers and limiters, Zener regulation) - Transistors JFET & BJT amplifiers. Amplifiers with 741(Inverting & Non inverting Amplifiers, Active Filters, Wien Oscillator, Astable Multivibrator). Half and Full Adder (7483), Flip Flop (7474-7476), Shift Register (7495-74194), Counters (7493-74193).

**PHYS 452 Quantum Mechanics II (3 + 0) h.**

Dirac notation, Vector space algebra and Hilbert space, Rephrasing wave mechanics and operator methods in abstract view, Angular momentum commutation relations, Raising and lowering operators for angular momentum, Expansion theory in abstract view, Matrix representation of angular momentum operators, General relations in matrix mechanics, Eigen states of spin ½, The intrinsic magnetic moment of spin ½ particles, Addition of two spins, Addition of Spin ½ and orbital angular momentum, Time independent perturbation theory and energy shifts, Degenerate perturbation theory, The Stark effect, Hyperfined splitting, Variational principle and its applications, The WKB approximation, Time-dependent perturbation theory, The interaction of charged particle with electromagnetic field, Two level-system, emission and absorption of radiations, spontaneous emission, Transition rate, selection rule, scattering theory, Partial wave analysis, The Born approximation.

**PHYS 471 Solid State Physics I (3 + 0) h.**

Different states of matter, classification of solids, crystal structure (Bravais lattices & Miller indices), methods of determination of crystal structure (X-ray diffraction, electron and neutron diffraction), crystal defects, crystal binding (interatomic forces, types crystal bonds), Methods of crystal growth, lattice dynamics (crystal vibration modes and phonons), thermal properties of insulators (specific heat of insulators: classical model, Einstein's model, Debye model,-thermal conductivity of insulators), Dependence of thermal conductivity on temperature, Free electron theory (classical model of free electron, Fermi gas of free electrons, Maxwell-Boltzmann distribution, Fermi-Dirac distribution function), band theory (zone theory and tight binding theory).

**PHYS 481 Nuclear Physics I (3 + 0) h.**

Properties of the nucleus: determination of nuclear charge, radius and mass, Nuclear binding energy, Natural Radioactivity: Decay law, Nuclear stability, Radioactivity and theory of transformation .Artificial Radioactivity: Discovery of artificial radionuclides, Transuranium elements, Interaction of radiation with matter: Interaction of heavy elements, interaction of light electrons, interaction of gamma rays with matter, interaction of neutrons with matter, Radiation Detectors: Gas detectors, Scintillation detectors, solid state detectors, Nuclear Reactions: Reactions of matter by gamma rays, reactions by alpha particles, reactions by protons, reactions by neutrons, Nuclear fission: Discovery of Nuclear fission, theory of Nuclear fission, Nuclear fusion: Energy production in stars, control of thermonuclear reactions.

**PHYS 455 Molecular and Atomic Spectra (3 + 0) h.**

Introduction: Comparing between atomic emission spectroscopy and atomic absorption spectroscopy; Optical spectroscopy, Atomic spectrum, Quantization of hydrogen atom, Atomic emission / absorption spectrophotometry Molecular spectroscopy , Spectroscopy of inner electrons. Zeemen's effect, Sodium spectrum, Effect of magnetic field on the energy levels of atom. Theory of magnetic energy, Anomalous Zeeman's effect and Lande splitting factor. Molecular Spectra of diatomic molecules, Vibrational energy levels in both classical mechanics and quantum mechanics. Rotational spectra of diatomic molecule in gaseous state and rotational energy levels, Molecular spectra; harmonic Oscillator, Non Rigid Rotator, Infrared Vibration, Rotation spectra, spectrum, IR spectrum, RBS spectra, XRD spectrum, measurements of Absorbance, Transmitting and Reflecting using double beam Spectrophotometers in all ranges of wavelengths (UV-VIS-NIR-IR), Normal modes of vibrations; Natural of infrared absorption, Basic Laser principles, Laser behavior, Properties of laser radiations, Different types of lasers, Laser spectroscopy, The total losses of the laser system, Transmission at the mirrors, Absorption and scattering by the mirrors, Absorption in the laser medium, Diffraction losses at the mirrors, The Ruby Laser, Three Level Laser (Helium-Neon Laser)-Four Level Laser ( Carbon dioxide Laser), Laser applications.

**PHYS 497 Solid State Physics lab (0 + 2) h.**

Studying the characteristics of the solar cell, electron diffraction experiments characteristics curves of an optical (photo) resistor, studying the electron spin resonance (ESR), calculation of the energy gap of germanium by an electrical method determination of the thermal coefficient of resistance of a noble metal (platinum) by computer, the magnetic susceptibility of some materials and its classification, X-ray spectroscopy and calculation of Planck's constant and Miller indices of crystal planes in NaCl single crystal, thermoelectric effect in semiconductors (calculation of Seebeck, Peltier and Thomson coefficients), superconductivity and determination of the transformation temperature TC of YBCO specimen by computer, determination of the absorption coefficient of aluminum for X-ray, Hall effect, studying the crystalline structure by using the field effect microscope.

**PHYS 498 Nuclear Physics Lab (0 + 2) h.**

Statistical nature of Radioactive decay law, Rutherford Scattering, Attenuation of gamma radiation, Absorption of beta radiation passing through different materials, Inverse square law in case of gamma-rays, Determination of the range of beta particles in absorbers by beta gamma source, Backscattering of beta particles, determination of the dead time of GM tube, Effect of a magnetic field on beta particles motion, Assessment of natural radionuclide in NaCl, Compton scattering.

**PHYS 499 Project (2 + 0) h.**

The student carries out a research under the supervision of one of the Staff members in one of the following branches: Theoretical Physics, Nuclear Physics, Solid State Physics, Fiber Optics, Laser, Plasma, Electronics. The student submit a a report about his work, and is evaluated by a committee selected by the department.

# College of Sciences and Arts in Methnab

## Vision:

A distinctive college educationally, supportive of the continuous learning and community service, qualified for academic accreditation.

## Mission:

Through its educational career the college is committed to provide the students with the best educational opportunities, the necessary skills in addition to the values and behaviors to graduate students who have the ability to deal with the new technology in order to compete in the labor market and pursue graduate studies and scientific research in order to contribute in community development and face the national needs by its developed programs.

## Aims:

1- The Development of the professional performance of faculty members to keep up with the imaginative ways of teaching in the field of education and scientific research and using of the modern methods of copying with global standards.

2- Application of a variety of academic programs according to the quality specifications capable of development of society and proportionate to the needs of labor market.

3- Providing conducive environment for academic excellence.

4- Providing the students with the skills necessary for using modern technology and its applications, then qualifying them to pursue their graduate studies and scientific research.

5- Availability of graduate studies programs in different specializations of the college.

6- Providing training and academic programs to the local community .

7- Providing the graduators with continuous programs which suit the labor market.

8- Availability of good qualified experts of citizens who are qualified scientifically according to the improvement plans of the kingdom.

9- Graduation of students whose high qualification of using new technologies in their majors and capable to compete the students of other universities and capable of pursue of graduate studies and strongly entering the labor market.

10- The cooperation with the governmental and private sectors to benefit of the opportunities and minimizes the threatens.

## About:

The College of Sciences and Arts in Methnab was established under the name College of Education for Boys and Girls on 23 July 2001. Its name changed to the College of Science and Arts according to Higher Education Council Decision No. 10/50/1429H on 13 July 2008. The college includes the following departments: Islamic Studies, Arabic Language, Mathematics, Physics, Biology and Computer Science.

## Degrees:

Bachelor

Students who qualify the examination in the four-year- study program are entitled to be granted a B.A/ Bsc in their respective field of study.

**Programs:**

1- Islamic Studies

2- Physics

3- Mathematics

4- English Language & Translation

5-Computer Science

6- Arabic Language and Literature

## Study Plans:

**English Language & Translation program**

***Study Plan :***

**Level 1:**

| COURSE NO. | CODE | COURSE TITLE | UNITS |
|---|---|---|---|
| **101** | PSY | THINKING STRATEGIES AND LEARNING STYLES | 2 |
| **101** | ARAB | ARABIC LANGUAGE SKILLS | 2 |
| **110** | CSC | COMPUTER SKILLS | 2 |
| **110** | ENG | ENGLISH GRAMMAR & SENTENCE WRITING | 2 |
| **124** | ENG | LISTENING & SPEAKING(1) | 2 |
| **131** | ENG | READING & VOCABULARY BUILDING(1) | 3 |
| **150** | ENG | PRONUNCIATION | 3 |
| **101** | IC | INTRODUCTION ISLAMIC CULTURE | 2 |
| **143** | Eng | Writing 1 | |
| **Total** | | 18 | |

**Level 2:**

| COURSE NO. | CODE | COURSE TITLE | UNITS |
|---|---|---|---|
| **-** | - | ELECTIVE-COLLEGE | 2 |
| **ADM** | 103 | COMMUNICATION SKILLS | 2 |
| **103** | ARAB 103 | ARABIC COMPOSITION | 2 |
| **112** | ENG 112 | ENGLISH GRAMMAR (2) | 2 |
| **125** | ENG 125 | LISTENING & SPEAKING(2) | 2 |
| **132** | ENG 132 | READING & VOCABULARY BUILDING(2) | 3 |
| **143** | ENG 143 | ENGLISH WRITING (1) | 2 |
| **IC 102** | IC 102 | ISLAMIC AND SOCIETY BUILDING | 2 |
| **Total** | | 17 | |

**Level 3:**

| COURSE NO. | CODE | COURSE TITLE | UNITS |
|---|---|---|---|
| **-** | - | ELECTIVE-COLLEGE | 2 |
| **202** | ENG | COMPUTER ASSISTED LANGUAGE LEARNING(CALL) (Elective) | 3 |
| **214** | ENG | ENGLISH GRAMMAR (2) | 3 |
| **221** | ENG | LISTENING &SPEAKING(3) | 3 |
| **235** | ENG | READING & VOCABULARY BUILDING(3) | 3 |
| **242** | ENG | ENGLISH WRITING (2) | 3 |
| **Total** | | 17 | |

**Level 4:**

| COURSE NO. | CODE | COURSE TITLE | UNITS |
|---|---|---|---|
| **236** | ENG | ADVANCED READING(4) | 3 |
| **244** | ENG | ADVANCED WRITING | 3 |
| **250** | ENG | INTRODUCTION TO LINGUISTICS | 3 |
| **274** | ENG | INTRODUCTION TO TRANSLATION | 3 |
| **280** | ENG | INTRODUCTION TO LITERATURE | 3 |
| **103** | IC | THE ECONOMIC SYSTEM IN ISLAM | 2 |
| **Total** | | 17 | |

**Level 5:**

| COURSE NO. | CODE | COURSE TITLE | UNITS |
|---|---|---|---|
| - | - | ELECTIVE – DEPARTMENT | 3 |
| **351** | ENG | PHONETICS AND PHONOLOGY | 3 |
| **371** | ENG | TRANSLATION THEORIES | 3 |
| **373** | ENG | JUDICIAL AND POLITICAL TRANSLATION | 3 |
| **358** | ENG | HISTORICAL LINGUISTICS | 3 |
| **104** | IC | FUNDAMENTALS OF POLITICAL SYSTEM IN ISLAMIC | 2 |
| **Total** | | 17 | |

**Level 6**

| COURSE NO. | CODE | COURSE TITLE | UNITS |
|---|---|---|---|
| - | - | ELECTIVE – DEPARTMENT | 3 |
| **355** | ENG | English Morphology | 3 |
| **360** | ENG | Applied Linguistics | 3 |
| **377** | ENG | Islamic TRANSLATION | 3 |
| **378** | ENG | Scientific & Technical Translation | 3 |
| **379** | ENG | Machine Translation | 3 |
| **Total** | | 18 | |

**Level 7**

| COURSE NO. | CODE | COURSE TITLE | UNITS |
|---|---|---|---|
| - | - | ELECTIVE – DEPARTMENT | 3 |
| **446** | ENG | Research Methods | 3 |
| **453** | ENG | Socio Linguistics | 3 |
| | ENG | | 3 |
| **457** | ENG | Discourse Analysis | 3 |
| **Total** | | 15 | |

**Level 8**

| COURSE NO. | CODE | COURSE TITLE | UNITS |
|---|---|---|---|
| - | - | ELECTIVE – DEPARTMENT | 3 |
| **459** | ENG | Semantics | 3 |
| **466** | ENG | Language Acquisition | 3 |
| **472** | ENG | Consecutive Translation | 3 |
| **473** | ENG | Literary Translation | 3 |
| **474** | Eng | Software Translation | 3 |
| **Total** | | 18 | |

**COURSE DESCRIPTION:**

**ENG 333: International Tests: (2hrs )**

This course is designed to intimate students with different types of strategies related to standardized test, objective tests , subjective tests, and international tests. Students are introduced to a variety of International Tests eg, TOEFL, IELTS, GRE and Michigan Battery Tests.

**PNEL 025 Writing ( 5 hrs )**

**ENG 141 writing 1 ( 2 hrs )**

**ENG 242: Writing 2 ( 3hrs )**

**ENG 244: Advanced Writing 3 ( 3hrs )**

This course is designed to improve students' writing skills. Students are introduced to a practical and efficient approach to learning the skills, strategies and knowledge that are necessary for succeeding in content coursework. They are introduced to Specific and General, composing the basic paragraph, giving shapes to paragraph and writing a complete essay.

These courses enable students to be familiarize with the art of writing ,introduce students to practical and efficient approach to learning skill, as well as how to write a paragraph or essay effectively. They also enable students to write well-structured sentences. Students are expected to practice the sentence structure, and improve their writing skills.

Such course are meant to develop student-writers throughout the experience of composing various types of essays like the Five-Paragraph Essay, Process Analysis Essay, Cause and Effect Essay, Argumentative Essay, Classification Essay and Reaction Essay. They provide opportunities for students to explore their opinions, discuss their ideas, and share their experiences throughout written communication.

ENG 280: Introduction to Literature: ( 3hrs )

This course is designed to be an introduction to literature. It introduces student to three literary genres: novel, poetry, and drama. The aim is to enhance students' ability to assimilate and appreciate the linguistic patterns of these genres, in addition to upgrading their literary expression whether oral or written via the usage of sound literary language.

Eng 222: Cognitive & Meta cognitive Skills: (2 hrs)

The course aims to introduce students to; General fields of psychology, the principles and methods of cognitive and met cognitive skills.

Enabling the students to utilize this knowledge department of English language and Translation.

**ENG 274 : Introduction to Translation: ( 3hrs )**

The course aims to introduce the learners to translation as profession and qualification of competent translator as translation is required in modern life due to globalization, diplomacy, tourism. It helps the students to feel the difference between natural translation and literal translation

Grammar 025 (5hrs)

**Grammar 1 ENG110 (2hrs)**

**Grammar 2ENG113 (2hrs)**

**Grammar 3 ENG214 (3hrs)**

This course aims to provide the students with the necessary knowledge of English Grammar rules and usage. The course also aims to enable the students to write proper sentences and paragraphs

**025 Study skills ( 5 hrs )**

The textbook (study skills for students of English) introduces a variety of useful topics and skills such as : "How to use dictionaries; How to make an outline; How to take and make notes; How to divide words; and. How to use a library. Students are expected to learn a lot of essential skills in this course that would be of great use to them throughout their student life.

**ENG 250 introductory linguistics ( 3 hrs )**

This course aims to introduce students to a general investigation of language and linguistics. It includes the main cores areas linguistics. It provides students with the techniques and tools of analyzing Language.

**ENG 202 Computer assisted Language learning ( 3 hrs )**

This course aims to introduce to the variety of computer resources available will be required to design a unit which includes call component. It also focus on vocabulary related to computer and Language learning. It develops and articulates different usage of computer in developing Language skills.

**ENG 150 pronunciation ( 5 hrs )**

This course aims to introduce students to phonetic transcription and IPA and good pronunciation practice. The course introduces students to use web based language analysis materials. It encourage students to do practical phonetic study.

**Reading PNEL025 ( 5 hrs)**

**Reading 1 ENG131 ( 3hrs)**

**Reading 2 ENG132 (3hrs)**

**Reading 3 ENG235 (3hrs)**

**Reading 4 ENG236 (3hrs)**

This course presents advanced texts that contain morphological and syntactic items intended for enhancing student's ability to read and understand information. Students acquire advanced reading skills that enable them to accelerate reading processes and assimilation, and to express their personal views of advanced topics.

The main objective of these course is are to make the students able to understand the primary and secondary ideas of the text and make them able to differentiate feats from opinions .This series is useful and brings important topics about daily life like food sports …etc .Students like it as they discover new experiences and exercises.

## Listening & Speaking 025 (5hrs)

**Listening & Speaking 1 ENG124( 2hrs)**

**Listening & Speaking 2 ENG125 (2 hrs)**

**Listening & Speaking 3 ENG221 (3hrs)**

The main and prime objective of " listening courses" is enhance the students listening skills , and to make them familiar with native English accent , and make them capable to understand that accent .

This course also increase students' knowledge about the topics related to their daily lives and build a powerful vocabulary.

**Department of Arabic Language and Literature**

**Study Plan:**

**Level 1**

| Course Code No | Course Name | Credit | Prerequisite |
|---|---|---|---|
| **ARAB 110** | History of GREMMAR AND It's Original | 2 | |
| **ARAB 111** | Grammar | 3 | |
| **ARAB 120** | ARABIC Morphology | 2 | |
| **ARAB 155** | Litery Writing | 2 | |
| **ARAB 161** | Pre Islamic Literature | 2 | |
| **ARAB 176** | Litery Heritage Library | 2 | |
| **CSC 210** | Introduction to Computer | 2 | |
| **IC 101** | Introduction to Islamic Culture | 2 | |
| **Total** | | **17** | |

**Level 2**

| Course Code No | Course Name | Credit | Prerequisite |
|---|---|---|---|
| **ARAB112** | Arabic Grammar 2 | 3 | |
| **ARAB122** | Arabic Mophelogy2 | 2 | |
| **ARAB150** | Prosody Rhyme | 2 | |
| **ARAB156** | Old Arabic Texts1 | 2 | |
| **ARAB162** | Literature in The Beginning of Islam and Amawi Ages | 3 | ARAB161 |
| **ENGL101** | Eighth Language | 3 | |
| **IC102** | Islam and Society Constructio | 3 | |

| | | | |
|---|---|---|---|
| | n | | |
| **Total** | | **17** | |

**Level 3**

| Course Code No | Course Name | Credit | Prerequisite |
|---|---|---|---|
| **PSY101** | Thinking Skills | 2 | |
| **ARAB 240** | Semantic & Lexicology | 3 | |
| **ARAB 269** | Abbassi Poetry | 3 | ARAB 162 |
| **ARAB 280** | Rhetoric | 2 | |
| **ARAB 213** | Arabic Grammar(3) | 3 | ARAB 112 |
| **IC 103** | Economic System In Islam | 2 | |
| **Total** | | 15 | |

**Level 4**

| Course Code No | Course Name | Credit | Prerequisite |
|---|---|---|---|
| **ARAB223** | Morphology 3 | 2 | ARAB122(s) |
| **ARAB225** | Grammar 4 | 3 | ARAB213(s) |
| **ARAB270** | ABBASSI PRose | 2 | ARAB162(s) |
| **ARAB287** | Semantic | 3 | |
| **ARAB241** | Philology | 2 | |
| **IC104** | Political System Rules in Islam | 2 | IC101(s) |
| **Total** | | **14** | |

**Level 5**

| Course Code No | Course Name | Credit | Prerequisite |
|---|---|---|---|
| **ARAB 326** | Grammar (5) | 3 | ARAB 225 |
| **ARAB 342** | Phonology | 2 | |
| **ARAB 358** | Old Literary Texts (2) | 2 | ARAB 156 |
| **ARAB 364** | Andaluss Literature | 3 | ARAB 162 |
| **ARAB 384** | Semantic | 3 | |
| **Total** | | **13** | |

**Level 6**

| Course Code No | Course Name | Credit | Prerequisite |
|---|---|---|---|
| **ARAB190** | Communication skills | 2 | - |
| **ARAB327** | Grammar(6) | 3 | ARAB326 |
| **ARAB334** | Grammar Application -1 | 2 | - |
| **ARAB367** | Literature in the old ages | 2 | ARAB364 |
| **ARAB391** | Classical Arabic | 3 | - |
| **ARAB394** | Research Method | 2 | - |
| **Total** | | **14** | |

**Level 7**

| Course Code No | Course Name | Credit | Prerequisite |
|---|---|---|---|
| Methnab | Methnab | Methnab | Methnab |
| **ARAB 428** | Grammar (7) | 3 | ARAB 327 |
| **ARAB 454** | Graduation project | 2 | ARAB 394 |
| **ARAB 478** | Modern literature | 2 | |
| **ARAB 492** | Greek Criticism | 2 | |
| **ARAB 496** | Comparative Literature | 2 | |
| **Total** | | **13** | |

**Level 8**

| Course Code No | Course Name | Credit | Prerequisite |
|---|---|---|---|
| **ARAB435** | Syntax application | 2 | ARAB334 |
| **ARAB444** | Linguistics | 2 | - |
| **ARAB468** | Saudi | 2 | - |

| | | | |
|---|---|---|---|
| | literature | | |
| **ARAB475** | Modern Text | 2 | ARAB478 |
| **ARAB479** | Modern literature | 2 | - |
| **ARAB495** | Modern Criticism | 3 | ARAB391 |
| **Total** | | **13** | |

**Elective courses (8)**

| Course Code | Course Name | Credit |
|---|---|---|
| **ARAB 345** | Linguistics and Quranology | 2 |
| **ARAB 34** | Lingual | 2 |
| **ARAB 138** | Linguistics | 2 |
| **ARAB 198** | Stylistic analysis | 2 |
| **ARAB 425** | Morphology application | 2 |
| **ARAB 447** | Advertiment Language | 2 |
| **ENG222** | Methods of Teaching foreign language | 2 |
| **ENG333** | International test | 2 |
| **Soc410** | Social Issue | 2 |
| **ARAB368** | Reading in Old Arabic Prose | 2 |
| **ARAB387** | Rhetoric of Quran &prophetic “Hadeth” | 2 |
| **ARAB497** | Literature Theory | 2 |
| **ARAB498** | Narrative of Arab | 2 |
| **GEO222** | Continuous Development | 2 |
| **GEO333** | Geography of KSA | 2 |
| **HIS014** | Issues in Prophetic "sirah" | 2 |
| **HIS071** | National History | 2 |

**ARAB 269 ABBASI LETERATURE (POETRY)**

This course aims to introduce the students ABBASID state and how they established this state and its development stages. This course also introduced the students to the factors which effect the ABBASID poetry. This course is also designed to introduce the student to the ABBASI poets, poetry rhymes, rhythm and its purposes.

**ARAB 111 GRAMMER**

This course includes brief introduction about history of grammer, grammer schools and famous grammarians and their approaches. This course also introduce different parts of speech and different aspects of grammer. It also include regular and irregular verbs and gender description. It also include definite and indefinite articles and demonstrative pronoun.

**IC101 INTRODUCTION TO ISLAMIC CULTURE**

The purpose of this course is to highlight the values of Islamic culture and its impact on other cultures. The course introduces connotative and literal meaning of cultures, relationship between different cultures and relation of culture with science and civilizations.This course introduces the students to the different aspects of Islam and introduces the students to the pillars of Islam. It also introduces the students to the points which are contradictory to islam.

**ARAB 105 DEVELOPMENT OF THINKING SKILLS**

The course aims at development of thinking skills, importance of these skills and how to improve different kinds of thinking skills. The course focus on critical, creative and scientific thinking. The purpose of this course is that student will not only identify these thinking skills but analyse different component of these skills and they will learn how to develop these skills.

**ARAB176**

Make the students know the tradition's sources and focus on the different sources of approaches and know the Arab scientists role in the literary classification and give them imagination about the literary arts.

Objects which included:

1. Definition of the literary library from that it is a tradition which acts the humanitarian Arabic thinking
2. Arab efforts in utilize the humanitarian thinking – phase of collecting& writing – phase of origins

The most important sources of literature

**ARAB120**

The subject aims to make the students know about the word classing and know which is original and which is extra in the word and the way of adjunction and apply it.

The course included The meaning of classification and its famous books .Word classing and word classing patterns Original& extra letters, adjunction and joining ( hamzah) Divide the verbs into single & verb can be added to Divide the verb into verbs that compose of consonants and verbs that compose of vowels Divide the verb into fixed and changeable adjunction the verbs into the pronouns .Emphasize the verb by using double (n) of Emphasizing .

**ARAB34 Arabic Language &Quran types of Reading**

The course aims to make recognition of the concept of Quran Types of Reading and to show reasons of having different types of Quran reading, the descending of Quran in seven letters ,the first appearance of Types of Quran Reading and its improvement ,the famous readers of Quran Types of reading and the rules of them The relation between Reading types and phonetics ,semantic, syntax and phonology.

**ARAB 126 Literature in the forepart of Islam and in Amaoyan Literature.**

This course include -Introduction to the general situations in Islam: Political and social situation and connect them with the literal movement-Study of the renewal and copying phases in this period .Discuss the most common artistic characteristic which polished poetry in this period..

**ARAB 105 Literal redaction**

This course Introduce the students to different types and skills of writing .and to have the ability to good writing in different aspects also increase her ability to discover mistakes and correct them. It contain Elements of writing-Types of writing-Sources of culture-Elements of phrasing The word and the sentence-place of Cancelling and adding-Punctuation mark.

BA Degree Program: **Computer sciences**

**Level 3**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC101** | Introduction to Islamic Culture | 2 |
| **Arab101** | Language Skills | 2 |
| **Phys104** | General Physics (2) | 4 |
| **Math105** | Differential Calculus | 3 |
| **CEN111** | Logic Design | 4 |
| **CSC152** | Concepts of Algorithms & Computer Programming | 4 |

| | | |
|---|---|---|
| | Total | 19 |

**Level-4**

| Course Code | Course Title | Credit |
|---|---|---|
| **Arab103** | Expository Writing | 2 |
| **Math106** | Integral Calculus | 3 |
| **Math109** | Linear Algebra and Analytical Geometry | 3 |
| **IT125** | Database | 4 |
| **CEN126** | Computer Architecture | 3 |
| **CSC153** | Object Oriented Programming | 4 |
| | Total | 19 |

**Level-5**

| Course Code | Course Title | Credit |
|---|---|---|
| **Math203** | Differential and Integral Calculus | 3 |
| **Stat224** | Introduction to Statistics & Probability | 3 |
| **CSC225** | Assembly Language | 3 |
| **CSC244** | Concepts of Algorithms | 3 |
| **CSC276** | Computer Graphics | 4 |
| **CSC283** | Discrete Structures | 4 |
| | Total | 20 |

**Level-6**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC102** | Islam and Construction of Society | 2 |
| **Math207** | Differential Equations | 3 |
| **CSC214** | Data Structures | 4 |
| **IT224** | Visual Programming | 4 |
| **CSC237** | Programming Languages Concepts | 3 |
| **CSC229** | Operating Systems | 4 |
| | Total | 20 |

**Level-7**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN301** | Signals and Systems Analysis | 4 |
| **CEN333** | Microprocessors Systems | 4 |
| **CSC338** | Compiler Design | 3 |
| **CEN345** | Computer Networks | 4 |
| **CSC346** | Software Engineering | 3 |
| | Total | 18 |

**Level-8**

| Course Code | Course Title | Credit |
|---|---|---|

| | | |
|---|---|---|
| **IC103** | The Islamic Economical System | 2 |
| **CSC313** | Algorithms Analysis & Design | 3 |
| **CSC327** | Operations Research and Programming Applications | 3 |
| **CSC357** | Internet Techniques & Web Programming | 3 |
| **CSC392** | Selected Topics in Computer Sciences | 3 |
| **CSC393** | Systems Programming | 3 |
| | Total | 17 |

**Level-9**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC104** | Fundamentals of the Islamic Political Systems | 2 |
| **CSC414** | Introduction to Unix/Lunix Systems | 3 |
| **IT463** | Knowledge Base Systems Applications | 3 |
| **CSC448** | Optimization Techniques | 3 |
| **IT481** | Communication Skills | 2 |
| **CSC498** | Graduation Project (1) | 2 |
| | Total | 15 |

**Level-10**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC445** | Introduction to Cryptography & Information Security | 3 |
| **IT450** | Multimedia Data Management | 3 |
| **CSC458** | Distributed Systems & Parallel Processing | 3 |
| **CSC463** | Artificial Intelligence | 4 |
| **CSC499** | Graduation Project (2) | 4 |
| | Total | 17 |

## Course Description:

**Course Code :** **CSC 152**
**Course Title :** Concepts of Algorithms and Computer Programming
**Prerequisites :** non
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level : 3
**Course description:**
Problem-solving, algorithmic design, Introduction to Programming, Structured Program Development, Program Control, Functions, Arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.
**Textbook :**
C How to program , Deitel & Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004

**Course Code:** **CEN 111**
**Course Title:** Logic Design
**Prerequisites:** non
**Credit Hours**: 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: Level:3
**Course description:**
Digital computer and information (numbering systems, Arithmetic operations, Decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, Combinational circuits simplification, CMOS circuits), Combinational logic design (design procedure, decoders, multiplexes, Binary adder and subtracter), Sequential circuits (latches, flip flops, synchronous sequential circuits analysis and design), Analysis and design of synchronous sequential machines, Representation, state reduction and realization; Finite state machines.
**Textbook:**
M. Mano, Digital Design, 3rd Ed., 2002.

**Course Code :** **IS 125**
**Course Title:** Database
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4
**Prerequisites** : CSC 152
**Course discretion**
Database definition, Database system, Overview of database management, database system architecture, Introduction to Relational databases, An Introduction to Structured Query Language(SQL), Database Integrity, Views, Normalization, Database design, Practical Applications.
**Textbook:**
"An Introduction to Database Systems", Date, 2004, Addison-Wesley.

**Course Code:** **CEN 126**
**Course Title:** Computer Architecture
**Prerequisites:** CEN 111
**Credit Hours**: 3 Lecture Hrs: 3
Lab Hrs:0 Tut. Hrs: 0 Level:4
**Course description:**
Review of logic design principles. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design. System software. Micro-programmed CPU. Comparison between CISC, RISC and VLIW processors. Introduction to memory organization; I/O operations; Introduction to parallel processing techniques.
**Textbook:**
M. Mano, "Computer System Architecture," Prentice Hall, 2004.

**Course Code :** **CSC 153**
**Course Title :** Object Programming
**Prerequisites** : CSC152
**Credit Hours : 4** Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4
**Course description:**
Introduction to Object-Oriented Programming, Program Control Structures, Functions, Arrays, Pointers and Strings, Classes Part I Classes and data abstraction, Classes Part II: Operator Overloading, Inheritance Virtual Functions and Polymorphism.
**Textbook**:
C How to program ,Deitel & Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004.

**Course Code :** **CSC 244**
**Course Title :** Concepts of Algorithms
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:5
**Prerequisites**: CSC 152
**Course description:**
Growth function and Recurrence, Divide-and-Conquer: (Strassen, Fibonacci, Polynomial Multiplication), Heap Sort, Quick Sort, Bubble Sort, Insertion Sort, Merge Sort, Hash Table, Binary Search Tree, Dynamic Programming, Greedy Algorithms,
**Textbook**
Introduction to Algorithms, (Second Edition) Thomas Cormen, Charles Leiserson, Ronald

Rivest, and Clifford Stein. MIT Press. ISBN: 0262032937

**Course Code :** **CSC 276**
**Course Title :** Computer Graphics
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:5
**Prerequisites:** CSC 153
**Course Description:**
Computer Graphics Applications Survey. **Color models** (chromaticity diagram, RGB, CMY, YIQ, HSV, and HLS color models). **Graphics Output Primitives** (coordinate frames, DDA, Bresenham's algorithm, circle-drawing, fill-area primitives algorithms). **2D Graphics**(2D cartesian coordinates, curves and parametric equations, functions and transformations, inverse functions. **3D Graphics** (vectors in 3D, dot and cross product, homogeneous coordinates, correlation between Cartesian and homogeneous coordinates). **Geometric transformations**(2D geometric transformations, matrix representation and homogeneous coordinates, inverse transformations, 2D composite transformations).**Geometric representation** Lagrange polynomials of degree n, Hermit cubic polynomial, Bernstein polynomial, interpolation problem, Spline interpolation problem of approximation, Bezier-Bersnstein approximation, Bezier-B-Splineapproximation, quadric surfaces
**Graphics Lab**: modeling, rendering, animation using 3D Studio Max? from Autodesk?. Use of OpenGL?.
**Textbook:**
Hearn, D. and P. Baker "*Computer Graphics with OpenGL*". Pearson Prentice Hall, Pearson Education Inc., Upper Saddle River NJ07458, USA, 2004. PIE ISBN 0-13-120238-3

**Course Code :** **CSC 283**
**Course Title :** Discrete Structures
**Credit Hours** : 4 Lecture Hrs:
Lab Hrs: 0 Tut. Hrs: Level:5
**Prerequisites:** CSC 153
**Course description:**
**Introduction to Discrete Structures**: algorithmic language. **Logic**: propositions, predicate logic, proofs, mathematical induction. **Sets**: special sets, operations, properties and identities, application of logic to knowledge-based systems. **Relations**: graphical and matrix representations, equivalence and order relations, application to databases **Functions** types, cardinality, application to functional languages **Undirected Graphs** Simple graphs, Eulerian paths, Hamiltonian circuits, trees, application to syntax diagrams **Directed Graphs** digraphs, consistent labeling, paths problems, Wars hall's algorithm, shortest paths and Dijkstra's algorithm, application to routing in computer networks. **Machines and Computations**: automata as models, finite state automata (FSA) without outputs, FSA as language recognizers and their limits, introduction to Turing Machines, application of FSA to problem-solving.
**Textbook:**
Skvarcius, R. and W.B. Robinson "Discrete Mathematics with Computer Science Applications" The Benjamin / Cummings Publishing Co., 1986.

**Course Code :** **CSC 225**
**Course Title :** Assembly Language
**Prerequisites :** CEN 126
**Credit Hours :** 3 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:5
**Course description**
Introduction to PC hardware, PC software requirements, assembly language programmers requirements, program logical and control, string operations, arithmetic operations for processing binary data , assembling linking and executing a program.
**Textbook**
Peter Abel. IBM PC Assembly Language and Programming ". 1998

**Course Code : CSC 237**
**Course Title : Programming Languages Concepts**

**Prerequisites**: CSC 283

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0

**Course description:**

Preliminaries. Evolution of the Major Programming Languages. Describing Syntax and Semantics. Lexical and Syntax Analysis. Names, Binding, Type Checking, and Scopes. Data Types. Expressions and Assignment Statements. Statement-Level Control Structure. Subprograms. Implementing Subprograms. Abstract Data Types. Support for Object-Oriented Programming. Concurrency. Exception Handling and Event Handling. Functional Programming Languages. Logic Programming Languages. Project.

**Textbook**

Robert W. Sebesta. Concepts of programming languages, 2008 Addison-Wesley.

**Course Code :** **CSC 229**

**Course Title :** Operating Systems

**Prerequisites**: CEN 126

**Credit Hours** : 4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:6

**Course description:**

Computer System Structure, Operating System Concepts, Operating System Structure, Procedures, CPU Scheduling, ProcessSynchronization,BatchFiles,RecoveryConsole,MemoryManagement,VirtualMemory,File-System Interface, Storage Structure, Data Storage on Disks, File-Systems : Fat,Fat32, NTFS, Distributed Systems ,Hardware Protection, The Linux system

**Textbook**

Abraham Silberschatz, Peter Baer, Galvin, Greg Gagne. Operating Systems concepts , Pearson Educaion, Sixth Edition.

**Course Code :** **IS 224**

**Course Title :** Visual Programming

**Prerequisites** : CSC 153

**Credit Hours** : 3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0

**Course Description:**

Selecting a Visual Language, Knowing the concepts and procedures used in Visual Languages, Syntax and semantics of the language used. Types of Data, conditional statements, recursion, data structures, modular programming, review of Object-Oriented Programming concepts and techniques, User Interface Design rules, Materializing an interface into a set of visual objects, File types, File organizing techniques, File usages, Publishing an interface on the web, Basic concepts of Human Computer Interaction, Comparison between the selected language and other visual languages.

**Textbook:**

Diane Zak, Programming with Microsoft Visual Basic .NET 2005, Publisher Course Technology, ISBN 0-619-21718-9

**COURSE CODE :** **CSC 214**

**Course Title :** Data Structures

**Prerequisites :** CSC 283

**Credit Hours** : 4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:6

**Course description:**

Functions in C - Structures and pointers - Memory Management functions , Concepts and Definition of abstract data type, Array as ADT, Stack and operations, Queue and operations Linked List and stack as list, Queue as list and applications, Sorting, recursion, Tree Introduction to Graphs, Projects and Exercises.

**Textbook :**

Data structures using C and C++. Second edition, YEDIDYAH LANGSAM and others Prentice Hall and others. 1996.

**Course Code:** **CSC346**

**Course Title:** Software Engineering**.**

**Prerequisites:** CSC 214

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:7

**Course description:**

Software Engineering Concepts, System Engineering Concepts, Software Process, Analysis Concepts and Principles, Analysis

Modeling Design, Real-Time System Design, Software Testing Techniques, Technical Metrics for Software, Project

**Textbook:**

Ian Somerville, Software Engineering , Pearson Education, 7-th edition.

**Course Code :** **CSC 338**
**Course Title :** Compiler Design
**Prerequisites:** CSC237
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level: 7

**Course description**

The design and implementation of compilers. Compiler organization, algorithms for lexical, syntactic and semantic analysis, top-down and bottom-up parsing (e.g., recursive descent, LL, LR, LALR parsing). Symbol table organization, error detection and recovery, intermediate and object code generation, and code optimization. Student has to implement a compiler for a simple high level language as project.

**Textbook:**

A. V. Aho, R. Sethi, J. D. Ullman; *"Compilers: Principles, Techniques, and Tools";* 1986; Addison-Wesley; ISBN: 0-201-10088-6; (The dragon book).

**Course Code:** **CEN 333**
**Course Title:** Microprocessor Systems
**Prerequisites:** CEN 126
**Credit Hours**: 3 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level: 7

**Course description:**

Architecture and Instruction set of different 16 bit microprocessors; Microprocessor chips. **Supporting chips**: Buffers, decoders, system clock generator, reset system. Memory chips and subsystems Interfacing 16-bit Microcomputers. Architecture of Microprocessor based systems, design technique, memory and I/O devices interfacing to the microprocessor, interfacing technique. **I/O techniques**: Interrupts, Direct memory access; **System development and design tools techniques**: hardware and software.

**Textbook:**

B. Brey, " The Intel Microprocessors..", Prentice Hall, 5th Edition, 2000

**Course Code :** **CEN 301**
**Course Title:** Signals and Systems
**Prerequisites :** Math 207
**Credit Hours : 4** Lecture Hrs: 4
Lab Hrs: 0 Tut. : 0 Level:7

**Course description:**

Time-domain analysis of signals: Mathematical and graphical representation. Classifications. Basic operations. Basic signals. Sampling and aliasing. Time-domain analysis of systems: Block diagram representation. Differential and difference equation representation. Impulse and step responses. Frequency-domain analysis of signals: Spectra of continuous-time and discrete-time signals. Frequency-domain analysis of systems: Frequency response of continuous-time systems: Bode plot, SyQuest plot, feedback and its effects on system stability. Frequency response of discrete-time systems. Laplace transform and its applications. Z-transform and its applications: Relationship with Laplace. Exercises should be solved using MATLAB

**Textbook:**

A. V. Oppenheim*, Signals and Systems,* Prentice Hall, 2nd edition, 1997

**Course Code:** **CEN 345**
**Course Title :** Computer Networks
Prerequisites: CEN 126
Credit Hours :4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:7

**Course description:**

**Introduction to computer networks**: Network Types, Overview of data transmission, Introduction to network protocols, The Internet protocol. **Network topologies**; Network architecture and the OSI reference model; The physical and Data Link Layer , flow and errors control, ARQ Stop/wait, Sliding window protocols, **DLC standards**: HDLC , PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, Hubs, routers, Ethernet Switches; **Network Layer Services**: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.

**Textbook:**

A. Tanenbaum Computer Networks. 4rd Ed., Prentice-Hall, 2003.

**Course Code :** **CSC 392**

**Course Title:** Selected Topics for Computer science

**Credit Hours** :3 Lecture Hrs:

Lab Hrs: Tut. Hrs: 0 Level:8

**Prerequisites :**

**Course description:**

In this course, advanced topics in computer sciences are proposed, like: Java Object-Oriented programming, **Object-Oriented Software Engineering,** Application Programs, Operating Systems Design and implementation, Distributed Operating Systems, Distributed Computing, Introduction to Parallel Computing.

**Textbooks:**

The text book depends on the topic of the course.

**Course Code:** **CSC 393**

**Course Title:** Systems Programming

**Credit Hours** :3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level : 8

**Prerequisites:** CSC338

**Course description**

Study of one particular processor, assembly for this processor. Introduction to the assembly laguage of this processor. Design and implementation of an assembler (translation to machine code).

Linkers and loaders: Absolute loaders; Program relocation; Program linking; Data structures; Dynamic loading; Bootstrap loaders.

Macro processors: Data structures and logic flow for a simple one-pass macro processor; Concatenation of macro parameters; Generation of labels in macro expansions; Conditional macro expansion; Macro processing within an assembler; General-purpose macro processors. Project.

**Textbook :**

Leland Beck "An introduction to Systems programming", Addison Wesley, 1990.

**Course Code:** **CSC357**

**Course Title:** Internet Techniques web programming**.**

**Credit Hours** : 3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0 Level: 8.

**Prerequisites**: CEN 345

**Course description:**

An overview of connecting to and navigating within the Internet system and the World Wide Web: Navigation. Search Engines. Advanced search techniques. Design of web pages using HTML, XML and Java. TCP/IP. Client/Server architectures. Mastering Connectivity. Security.

**Textbook :**

Gary P. Schneider and Jessica Evans *The Internet -- 3rd Edition*, Course Technology, 2002.

**Course Code:** **CSC 327**

**Course Title:** Operations Research &Applications programming

**Credit Hours** :3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0 Level:8

**Prerequisites**: CSC 283

**Course description:**

OR Approach, Methodology And Applications : modeling, constraints, objective and criteia. Problems of multiple criteria optimization, model validation and systems design. Mathematical programming; simulation, gaming; heuristic programming. Examples,: theory of inventory. Production; linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. Theory of games for two-person competitive situations. Project management through PERT-CPM

**Textbook:**

Hamdi Taha , Operations Research: An Introduction (7th Edition), ISBN: 0130323748, 2002.

**Course Code :** **CSC 313**
**Course Title :** Algorithms Analysis and Design
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level : 8
**Prerequisites** : CSC 214
**Course description:**
Introduction to Algorithms Analysis and Design, General Algorithms: (1- Greater Common Divisor Algorithm, 2- Smaller Common Multiple Algorithm, 3- Pascal-Triangle Algorithm, 4- Inverse Number Algorithm, 5- Recursive Algorithm), Algorithms And Procedures, Algorithm Analysis: (Algorithm Efficiency, Algorithm Run-time, Algorithm Complexity, Computation Horner Algorithm Complexity Degree, Multiplication Two Polynomials Complexity Degree, Computation Using While Loop Algorithm Complexity Degree), Sorting Algorithms: (Insert Sort Algorithm, Selection Sort Algorithm, Bubble Sort Algorithm, Heap Sort Algorithm, Merge Sort Algorithm, Sort Algorithm, Files Sorting Algorithms), Searching Algorithms, Backtracking Algorithms: (8-th Queen Problem, Optimal Option Problem).
**Textbook**
Michael T.Goodrich, Roberto Tamassia , Algorithm Design: Foundations ,Analysis and Internet Examples, John Wiley & Sons Inc 0-471-38365-1, 2002.

**Course Code :** **IS 463**
**Course Title :** Knowledge base systems Application
**Prerequisites** : CS 214
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:9
**Course Description:**
Review of first-order logic, relational algebra, and relational calculus. Fundamentals of logic programming. Logic for knowledge representation. Architecture of a knowledge-base system. Fundamentals of deductive databases. Top-down and bottom-up query processing. Some important query processing strategies and their comparison. Project or term paper on current research topics.
**Textbook**
Richard A. Frost, Introduction to Knowledge Based Systems.

**Course Code :** **CSC 498**
**Course Title:** Project I
**Credit Hours : 2** Lecture Hrs:
Lab Hrs: Tut. Hrs: Level:9
**Prerequisites : 100 CH**
**Course description:**
Student will study, design and develop an integrated system, and he will be examined at the end of the semester.
**Textbooks**
Selected papers and researches related to the project topic.

**Course Code:** **IS 481**
**Course Title:** Communication skills
**Credit Hours** : Lecture Hrs: 2
Lab Hrs: 0 Tut. Hrs: 0 Level:
**Prerequisites: non**
**Course description**
This course covers written, oral, and interpersonal communication. Students will hand in short pieces of writing each week, will make oral presentations several times in the semester, and will work together in simulated project meetings and other realistic scenarios of pair and small group interaction.

**Course Code:** **CSC 448**
**Course title :** Optimization Techniques
**Perquisites:** CSC 327
**Credit Hours**: 3 Lecture Hrs 2: Lab Hours: 1
Tut. Hrs: 0
**Course description:**
Unconstrained optimization theory. Convex functions and convex sets. Algorithms for unconstrained optimization (Steepest descent Newton methods Conjugate gradient methods). Constrained optimization theory (Kuhn-Tucker conditions). Special problems:

(Linear programming Quadratic Programming). Algorithms for constrained optimization.
Since this is a course on optimization *techniques* you will need to be able to program with high level programming languages (e.g C/C++, Java, C#)

**Textbook :**

Wright, S. and J. Necedah *Numerical Optimization* Springer.

**Course Code:** **CSC 414**
**Course title:** introduction to Unix and Linux
**Prerequisites: CSC 229**
**Credit Hours : 3.** Lecture Hrs:2. Lab Hrs:2. Level:9

**Course description:**

User/kernel interface, fundamental concepts of Unix, user authentication, basic and advanced I/O, file system, signals, process relationships, and inter-process communication. Fundamental development and debugging tools such as "make" and "gdb" will also be covered.

**Textbook:**

W. Richard Stevens, Advanced Programming in the UNIX Environment, Addison Wesley Professional, 1992.

**Course Code :** **IS 491**
**Course Title : Multimedia Data Management**
**Prerequisites** : IS 224
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 1 Level : 10

**Course Description:**

Significance and value of multimedia for a variety of end uses .Multimedia data storage. Use of multimedia hardware for capture and management of sound, graphics and video. Multimedia development tools, programming, scripting and design skills. Use of multimedia authoring tools for producing multimedia applications

**Textbook:**

Boyle, T. .*Design for Multimedia Learning.* London: Prentice Hall, 1997

**Course Code :** **CSC 463**
**Course Title:** Artificial Intelligence
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level : 10
**Prerequisites**: CSC 214

**Course description**

Introduction & Definitions. Agent and examples. Uninformed Search. Heuristic Search. Constrained Search Problems CSP). Logical agents. First Order Logic and examples Machine Learning. Project.

**Textbook**

Russell, S. J. and P. Norvig. Artificial Intelligence, A Modern Approach, Prentice Hall,2003,USA.

**Course Code :** **CSC 458**
**Course Title :** Distributed Systems and Parallel Processing
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0
**Prerequisites** : CSC 229

**Course description:**

Introduction to distributed systems, processes and processors, parallel architecture (multi-computers, multi-processors), communication in parallel systems, performance of parallel systems, examples of parallel programming, introduction to distributed systems, distributed algorithms, types of distributed systems, compatibility of distributed systems and discovery of the end of processes.

**Textbook:**

Coulouris, G., Jean Doll more, and Tim Kind berg Distributed Systems: Concepts and Design, Addison-Wesley, 3rd Edition, 2001-ISBN: 0-201-619180

**Course Code :** **CSC 499**
**Course Title:** Project II
**Credit Hours** :4 Lecture Hrs:
Lab Hrs: Tut. Hrs: Level: 10
**Prerequisites : CSC498**

**Course description:**

Student will study, design and develop an integrated system. Examination to be held at the end of the semester.

**Textbooks:**

Selected papers and researches related to the project topic.

## Second Program:

BA Degree Program: **Information technology**

**Study Plan:**

**Level 3**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC244** | Concepts of Algorithms | 3 |
| **CSC276** | Computer Graphics | 4 |
| **CSC283** | Discrete Structures | 4 |
| **IS226** | Information Systems Fundamentals | 3 |
| **MATH203** | Differential and Integral Calculus | 3 |
| **STAT224** | Introduction to Statistics & Probability | 3 |
| | Total | 20 |

**Level-4**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC214** | Data Structures | 4 |
| **CSC229** | Operating Systems | 4 |
| **CSC237** | Programming Languages Concepts | 3 |
| **IC102** | Islam and Construction of Society | 2 |
| **IS224** | Visual Programming | 4 |
| **MATH207** | Differential Equations | 3 |
| | Total | 20 |

**Level-5**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN345** | Computer Networks | 4 |
| **CSC346** | Software Engineering | 3 |
| **IS326** | Database (2) | 4 |
| **IS340** | Information Systems Analysis and Design | 3 |
| **IS344** | Design and Programming of GUI | 4 |
| | Total | 18 |

**Level-7**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC414** | Introduction to Unix and Linux Systems | 3 |
| **IC104** | Fundamentals of the Islamic Political System | 2 |
| **IS449** | Data Mining | 3 |
| **IS463** | Knowledge base Systems Application | 3 |

| | | |
|---|---|---|
| **IS481** | Communication Skills | 2 |
| **IS498** | Graduation Project-1 | 2 |
| | Total | 15 |

**Level-8**

| Course Code | Course Title | Credit |
|---|---|---|
| **IS450** | Multimedia Data Management | 3 |
| **IS452** | Planning & Management of Information Resources | 3 |
| **IS465** | Decision Support Systems | 3 |
| **IS480** | Electronic Commerce Systems | 3 |
| **IS499** | Graduation Project-II | 4 |
| | Total | 16 |

## Course Description:

**Course Code :** **CSC 152**
**Course Title :** Concepts of Algorithms and Computer Programming
**Prerequisites :** non
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level : 3
**Course description:**
Problem-solving, algorithmic design, Introduction to Programming, Structured Program Development, Program Control, Functions, Arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.

**Textbook :**
C How to program ,Deitel&Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004

**Course Code:** **CEN 111**
**Course Title:** Logic Design
**Prerequisites:** non
**Credit Hours**: 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: Level:3
**Course description:**
Digital computer and information (numbering systems, Arithmetic operations, Decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, Combinational circuits simplification, CMOS circuits), Combinational logic design (design procedure, decoders, multiplexes, Binary adder and subtracted), Sequential circuits (latches, flip flops, synchronous sequential circuits analysis and design), Analysis and design of synchronous sequential machines, Representation, state reduction and realization; Finite state machines.
**Textbook:**
M. Mano, Digital Design, 3rd Ed., 2007.

**Course Code :** **IT 125**
**Course Title :** Database
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4
**Prerequisites** : CSC 152
**Course discretion:**
Database definition, Database system, Overview of database management, database system architecture, Introduction to Relational databases, An Introduction to Structured Query Language(SQL), Database Integrity, Views, Normalization, Database design, Practical Applications.
**Textbook:**
"An Introduction to Database Systems", Date, 2004, Addison-Wesley.

**Course Code:** **CEN 126**
**Course Title:** Computer Architecture
**Prerequisites:** CEN 111
**Credit Hours**: 3 Lecture Hrs: 3

Lab Hrs:0 Tut. Hrs: 0 Level:4

**Course description:**

Review of logic design principles. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design .System software .Micro-programmed CPU .Comparison between CISC, RISC and VLIW processors. Introduction to memory organization; I/O operations; Introduction to parallel processing techniques.

**Textbook:**

M. Mano, "Computer System Architecture," Prentice Hall, 2004.

**Course Code :** **CSC 153**

**Course Title :** Object Programming

**Prerequisites** : CSC152

**Credit Hours : 4** Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:4

**Course description:**

Introduction to Object-Oriented Programming, Program Control Structures, Functions, Arrays, Pointers and Strings, Classes Part I Classes and data abstraction, Classes Part II :Operator Overloading, Inheritance Virtual Functions and Polymorphism.

**Textbook**:

C How to program ,Deitel&Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004.

**Course Code :** **CSC 244**

**Course Title :** Concepts of Algorithms

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:5

**Prerequisites**: CSC 152

**Course description:**

Growth function and Recurrence, Divide-and-Conquer: (Strassen, Fibonacci, Polynomial Multiplication), Heap Sort, Quick Sort, Bubble Sort, Insertion Sort, Merge Sort, Hash Table, Binary Search Tree, Dynamic Programming, Greedy Algorithms,

**Textbook**

Introduction to Algorithms, (Second Edition) Thomas Cormen, Charles Leiserson, Ronald Rivest, and Clifford Stein. MIT Press. ISBN: 0262032937

**Course Code :** **CSC 276**

**Course Title :** Computer Graphics

**Credit Hours** : 4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:5

**Prerequisites:** CSC 153

**Course description:**

Computer Graphics Applications Survey.**Color models** (chromaticity diagram, RGB, CMY, YIQ, HSV, and HLS color models).**Graphics Output Primitives** (coordinate frames, DDA, Bresenham's algorithm, circle-drawing, fill-area primitives algorithms). **2D Graphics** (2D Cartesian coordinates, curves and parametric equations, functions and transformations, inverse functions. **3D Graphics** (vectors in 3D, dot and cross product, homogeneous coordinates, correlation between cartesian and homogeneous coordinates). **Geometric transformations** (2D geometric transformations, matrix representation and homogeneous coordinates, inverse transformations, 2D composite transformations).**Geometric representation** (Lagrange polynomials of degree n, Hermite cubic polynomial, Bernstein polynomial, interpolation problem, Spline interpolation, problem of approximation, Bezier-Bersnstein approximation, Bezier-B-Spline approximation, quadric surfaces).

**Graphics Lab:** modeling, rendering, animation using 3D Studio Max from Autodesk. Use of OpenGL.

**Textbook:**

Hearn, D. and P. Baker "*Computer Graphics with OpenGL*".Pearson Prentice Hall, PearsonEducation Inc., Upper Saddle River, NJ07458, USA, 2004.PIE ISBN 0-13-120238-3.

**Course Code :** **CSC 283**

**Course Title :** Discrete Structures

**Credit Hours** : 4 Lecture Hrs:

Lab Hrs: 0 Tut. Hrs: Level:5
**Prerequisites:** CSC 153
**Course description:**
**Introduction to Discrete Structures**: algorithmic language. **Logic**: propositions, predicate logic, proofs, mathematical induction. **Sets**: special sets, operations, properties and identities, application of logic to knowledge-based systems. **Relations**: graphical and matrix representations, equivalence and order relations, application to databases. **Functions**: types, cardinality, application to functional languages. **Undirected Graphs**: Simple graphs, Eulerian paths, Hamiltonian circuits, trees, application to syntax diagrams. **Directed Graphs**: digraphs, consistent labeling, paths problems, Warshall's algorithm, shortest paths and Dijkstra's algorithm, application to routing in computer networks .**Machines and Computations**: automata as models, finite state automata (FSA) without outputs, FSA as language recognizers and their limits, introduction to Turing Machines, application of FSA to problem-solving.
**Textbook:**
Skvarcius, R. and W.B. Robinson "Discrete Mathematics with Computer Science Applications" The Benjamin / Cummings Publishing Co., 1986.
**Course Code : IT 226**
**Course Title :** Information Systems Fundamentals
**Prerequisites** : IT 125
**Credit Hours** :3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level: 5
**Course description:**
Definition of Information Systems ,Philosophy of IT Department, IT Courses Interrelations, Survey of information systems technology, Strategies for IT design, Strategic Role for Information and Information Systems, Organizational Structure and Information Systems, Organizational Modeling, Enterprise-wide computing and networking, Conceptual foundations, The Decision-making process, Information Systems Strategic Planning, Information system requirements, designing the information architecture of an organization, Information systems products and services, Managing of Information Systems.
**Textbook:**
O'Brien, J. A. (2003). Introduction to Information Systems (11th ed.). New York: McGraw Hill

**Course Code : CSC 237**
**Course Title :** Programming Languages Concepts
**Prerequisites**: CSC 283
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0
**Course description:**
To present an overview of several different paradigms of programming, To give some experience in writing programs in different languages, To introduce the concepts of syntax-directed translation, programming language semantics, parsing, and others.
**Textbook**
Robert W. Sebesta. Concepts of programming languages, 2008 Addison-Wesley.

**Course Code : CSC 229**
**Course Title :** Operating Systems
**Prerequisites**: CEN 126
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:6
**Course description:**
Computer System Structure ,Operating System Concepts ,Operating System Structure ,Procedures, CPU Scheduling, Process Synchronization,BatchFiles,RecoveryConsole,MemoryManagement,VirtualMemory,File-System Interface, Storage Structure, Data Storage on Disks ,File-Systems : Fat,Fat32, NTFS, Distributed Systems ,Hardware Protection ,The Linux system.
**Textbook**
Abraham Silberschatz, Peter Baer, Galvin, Greg Gagne. Operating Systems concepts , Pearson Educaion, Sixth Editio

**Course Code : ITS 224**

**Course Title :** Visual Programming
**Prerequisites** : CSC 153
**Credit Hours** : 3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0
**Course Description:**
Selecting a Visual Language, Knowing the concepts and procedures used in Visual Languages, Syntax and semantics of the language used. Types of Data, conditional statements, recursion, data structures, modular programming, review of Object-Oriented Programming concepts and techniques, User Interface Design rules, Materializing an interface into a set of visual objects, File types, File organizing techniques, File usages, Publishing an interface on the web, Basic concepts of Human Computer Interaction, Comparison between the selected language and other visual languages.
**Textbook:**
Diane Zak, Programming with Microsoft Visual Basic .NET 2005, Publisher Course Technology, ISBN 0-619-21718-9

**Course Code :** **CSC 214**
**Course Title :** Data Structures
**Prerequisites :** CSC 283
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:6
**Course description:**
Functions in C - Structures and pointers - Memory Management functions , Concepts and Definition of abstract data type, Array as ADT, Stack and operations, Queue and operations Linked List and stack as list, Queue as list and applications, Sorting, recursion, Tree Introduction to Graphs, Projects and Exercises.
**Textbook :**
Data structures using C and C++. Second edition, YEDIDYAH LANGSAM and others Prentice Hall and others. 1996.

**Course Code :** **IT 326**
**Course Title :** Database (2)
**Prerequisites** : IT 125
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 1 Level : 7
**Course Description:**
DBMS architecture and administration; Centralized and Client-Server approaches, System Catalog, Data Dictionary. Transaction management; Transactions: concepts, characteristics. Recovery techniques, Concurrency control techniques: Serializability, Deadlock, Locking schemes, Time-stamp ordering, Multi-version, Optimistic techniques; DB security; Distributed databases; Distributed DBMS, Data fragmentation and replication, Distributed transactions management. Object-Oriented databases. Introducing to new emerging DB technologies and applications; Web DBs, Multimedia DBs, Data Warehousing and Data Mining
**Textbook:**
Principles of Distributed Database Systems, Ozsu, M. Tamer And Valduriez, Patrick

**Course Code:** **CSC346**
**Course Title:** Software Engineering.
**Prerequisites:** CSC 214
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:7
**Course description:**
Software Engineering Concepts, System Engineering Concepts, Software Process, Analysis Concepts and Principles, Analysis Modeling Design, Real-Time System Design, Software Testing Techniques,Technical Metrics for Software, Project.
**Textbook:**
Ian Somerville, Software Engineering , Pearson Education, 7-th edition.

**Course Code :** **IT 340**
**Course Title :** Information Systems Analysis and Design
**Prerequisites** : IT 226.
**Credit Hours** : 3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0 Level:7
**Course Description:**
fundamental knowledge, methods and skills needed to analyze, design and implement computer-based systems. The role of the

systems analyst and the techniques employed. Utilizing the structured software development life cycle approach, the development phases are comprehensively discussed and reviewed.The Modeling Techniques: Process Modeling (DFDs), Data Modeling (ERDs), Architectural System Design Modeling, Unified Modeling language forms and Object-Oriented Modeling. The Course includes an integrated project that covers the whole system analysis and design phases, which the students will fulfill on a groub base manner. The Course also emphasizes on developing and improving the skills of interrelating, documenting, and modeling for the students.

**Textbook:**

Modern System Analysis & Design, $3^{rd}$Edition, 2002, J. A. Hoffer, J. F. George, J. S. Valacich, ISBN 0130339903

**Course Code :** **IT 344**
**Course Title :** Design and programming of GUI
**Prerequisites** : IT 224
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:7

**Course Description:**

Fundamentals of programming and designing of business applications using Visual programming, Common controls and construction of menus in Visual programming, Concepts and applications of data structures and design of graphical user interfaces, adding Database access and Internet access to Visual programming programs.

**Textbook:**

Philip A. Koneman, Visual Basic.NET Programming for Business, Pearson Education, Prentice-Hall

**Course Code:** **CEN 345**
**Course Title :** Computer Networks
**Prerequisites:** CEN 126
**Credit Hours :**4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:7

**Course description:**

**Introduction to computer networks**: Network Types, Overview of data transmission, Introduction to network protocols, The Internet protocol. **Network topologies**; Network architecture and the OSI reference model; The physical and Data Link Layer , flow and errors control, ARQ Stop/wait, Sliding window protocols, **DLC standards**: HDLC , PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, Hubs, routers, Ethernet Switches; **Network Layer Services**: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.

**Textbook:**

A. Tanenbaum Computer Networks.4rd Ed., Prentice-Hall, 2003.

**Course Code :** **IT 324**
**Course Title :** Modern Concepts of Application Programming
**Prerequisites** : IT 224
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:8

**Course description:**

Modern programming Concepts and how to be used to build real world applications needed by Society Organizations. Understanding a problem and analyzing it, sketching a solution, implementing the solution, documenting it and finally presenting the work in a professional manner. Projects tobe selected in the domain of modern applications, e.g: Health Information Systems, E-Commerce applications, Academic field, … .

This course, however, is intended to develop the talents of students and to encourage the spirit of competition, creation, goodness of work, and prettiness of exposition This course includes 2 or 3 large programming projects per semester.

**Textbook**

To be determined according to the chosen projects.

**Course Code :** **IT 342**
**Course Title :** Information Systems Engineering
**Prerequisites** : IT 340
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:8
**Course description:**
Application systems implementation, functional testing, user acceptance testing, and installation strategies .The processes of maintaining information systems, types of maintenance, measuring and controlling of maintenance effectiveness.

Software quality assurance, quality concepts, the ISO quality factors, technical metrics for software and examples of function-based, specification quality, testing metrics. Technical metrics for object-oriented systems. Information Systems Development Methodologies. Requirements Gathering Engineering. Software Copying Management.
**Textbook:**
Kees M. van Hee, Information Systems Engineering, A Formal Approach, (ISBN-13: 9780521455145 | ISBN-10: 0521455146)

**Course Code :** **IT 392**
**Course Title :** Selected Topics in Information Systems
**Prerequisites** :80CH.
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:8
**Course Description:**
Special topics of current trends in information systems. Engineering Tools and Methods, Simulation, Virtual Reality, Internet Security, Data Warehousing and Mining, Geographic Information Systems, Telemedicine and Medical Informatics, Workflow Management, Quantitative and Qualitative Methods in Information Systems, Global Information Systems Management, Intelligent Agent Technology and Applications, Human Computer Interaction, Computer-Based Learning and Training, Philosophical Foundations of Information Systems, Absorbing Continuous IT Developments in Organizations, IT Professional and Organizational Needs, Organizational Learning and Collaborative Technologies, Understanding and Managing Information Users Behavior, Policy, Legal and Security Issues in IT , and Virtual Organizations.

**Course Code:** **CSC 357**
**Course Title:** Internet Techniques web programming**.**
**Credit Hours** : 3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0 Level: 8.
**Prerequisites**: CEN 345
**Course description:**
An overview of connecting to and navigating within the Internet system and the World Wide Web: Navigation. Search Engines. Advanced search techniques. Design of web pages using HTML, XML and Java.TCP/IP.Client/Server architectures. Mastering Connectivity. Security.
**Textbook :**
Gary P. Schneider and Jessica Evans*The Internet -- 3rd Edition*, Course Technology, 2002.

**Course Code:** **CSC 327**
**Course Title:** Operations Research &Applications programming
**Credit Hours** :3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0 Level:8
**Prerequisites**: CSC 283
**Course description:**
OR Approach, Methodology And Applications : modeling, constraints, objective and criteia. Problems of multiple criteria optimization, model validation and systems design.Mathematical programming; simulation, gaming; heuristic programming. Examples,: theory of inventory. Production; linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. Theory of games for two-person competitive situations. Project management through PERT-CPM
**Textbook:**

HamdiTaha, Operations Research: An Introduction (7th Edition), ISBN: 0130323748, 2002.

**Course Code :** **IT 449**
**Course Title :** Data Mining
**Prerequisites** : IT 326.
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:9
**Course description:**
Principles, algorithms and applications of data mining, including algorithms, methods, implementations and applications of mining sequential and structured data, text data, Web data, spatiotemporal data, biomedical data and other forms of complex data.
**Textbook:**
Jiawei Han and MichelineKamber*"* ***Data Mining****: Concepts and Techniques*" 2nd ed., Morgan Kaufmann, 2006

**Course Code:** **IT 481**
**Course Title:** Communication skills
**Credit Hours** :2 Lecture Hrs: 2
Lab Hrs: 0 Tut. Hrs: 0 Level: 9
**Prerequisites: non**
**Course description**
This course covers written, oral, and interpersonal communication. Students will hand in short pieces of writing each week, will make oral presentations several times in the semester, and will work together in simulated project meetings and other realistic scenarios of pair and small group interaction.

**Course Code :** **IT 463**
**Course Title :** Knowledge base systems Application
**Prerequisites** : CSC 214
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:9
**Course Description:**
Review of first-order logic, relational algebra, and relational calculus. Fundamentals of logic programming .Logic for knowledge representation .Architecture of a knowledge-base system .Fundamentals of deductive databases. Top-down and bottom-up query processing. Some important query processing strategies and their comparison .Project or term paper on current research topics.
**Textbook**
Richard A. Frost, Introduction to Knowledge Based Systems.

**Course Code :** **CSC 414**
**Course title:** introduction to Unix and Linux
**Prerequisites: CSC 229**
**Credit Hours** : 3. Lecture Hrs:2.
Lab Hrs:2. Level:9
**Course description:**
User/kernel interface, fundamental concepts of Unix, user authentication, basic and advanced I/O, file system, signals, process relationships, and inter-process communication. Fundamental development and debugging tools such as "make" and "gdb" will also be covered.
**Textbook:**
W. Richard Stevens, Advanced Programming in the UNIX Environment, Addison Wesley Professional, 1992.

**Course Code :** **IT 498**
**Course Title :** Graduation Project-1
**Prerequisites** : 100 CH.
**Credit Hours** : 2.
Level:9
**Course Description:**
The previous courses have provided the IT students with strong and sufficient knowledge to develop information systems. The next logical stage is that the IT student must acquire hands-on experiences on developing real world information systems. In addition, the students should be familiarized with real world problems encounter during the development of real world information systems. Furthermore, the students should be trained to work in teams. In this course, the students will be organized into groups. The number of students in each group should not exceed three students. For each group, a supervisor will be allocated to guide the

group in developing a particular information system. In developing an information system, a particular information system development methodology should be used. Each group will develop a real world information system in two stages: The first stage will be carried out in IT 498 and the second stage will be carried out in IT 499. In IT 498, the students of each group must identify a problem domain, define a problem, identify the requirements in details, specify requirements in details, analyze and document the current system, proposed alternative systems, and design a particular system in details which includes the definitions of all the required system models such as the data model and the functional model. At the end of the course, each group must submit a formal report documenting the problem domain, the requirements, specifications, and the system models.

**Course Code :** **IT 450**
**Course Title :** Multimedia Data Management
**Prerequisites** : IT 224
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 1 Level : 10
**Course Description:**
Significance and value of multimedia for a variety of end uses .Multimedia data storage. Use of multimedia hardware for capture and management of sound, graphics and video. Multimedia development tools, programming, scripting and design skills. Use of multimedia authoring tools for producing multimedia applications.
**Textbook:**
Boyle, T. .*Design for Multimedia Learning.* London: Prentice Hall, 1997.

**Course Code :** **IT 452**
**Course Title :** Planning & Management of Information Resources
**Prerequisites** : IT 342
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level: 10

**Course Description:**
Definition of Information Resources and IT Infrastructure, Information Strategy Planning Components (Business Planning, Systems Planning, technical Planning). Strategic Planning Steps, used tools, managing the Feedback, Developing strategic Objectives and Rules. Organizing, Managing, and Developing of Information Resources for the Information Systems Departments, Cost Analysis, Outsourcing Management, IT Contingency Planning and Resources Safety. Human Factors and Performance Measurements. Security issues, Internal auditing, Standards and procedures of the Information Center, Continuous Improvement of IT Resources. Standards of Computer Networks, Planning of Networks, Business Requirements to Construct Networks, Requirements Analysis, Design of Networks, Choosing Network Technologies, Managing Networks, Measuring and continuous Evaluation of Network Performance, Network Maintenance and Development, Economical and Legal Issues of Managing Networks, Network effects on the performance and Productivity of the Organization, Computer Networks and the Organization, Network Management Tools.
**Textbook:**

**Course Code :** **IT 465**
**Course Title :** Decision Support Systems
**Prerequisites** : IT 326
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 level:10
**Course description:**
Decision-making process, systems modeling and support .Categorization of problem-solving techniques .Data management and concepts of the data warehousing .**Modeling of managerial problems**; linear programming models, simulation models, heuristics and forecasting models. Model-base management systems. DSS user interface design and management. Decision support system construction methods.DSS Hardware, software, and technology Levels. Knowledge-based and expert systems, expert

system architecture; representation of knowledge; forward and backward chaining; inferences making process; Applications of expert systems in decision making Group, distributed, and executive decision support systems.

**Textbook:**

Turban, E. & Aronson J. E., Decision Support Systems & Intelligent Systems, Seventh Edition. Upper Saddle River, NJ: Prentice Hall. ISBN: 0-13-046106-7

**Course Code :** **IT 480**

**Course Title :** Electronic Commerce Systems

**Prerequisites** : IT 340

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:10

**Course description:**

Strategic planning for EC adoption; Business design and architecture for EC applications; Web-based marketing strategies and models; E-Commerce Project Management; Public Policy and Legal Issues of Privacy; Socio-Technical Infrastructure for E-Commerce; Risk Management in E-Commerce Initiatives; E-Transformation; Measuring Effectiveness of E-Commerce Projects; EC and organizational change management; EC and competitiveness; Success and failure in EC implementation; Retailing in E-Commerce; E-Commerce in Banking; Advertisement in E-Commerce; E-Commerce and Online Publishing; E-Commerce in Manufacturing; E-Commerce and Supply Chain Management; E-Commerce and Customer Asset Management; Electronic Payment Systems; Mobile E-Commerce; Modern trends in developing E-commerce systems.

**Textbook:**

Daniel Amor. (1999). *The E-business (R)evoltion: Living and Working in an Interconnected World*. Upper Saddle River, NJ: Prentice Hall.

**Course Code :** **IT 499**

**Course Title :** Graduation Project-II

**Prerequisites** : IT 498

**Credit Hours** : 4

**Course description:**

In this course, each group will continue developing the information systems that started in IT 498. Each group must use a particular tool to implement its information system in a good programming practice. This implementation tool must be new and the students have not been experienced in the previous courses. Furthermore, the students must generate a user manual for their information system in an appropriate format. At the end of the term, each group must submit a final report, which documents completely the information system from the problem definition phase to the test and implementation phase and contains a user manual for the information system.

## Program: Mathematic

**Study plan:**

**The first and second level is the nature science preparation**

**Level 3**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration(2)** | Math.202 | 4 |
| **Principal of Probability Distribution Theorem** | Stat212 | 4 |
| **Basics of Mathematics** | Math.231 | 3 |
| **Introduction to Geometry** | Math.273 | 3 |

**Level 4**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration in many variables** | Math.203 | 4 |
| **Mathematical applications on computers** | Math.251 | 2 |
| **Vectors** | Math.204 | 3 |
| **Linear algebra** | Math.242 | 4 |
| **Theory of numbers** | Math.243 | 3 |

**Level 5**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Linear Programming** | Math.213 | 4 |
| **History of Mathematics** | Math.232 | 3 |
| **Introduction to Differential Equations** | Math.321 | 4 |
| **Numerical analysis** | Math.351 | 4 |

**Level 6**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Mathematical Methods** | Math.326 | 4 |
| **Group Theory** | Math.343 | 4 |
| **Real Analysis (1)** | Math.382 | 4 |

**Level 7**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Rings and Fields** | Math.444 | 4 |
| **Introduction to Topology** | Math.471 | 4 |
| **Real Analysis (2)** | Math.483 | 4 |
| **Project** | Math.499 | 4 |

**Level 8**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Introduction to Partial Differential Equations** | Math.422 | 4 |
| **Introduction to Differential Geometry** | Math.472 | 4 |
| **Complex Analysis** | Math.484 | 4 |

## COURSE DESCRIPTION:

**Level 3**

**Math .202 Differentiation & Integration(2) :** This course aims at giving students definite integral and its properties , mean value theorem of integral and the fundamental theorem of calculus. It also discusses indefinite integral , standard integrals, derivatives & integrals of hyperbolic and inverse hyperbolic functions, integration methods such as: integration by substitution , integration by parts , integration by partial fractions and other substitutions. Also L'Hospitals Rule , evaluation of area and volume of revolution, arc length, Numerical integration (Trapezoidal rule), Polar coordinates, Polar curves graphs and areas using polar coordinates.

**Stat212 Principal of probability distribution theorem:**

This course discusses the discrete and continuous probability distributions (The mass and density probability functions and their properties, expectation, variance, standard deviation and the moment generating functions) . The discrete and continuous bi variety random variables and their properties (expectation, covariance, correlation coefficient, variance of sum or difference of two random variables and the moment generating functions of bi variety random variables) . Bi variety distributions (marginal and conditional distributions ,independence of random variables , conditional expectation) .Also distribution functions of random vectors and random samples (distribution of sample mean – law of large number – central limit theorem) are discussed.

**Math.231 Basics of mathematics :**

This course aims at introducing mathematical logic, methods of proofs, mathematical induction, set theory, the product of sets, binary operations, equivalence relations , equivalence classes and partitions , mappings , the images and inverse images of sets under mappings , equivalence sets, countable and finite sets. Binary operations, morphisms, definition and examples of groups- definition and examples of rings and fields, polynomials and partial fractions.

**Math.273 Introduction to geometry:**

This course provides students with the main concepts of plane Euclidean geometry such as: coordinates, transformation, reflections ,translation, isometrics and similarity. Theorems on triangles, circles, tangents and angles. Polygons, polyhedral, regular polyhedral, their classification, and properties. Spherical geometry such as: sum of angle formula for spherical triangles, projection, conservative functions. Affine geometry : linear and affine transformation, isometrics, finite affine planes.

**Level 4**

**Math.203 Differentiation & integration in many variables:**This course studies the functions in two or more variables, domain of the function, three dimension rectangular coordinates, limits, continuity, partial derivative, higher-order partial derivatives, differentiation of composed function, maxima and minima- method of Lagrange multipliers for maxima and minima. Double integrals in Cartesian and polar coordinates , triple integrals in spherical and cylindrical coordinates,

infinite series, convergence tests, representations of functions by power series, Taylor , Maclaurin, and the binomial series.

**Math.251 Mathematical applications on computers**

This course provides an introduction to mathematics software as Mathematica, Mat lap and solving some problems in calculus and linear algebra by mathematica and Mat lap. Applications: modeling , simulation and visualization , internet research . Writing mathematical reports and projects using scientific work place.

**Math.204 Vectors:**

Students studies vectors in two and three dimensions, scalar and vector products, equations of lines and planes in 3-dimensional space. Surfaces of revolution and their equations in cylindrical and spherical Coordinates. Vector valued functions of a real variable, curves in space, curvature, rates of change in tangent and normal directions, directional derivatives and gradient of a function. Application to equations of normal and tangent space to a surface at a point. Vector fields, divergence, curl of a vector, line and surface integrals, Green's theorem, Gauss' divergence theorem and Stock's theorem.

**Math.242 Linear algebra**

This course studies matrices and their operations, types of matrices, elementary transformations, determinants, elementary properties of determinants, inverse of a matrix, rank of matrix, linear systems of equations, vector spaces, linear independence , finite dimensional spaces , linear subspaces, inner product spaces, linear mappings, Kernel and image of a linear mapping- Eigen values and Eigen vectors of a matrix and of a linear operator mapping.

**Math.243 Theory of numbers:**

Students study the first and second principle of mathematical induction, well-ordering principle , divisibility, Euclidean algorithm, prime numbers and their properties, linear Diophantine equations, congruencies and their properties, linear congruencies- the Chinese remainder theorem, Fermat's little theorem, Euler's theorem, Wilson's theorem, arithmetic functions and Pythagorean triples.

**Level 5**

**Math. 213 Linear programming:**

This course gives introduction to operations research, mathematical model for some real problems and mathematical formulation of linear programming problem. Graphical method for solving linear programming problems, convex sets, polygons, extreme point and optimality theorem. Analytical method (Simplex method) , big-M method , Two-phase method, formulation mistakes, dual problem, sensitivity analysis, application to transportation and network problems.

**Math.232 History of mathematics:**

This course aims at giving students some knowledge about the evolution of some mathematical concepts ,facts and algorithms in arithmetic , algebra, trigonometry ,Euclidean geometry, analytic geometry and calculus through early civilizations such as ancient Egyptian , Babylonians, Greeks, Indians, Chinese, Muslims and Europeans . Evolution of solutions of some conjectures and open problems.

**Math.321 Introduction to differential equations**:

This course gives basic definitions and construction of an ordinary differential equation. Methods of solving ordinary differential equations of first order . Orthogonal trajectories, ordinary differential equations of high orders with constant coefficients and with variable coefficients, types of solutions, linear systems of ordinary differential equations, series solutions of a linear ordinary differential equation of second order with polynomial coefficient and Laplace transform.

**Math. 351 Numerical analysis:**

Students study numerical methods for solving nonlinear equations (bisection – iteration – Newton – false position … ), errors and rates of convergence. Direct methods for solving linear systems (Gauss

elimination, LU decomposition) and iterative methods (Jacobi –Gauss Seidel – Relaxation). Errors iteration matrices and convergence of iterative methods, polynomial interpolation (Lagrange-
Newton's methods: divided differences- forward and backward differences) and analysis of errors. Numerical differentiation and integration, errors and accuracy. Gaussian integration formulas.

**Level 6**

**Math.326 Mathematical Methods :**

This course discusses series solutions of ordinary differential equations with variable coefficients, inner product space of functions, self- ad joint operator, Sturm-Lowville theory, orthogonal polynomials and special

functions( Legendre, Hermit, gamma, beta, Bessel). Generalized theory of Fourier series and Fourier integrals.

**Math.343 Group Theory:**

This course studies the axioms of group theory and some examples of groups. Subgroups, cyclic groups, Lagrange theorem, normal subgroup, factor group, homomorphism, fundamental theorems of isomorphism, auto morphisms, Caley theorem and its generalization, simple groups, permutation groups, class equation, group action on a set, p-groups, Cauchy theorem- Sylow's theorems, external and internal direct product of group, Burnside theorem, dihedral- quaternion, groups of

auto morphisms on finite and infinite cyclic groups.

**Math.382 Real Analysis (1):**

This course introduces basic properties of the field of real numbers , completeness axiom , series and their convergence ,

monotone sequence , Bolzano-Weirstrass theorem , Cauchy criterion, basic topological properties of the real numbers, limit of a function , continuous functions and their properties . Uniform continuity , compact sets and its properties. The derivative of a function ,mean value theorem and Lupital rule and Taylor theorem.

**Level 7**

**Math.444 Ring and Fields:**

Students study rings, group of units, group of auto morphisms of a ring , ideals and factor rings and principal ring. They also study prime and maximal ideals, field of quotient of integral domain, characteristic of a ring, direct sum of rings, modules, Euclidean rings, ring of polynomials, roots of polynomials over a field, fields extensions, finite and simple extensions of fields, algebraic closure of a field, splitting fields and finite fields.

**Math.471 Introduction to Topology:**

This course introduces topological spaces, examples, closure of a set, derived set, topological subspaces, bases ,finite product topology, sub-bases, metric spaces , examples, metrizability, continuous functions , characterization of continuous functions on topological and metric spaces, homeomorphisms and examples. Topological property, compact spaces, examples , limit point and sequentially compact spaces.

**Math.483 Real Analysis (2):**

This course studies definition of Riemann integral, Darboux theorem , Riemann sums , properties and the principle theorem in calculus. Series of functions, point twice convergence , uniform convergence, algebra
and σ – algebra (sigma algebra), finite additivity and countable additivity, main extension theorem and outer measure. Measurable sets , measure , Lebesgue measure and its properties, simple functions, measurable functions, Lebesgue integral, theorems of convergence, the relation between Lebesgue and Riemann integral.

**Math.499 Project:**

A student prepares a research project in one of the Math. topics under the supervision of the staff.
The student should submit a report for an oral exam.

**Level 8**

**Math.422 Introduction to partial differential equations:**

This course discusses classification and formation of partial differential equation , first order linear partial differential equation , solution
using Lagrange's method , Cauchy problem , second order linear partial differential equation in several variables , physical application using separation of variables , classifications of partial differential equation , some boundary value problems and Green's function.

**Math.472 Introduction to differential geometry:**

This course discusses theory of curves in $R^3$, regular curves , arc length and reparameterization , natural parameterization, Serret-Frenet apparatus, existence and uniqueness theorem for space curves, Bertrand curves. Involutes and evolutes, local theory of surfaces, simple surfaces, coordinate transformations, tangent vectors & tangent spaces . First and second fundamental forms, normal and geodesic curvature , Weingarten map, principal Gaussian and mean curvatures, geodesics, equations of Gauss and Godazzi-Mainardi.

**Math.484 Complex Analysis:**

This course discusses complex numbers, Cartesian and polar representation of complex numbers, powers and roots of complex numbers, limits and continuity of complex functions, analytic functions , Cauchy-Riemann equations. Harmonic functions, exponential, trigonometric , hyperbolic functions and logarithmic functions. Complex integration, contour integral , Cauchy's theorem, Cauchy's integral
Formula, bounds on analytic functions ,Taylor and Laurent series, power series, zeros and singularities. Residue theory and applications to real and improper integrals.

## BA Degree Program : Physics

The first year for these program is the preparatory year of natural Science

**Level 1**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 101** | Language Skills | 2 | - |
| **CHEM101** | General Chemistry (1) | 4 | - |
| **ENG101** | English Language | 3 | - |
| **IC101** | Introduction to Islamic Culture | 2 | - |

| | | | |
|---|---|---|---|
| **MATH101** | Calculus (1) | 4 | - |
| **PSY101** | Thinking Skills | 2 | - |
| **Total** | 17 | | |

**Level 2**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 103** | Arabic Editing | 2 | - |
| **CSC101** | Introduction to Computers and Programming | 3 | - |
| **ENG103** | English Language (2) | 3 | ENG101 |
| **IC102** | Islamic and Society Building | 2 | IC101 |
| **PHYS101** | General Physics (1) | 4 | - |
| **STAT101** | Statistical Probability | 3 | - |
| **Total** | 17 | | |

**Level 3**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC103** | Economic System in Islam | 2 | IC101 |
| **MATH201** | Calculus for Science (2) | 3 | MATH101 |
| **PHYS243** | General Physics (2) | 4 | PHYS101 |
| **PHYS211** | Classical Mechanics (1) | 3 | MATH101 PHYS101 |
| **PHYS231** | Vibrations and Waves | 2 | MATH101 PHYS101 |
| **PHYS243** | Thermodynamics | 3 | PHYS101 |
| **Total** | 17 | | |

**Level 4**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **MATH205** | Calculus for Physics (3) | 3 | MATH201 |
| **PHYS232** | Physical Optics | 3 | Phys231 |
| **PHYS234** | Health Physics | 2 | - |
| **PHYS203** | Mathematical Physics (1) | 3 | MATH201 |
| **PHYS212** | Classical Mechanics (2) | 3 | PHYS211 |
| **PHYS221** | Electromagnetism (1) | 3 | PHYS202 |
| **Total** | 17 | | |

**Level 5**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **BUS103** | Communication Skills | 2 | - |
| **MATH210** | Differential Equations | 3 | MATH205 |
| **PHYS302** | Mathematical Physics (2) | 3 | PHYS203 |
| **PHYS321** | Electromagnetis | 3 | PHYS212 |

| | | | |
|---|---|---|---|
| | m (2) | | |
| **PHYS351** | Modern Physics | 3 | PHYS232 |
| **PHYS393** | Optics Physics | 3 | PHYS232 |
| **BIO314** | Healthy Culture | 2 | - |
| **Total** | 18 | | |

**Level 6**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC104** | Political System in Islam | 2 | IC101 |
| **PHYS303** | Mathematical Physics (3) | 3 | PHYS30 |
| **PHYS350** | Quantum Mechanics (1) | 3 | PHYS212 PHYS351 |
| **PHYS391** | Electromagnetism Lab | 2 | PHYS221 |
| **PHYS393** | Modern Physics Lab | 2 | PHYS351 |
| **PHYS342** | Statistical Physics | 3 | PHYS243 |
| **PQUR126** | Islamic Morals | 2 | |
| **Total** | 17 | | |

**Level 7**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS422** | Electronics | 4 | PHYS243 |
| **PHYS452** | Quantum Mechanics (2) | 3 | PHYS350 |
| **PHYS471** | Solid State Physics (1) | 3 | PHYS350 |
| **PHYS481** | Nuclear Physics (1) | 3 | PHYS351 |
| | Selective Course (Faculty) | 2 | - |
| **Total** | 16 | | |

**Level 8**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS455** | Molecular and Atomic Spectra | 3 | PHYS452 |
| **PHYS495** | Solid State Lab | 2 | PHYS471 |
| **PHYS497** | Nuclear Physics Lab | 2 | PHYS481 |
| **PHYS498** | Project | 2 | PHYS497 PHYS495 |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course | 2 | - |
| **Total** | 17 | | |

## Course Description:

**CHEM 10 : General Chemistry**

Theoretical part : Chemical calculations, gasea, liquid state, thermochemistry, solutions, chemical kinetics, chemical and ionic equilibria Bohr Theory and electronic configuration of atoms and periodic table . An Introduction to types of chemical bonds .

Practical part : some experiments on properties of matter : density , viscosity, qualitative analysis : identification of acidic and basic radicals for inorganic salts .

**Course Number : CSC 101 Introductions to Computer and Programming**

Credit Hours ( lecture and Lab ) : 3 (2+ 1) Level : Second

Theoretical parts : Introduction to programming , structured program development, program control, functions, array. Assignments in algorithm design and translation of algorithms in high level language like C language

Practical part: Excercices on the theoretical part.

**Course Number :** ENG **101 - English Language**

The course aims to introduce students to :

An awareness of the basics of the English language in general .

An understanding of the basics of English grammar .

The basics of English pronunciation.

Specialized academic topics in the students, respective disciplines.

Proposed Teaching Methods

The course will be conducted via lectures in the main seminar, workshops and group discussions will also be used .

**Course Number : Math 101 - Calculus -1**

Real number and real line – Inequality. Function – The graph of a function- even and odd functions- composite of functions- Review of Trigonometric functions – inverse functions- Limits – The definition of a limit – Properties of Limits- Techniques for Evaluaring Limits – Infinites Limits. Continuity at a point on an open interval - one sided limits and continuity on a closed interval – Properties of continuity . The Derivative of a function – Differentiability and continuity – chain Rule – Derivatives of Trigonometric function – Logarithmic and Exponential functios ( Differentiation ) - Hyperbolic functions – inverse Trigonometric functions Differentiation . Exterma on an interval- Rolle,s Theorem and mean value theorem – Increasing and Decreasing functions and the first derivative test – concavity and second derivative test- related rates .

**PHYS 101 General Physics (1) (3 + 1) h.**

<u>Theoretical part:</u> Physics and measurements, Units and dimensions, Dynamics of particle in one dimension (displacement, average velocity, instantaneous velocity, acceleration, free fall), vector algebra and geometry, Motion in two dimensions, Projectile motion, Uniform circular motion, Tangential and radial accelerations, Newton's first law and inertial frames, Mass and weight, Newton's second law, Newton's third law, Friction, Work and energy, Vector scalar products, Work of variable forces, Kinetic energy and work-energy theorem, Conservative and non-conservative forces and potential energy, Power, Conservation of mechanical energy, The conservation law of linear momentum, Impulse, Collisions, Collision in one and two dimensions, Rotational motion with constant angular acceleration, Angular quantities, Moment of inertia, Torque and angular momentum, Work of rotational motion, Properties of matter: Elasticity, Stress, Strain, Modulus's, Strain energy, Fluid mechanics: Density and relative density, the concept of pressure, Pascal law, Archimedes principle, Fluid flow, Bernoulli's equation and its applications. State of matters, heat and Temperature and zero law of thermodynamics, Phase transitions, Latent heats, Ideal gases.

<u>Practical part:</u> Error and measurements, Force table, Hook’s Law, Free fall, Projectile motion, Boyle’s Law, Young’s Modulus, Specific Heat of a Solid, Coefficient of Thermal expansion, Surface tension in capillary tube, viscosity, Newton's law

of cooling, Determination of the Paraffin wax fusion temperature.

**PHYS 202 General Physics (2) (3 + 1) h.**

Theoretical part: Electric Charge, Insulators and conductors, Coulomb's law, Point charge, The electric field, Electric field of multiple point charges, The electric field of continuous charge distribution, examples of various shapes (disks, rings, spheres, planes), The parallel plate capacitor, Electric dipole, motion of point charge and electric dipole in electric field, Electric flux, Gauss's law, Applications of Gauss's law, Conductor in electrostatic equilibrium, Electric potential, The potential of point charges, The potential of dipole, The electric potential of many charges, Capacitance and capacitors, Energy stored in a capacitor, Fundamental circuits, The electric current, Batteries, current density, Conductivity and resistivity, Ohm's law, Series resistors, Parallel resistors, Kirchhoff's laws, RC circuits, Magnetism and magnetic force, source of magnetic fields, Magnetic field of a current, Magnetic dipoles, Ampere's law and solenoids, The magnetic force on a moving charge, The magnetic force on a current-carrying wire, Forces and torques on current loops, Induced current, Motional emf, Magnetic flux, Lenz's law, Faraday's law, Induced fields and EM waves, Inductors, LC circuits, LR circuits, AC circuits and phase, Capacitors in AC circuits, RC filter circuits, Inductor circuits, The RLC circuits, Power in AC circuits, Wave phenomena, geometrical optics, speed of light, Longitudinal and transverse waves, Sound, The nature of light and the laws of geometric optics, reflection and refraction, Fermat's principle, Snell's law, Image formation.

Practical part: Verification of Ohm's Law, Metric bridge, Charge and discharge of capacitors, Inductive Reactance, Capacitive Reactance, RCL circuits, Transformers, Speed of sound in air , Refractive Index of a Prism, Focal length of Lenses, Focal Length of Mirrors.

**PHYS 211 Classical Mechanics (1) (3 + 0) h.**

Space time, Review of Newton's law and conservation of linear momentum in Cartesian and polar coordinate system, applications on projectile motion in a linear air resistance medium, Quadratic air resistance. Motion of charges in a uniform magnetic field, The center of mass, angular momentum of several particles, Kinetic energy and work, Potential energy and conservative forces, Gradient relation, Time dependent potential energy, Energy for one dimensional linear system, Curvilinear one-dimensional systems, Central forces, The energy of interaction of two particles, The energy of multi-particle systems, CM and relative coordinates, The equation of the orbit, Kepler orbits, The unbound Kepler orbits, Change of orbits, Mechanics in non inertial frames, The tides, Rotating frames and angular velocity vector. Newton's second law in rotating frame, The centrifugal force, Coriolis force, Coriolis force and

free fall, The Foucault pendulum, Coriolis acceleration.

**PHYS 231 Vibration and Waves (2 +0) h.**

Periodic motion, Simple harmonic oscillation, Damped oscillation, Forced oscillation, Application of damped and forced oscillations, Superposition of simple harmonic oscillations, traveling waves, standing, Beats, Transverse wave in wires, Longitudinal wave in rods, Application of longitudinal wave in open and closed air columns, Fourier analysis, Doppler effect.

**PHYS 243 Thermodynamics (3 + 0) h.**

Fundamental concept in heat and thermodynamics, Thermal Equilibrium and zeroth law of thermodynamics, Ideal gases, Kinetic theory of gases, First law of thermodynamic, Application of first law of thermodynamic, isothermal and adiabatic processes. Irreversible process and reversible processes, Carrnot cycle, Otto cycle-cleapeyron latent heat equation, Second law of thermodynamic, Heat Engines, Refrigerators, Entropy, Thermodynamic functions, Maxwell relations, Third law of thermodynamic, Phase change, Applications on thermodynamic laws.

**PHYS 203 Mathematical Physics I (3 + 0) h.**

Determinants, Matrices, Solving linear equations and differential equations by matrices, Application on the motion of the rotation of the rigid body, Vector Algebra: Vector products, Position, Displacement, Vector transformation, Gradient, The Divergence, The Curl, Laplace operator, Line, Surface, and Volume Integrals, Gauss theorem, Stock's theorem, Green's theorem, Spherical polar coordinates, Cylindrical coordinates.

**PHYS 212 Classical Mechanics II (3 + 0) h.**

Calculus of variations, The Euler-Lagrange equation and applications, Lagrange's equations for Unconstrained motion, Constrained systems, Generalized momenta and Ignorable coordinates, Lagrange multipliers and constraint forces, Rotational motion of rigid body, The inertial tensor, Principal axes of Inertia, Precession of a top by weak torque, Euler's equations, Euler's angles, Coupled oscillations and normal modes, The double pendulum, Three coupled pendulum, Hamiltonian mechanics for one dimensional systems, Hamiltonian mechanics in several dimensions, Ignorable

coordinates, Phase space orbits, Liouville's Theorem.

**PHYS 221 Electromagnetism I (3 + 0) h.**

Review of vector Operations and algebra, Linear and rotational transformation of vectors, Vector field, Review of vector differential calculus: (gradient, the divergence, the curl, product rules of algebra , Second Derivatives,), Review of integral Calculus: (linear, surface, and volume integrals of vector functions), The fundamental theorem for: (calculus, gradient, divergence, curl), Curvilinear Coordinates: (spherical polar and cylindrical coordinates), The Dirac delta function in one and three dimension, The divergence of reciprocal square of radial distance, The Helmholtz theorem, Coulomb's law, The electric field, Continuous charge distributions, Divergence and curl of electrostatic field, Field lines and flux, Gauss's law and its applications, Electric potential, The potential of a localized charge distribution, The work done to move a charge, The energy of a point charge distribution, The energy of a continuous charge distribution, Properties of conductors and induced charges, Surface charge and the force on a conductor, Capacitors, Poisson's equation, Laplace's equation in one, two and three dimensions, Boundary conditions and uniqueness theorems, Conductors and the second uniqueness theorem, The Method of images and induced surface charge and calculating force and energy, Multipole expansion and approximate potentials at large distances, The monopole and dipole terms, The electric field of a dipole, Polarization, Field of a polarized object, Induced dipole and dielectrics, Polar molecules, Bound charges, The field inside a dielectric and the electric displacement, Gauss's law in the presence of dielectrics, Boundary conditions, Linear Dielectrics: (susceptibility, permittivity, dielectric constant), Boundary value problems with linear dielectrics, Force and energy in dielectric systems, Magnetostatics and the Lorentz law , Magnetic fields and magnetic forces, The Biot-Savart law, The magnetic field of a steady current, The divergence and curl of the magnetic field, Ampere's law and its applications, Magnetic vector potential, Magnetostatic boundary conditions, Multipole expansion of the vector potential, Magnetic fields in matter and the magnetization, Magnetic materials: (diamagnets, paramagnets, ferromagnets), Torques and forces on magnetic dipoles, Effect of magnetic field on atomic orbits, The field of a magnetized object, Bound currents, The magnetic field inside matter and the auxiliary field, Ampere's law in magnetized materials, Boundary Conditions, Linear and nonlinear media, Magnetic susceptibility and permeability, Ferromagnetism.

**PHYS 232 Physical Optics (3 + 0) h.**

The nature of light , The superposition of waves, Interference of two-beams of light (division of the wave front & division of amplitude) Interferometers( Young , Fresnel's biprism , loyed mirror, Fresnel's double mirrors , wedge interferometer , Newton rings , Michelson interferometer , Jamin & Mach-Zehnder refractometers ), Interference of multiple beams , Fabry-Perot interferometer , Applications of interferometry, Diffraction , Fraunhofer diffraction (single slit, two slits, multiple slits) – diffraction grating - Fresnel diffraction (circular aperture & circular Obstacle ), Polarization - polarization by absorption , reflection , refraction & double refraction, Optical active materials & polarometer .Interference of polarized light , Analysis of polarized light , Electro-optics (Kerr effect & Pockels effect ) , Magneto- optics (Faraday effect).

**PHYS 302 Mathematical Physics II (3 + 0) h.**

Complex numbers, Analytic functions, Limits and Continuity, Analyticity, The Cauchy, Riemann Equations, Elementary Functions, Complex Integration, Contoursm, Independence of path- Cauchy integral theorem- Bounds for analytic Functions, Series representations for analytic functions, Residue Theory, Conformal Mapping, Invariance of Laplace's Equation, Geometric Considerations, Bilinear Transformations, The Schwartz, Christoffel Transformations.

**PHYS 321 Electromagnetism II (3+0) h.**

Electromotive force, Ohm's law, Motional electromotive force, Electromagnetic induction, Faraday's law, The induced electric field, Inductance, Energy stored in magnetic fields, The modified Ampere's law, Maxwell's equations in vacuum, Maxwell's equations in matter, Boundary conditions, Conservation laws and the continuity equation, Poynting's theorem, Newton's third law in electrodynamics and momentum, Maxwell's stress tensor, Conservation of momentum, Angular momentum, Electromagnetic waves in one dimension, The wave equation, Sinusoidal waves, Boundary conditions: reflection and transmission, Polarization, Electromagnetic waves in vacuum, Monochromatic plane waves, Energy and momentum in electromagnetic waves, Electromagnetic waves in matter, Propagation in linear media, Reflection and transmission at normal incidence, Reflection and transmission at oblique incidence, Absorption and dispersion, Electromagnetic waves in conductors, Reflection at a conducting surface, The frequency dependence of permittivity, Guided waves and wave guides, TE waves in a rectangular wave guide, The coaxial transmission lines, Electric dipole radiation, Magnetic dipole radiation, Radiation from an arbitrary source, Power radiated by a point charge, Radiation reaction with matter.

**PHYS 351 Modern Physics (3 + 0) h.**

Special Theory of Relativity: wave propagation, Michelson Morley experiment, Galilean transformation, Lorentz transformations, Relative velocity, Lorentz contraction, Time Dilation, relativity of mass, Mass and energy, Applications, The particle like properties of Electromagnetic radiation: Electromagnetic waves, The photoelectric effect, black body radition, The Compton Effect, X-rays Waves like properties of particles: De-Broglie hypothesis, Electron diffraction experiment of Davison and Germer, Electron microscope, Uncertainity principle, quantum theory, Atomic Structure: atomic properties, The Thomson model, Rutherford Model for atomic nuclei, alpha particle scattering, Atomic Spectra, Bohr theory of the hydrogen atom, Sommerfeld’s Model, Failure of the Bohr theory Frank-Hertz experiment, The basic ideas of the Quantum Mechanics.

**PHYS 393 Optics Lab (0 + 2) h.**

Prism spectrometer (refractive index and dispersion), Grating spectrometer, Fresnel's biprism with He-Ne laser, Fresnel's double mirrors with He-Ne laser, Newton's rings, Michelson interferometer, Mach-Zehnder-interferometer, Diffraction at a single slit, Diffraction at double slits, Diffraction at one-and two dimensional gratings, Diffraction at a single slit measuring and evaluating with Video Com, Polarimter and optical activity, Abbe's refractometer, Inverse square law of light radiation and absorption coefficient of glass or plastic materials, Polarization of light.

**PHYS 303 Mathematical Physics III (3+0) h.**

Series Method for solving linear differential equations, Fuch's theorem, Second solution, Legendre polynomials, Hermite polynomials, Lagurre polynomials, Bessel Functions, Fourier transformation and its application, Laplace transformation and its application, Eigenvalue problem, Differentional equations of Boundary value problem.

**PHYS 342 Statistical Physics (3 + 0) h.**

Probability, One random variable, Some important probability distributions, Many random variables, Sums of random variables and the central limit theorem, Rules for large numbers, entropy, Kinetic theory of gases, Maxwell's distribution of the velocities of gas molecules and its applications, Distribution function of the energy of molecules, Liouville's theorem, Equilibrium properties, The microcanonical ensemble, Two-level systems, The ideal gas, Mixing entropy and the Gibbs paradox, The canonical ensemble, Canonical examples, The Gibbs canonical ensemblem, The grand canonical ensemble, Quantum statistical mechanics, Maxwell-Boltzmann distribution, Bose Einstein distribution, Fermi-Dirac distribution, Vibrations of a solid, Black-body radiation, Quantum microstates, Quantum macrostates, Ideal quantum gases, Hilbert space of identical particles, Canonical formulation, Grand canonical formulation, The degenerate fermi gas, The degenerate bose gas.

**PHYS 352 Quantum Mechanics (3 + 0) h.**

**Reviews of the fundamental experiments in** modern physics, the need for quantum mechanics. Wave packet and uncertainty principle, Schrödinger equation for free particle, Continuity relation, The dynamical variables and calculating the expectation values, Schrödinger equation with a potential in one dimension, Dynamical variables and calculating the expectation values in momentum space, Commutation relations, Hermitian operators, Linear operators, Completeness relation and orthonormality, Schrödinger equation in three dimensions, The fundamental postulates of quantum mechanics, Particle in an infinite well, Spectral expansion theory, The parity, Constants of motion and conservation laws, Momentum eigen functions and free body, One-dimensional potentials:(The potential step, The finite potential well at scattering and bound states, The potential barrier, The delta function potential at Scattering and Bound states, Simple harmonic oscillator, Oscillator eigen functions and eigen values, Ladder operators and dynamical variables, Schrödinger equation in three dimensions in Cartesian coordinates, Schrödinger equation in three dimension curvilinear coordinate system, Angular momentum and its eigen functions and eigen values, The addition of angular momentum, The central potentials.

**PHYS 392 Electromagnetism Lab (0 + 2) h.**

Measurement of e/m of the electron, Verification of Biot - Savart law , Verification of Faraday's law, Transformers , Measuring the force on current carrying conductors in a homogenous magnetic fields, RLC circuits, Generators, Motors, Transformers, Magnetic moment of magnetized rod, Helmholtz coils, Magnetic induction.

**PHYS 395 Modern Physics lab (0 + 2) h.**

Characteristics of microwaves, Franck- Hertz experiment, Stefan-Boltzmann law for heat radiation, Determination of Planck's constant by means of the photoelectric effect using the compact arrangement, Faraday effect, Fabry – Perot interferometer, Kerr effect, The Balmer series of hydrogen and determination of Rydbergs constant, Pockels effect, Zeeman effect.

**PHYS 422 Electronics (3 + 1) h.**

Theoretical part: Analog Electronics: The P-N junction diode and Zener diode with their applications Junction Field effect transistor - Bipolar junction transistor (Bias and amplifiers: JFET & BJT) – Differential and Operational Amplifiers, Introduction to Feedback Circuits, Multivibrators and Oscillators, Digital Electronics: Binary and Hexadecimal System, Logic Gates, Karnaugh Maps, Flip Flops, Shift Registers, Counters, Memories. Practical part: P-N junction application (half-wave rectifier, full-wave rectifier, clampers and limiters, Zener regulation) - Transistors JFET & BJT amplifiers. Amplifiers with 741(Inverting & Non inverting Amplifiers, Active Filters, Wien Oscillator, Astable Multivibrator). Half and Full Adder (7483), Flip Flop (7474-7476), Shift Register (7495-74194), Counters (7493-74193).

**PHYS 452 Quantum Mechanics II (3 + 0) h.**

Dirac notation, Vector space algebra and Hilbert space, Rephrasing wave mechanics and operator methods in abstract view, Angular momentum commutation relations, Raising and lowering operators for angular momentum, Expansion theory in abstract view, Matrix representation of angular momentum operators, General relations in matrix mechanics, Eigen states of spin ½, The intrinsic magnetic moment of spin ½ particles, Addition of two spins, Addition of Spin ½ and orbital angular momentum, Time independent perturbation theory and energy shifts, Degenerate perturbation theory, The Stark effect, Hyperfined splitting, Variational principle and its applications, The WKB approximation, Time-dependent perturbation theory, The interaction of charged particle with electromagnetic field, Two level-system, emission and absorption of radiations, spontaneous emission, Transition rate, selection rule, scattering theory, Partial wave analysis, The Born approximation.

**PHYS 471 Solid State Physics I (3 + 0) h.**

Different states of matter, classification of solids, crystal structure (Bravais lattices & Miller indices), methods of determination of crystal structure (X-ray diffraction, electron and neutron diffraction), crystal defects, crystal binding (interatomic forces, types crystal bonds), Methods of crystal growth, lattice dynamics (crystal vibration modes and phonons), thermal properties of insulators (specific heat of insulators: classical model, Einstein's model, Debye model,-thermal conductivity of insulators), Dependence of thermal conductivity on temperature, Free electron theory (classical model of free electron, Fermi gas of free electrons, Maxwell-Boltzmann distribution, Fermi-Dirac distribution function), band theory (zone theory and tight binding theory).

**PHYS 481 Nuclear Physics I (3 + 0) h.**

Properties of the nucleus: determination of nuclear charge, radius and mass, Nuclear binding energy, Natural Radioactivity: Decay law, Nuclear stability, Radioactivity and theory of transformation .Artificial Radioactivity: Discovery of artificial radionuclides, Transuranium elements, Interaction of radiation with matter: Interaction of heavy elements, interaction of light electrons, interaction of gamma rays with matter, interaction of neutrons with matter, Radiation Detectors: Gas detectors, Scintillation detectors, solid state detectors, Nuclear Reactions: Reactions of matter by gamma rays, reactions by alpha particles, reactions by protons, reactions by neutrons, Nuclear fission: Discovery of Nuclear fission, theory of Nuclear fission, Nuclear fusion: Energy production in stars, control of thermonuclear reactions.

**PHYS 455 Molecular and Atomic Spectra (3 + 0) h.**

Introduction: Comparing between atomic emission spectroscopy and atomic absorption spectroscopy; Optical spectroscopy, Atomic spectrum, Quantization of hydrogen atom, Atomic emission / absorption spectrophotometry Molecular spectroscopy , Spectroscopy of inner electrons. Zeemen's effect, Sodium spectrum, Effect of magnetic field on the energy levels of atom. Theory of magnetic energy, Anomalous Zeeman's effect and Lande splitting factor. Molecular Spectra of diatomic molecules, Vibrational energy levels in both classical mechanics and quantum mechanics. Rotational spectra of diatomic molecule in gaseous state and rotational energy levels, Molecular spectra; harmonic Oscillator, Non Rigid Rotator, Infrared Vibration, Rotation spectra, spectrum, IR spectrum, RBS spectra, XRD spectrum, measurements of Absorbance, Transmitting and Reflecting using double beam Spectrophotometers in all ranges of wavelengths (UV-VIS-NIR-IR), Normal modes of vibrations; Natural of infrared absorption, Basic Laser principles, Laser behavior, Properties of laser radiations, Different types of lasers, Laser spectroscopy, The total losses of the laser system, Transmission at the mirrors, Absorption and scattering by the mirrors, Absorption in the laser medium, Diffraction losses at the mirrors, The Ruby Laser, Three Level Laser (Helium-Neon Laser)-Four Level Laser ( Carbon dioxide Laser), Laser applications.

**PHYS 497 Solid State Physics lab (0 + 2) h.**

Studying the characteristics of the solar cell, electron diffraction experiments characteristics curves of an optical (photo) resistor, studying the electron spin resonance (ESR), calculation of the energy gap of germanium by an electrical method determination of the thermal coefficient of resistance of a noble metal (platinum) by computer, the magnetic susceptibility of some materials and its classification, X-ray spectroscopy and calculation of Planck's constant and Miller indices of crystal planes in NaCl single crystal, thermoelectric effect in semiconductors (calculation of Seebeck, Peltier and Thomson coefficients), superconductivity and determination of the transformation temperature TC of YBCO specimen by computer, determination of the absorption coefficient of aluminum for X-ray, Hall effect, studying the crystalline structure by using the field effect microscope.

**PHYS 498 Nuclear Physics Lab (0 + 2) h.**

Statistical nature of Radioactive decay law, Rutherford Scattering, Attenuation of gamma radiation, Absorption of beta radiation passing through different materials, Inverse square law in case of gamma-rays, Determination of the range of beta particles in absorbers by beta gamma source, Backscattering of beta particles, determination of the dead time of GM tube, Effect of a magnetic field on beta particles motion, Assessment of natural radionuclide in NaCl, Compton scattering.

**PHYS 499 Project (2 + 0) h.**

The student carries out a research under the supervision of one of the Staff members in one of the following branches: Theoretical Physics, Nuclear Physics, Solid State Physics, Fiber Optics, Laser, Plasma, Electronics. The student submit a a report about his work, and is evaluated by a committee selected by the department.

# College of Sciences and Arts in Rass

## Vision:

The faculty aims at providing a high-quality type of instruction , an enthusiasm-provoking and stimulating educational environment and brand new curricula that are coping with modern trends in development and innovation. The faculty also aspires to prepare an efficient teacher who is religiously committed and who is strongly attached to his homeland, a teacher who is innovative and ever developing .This is the teacher who takes a strong hold of constants and originality, taking into consideration what is new and participating effectively in developing future generations.

## Mission:

The faculty aims at preparing the prospective teacher who is religiously committed; the one is attached strongly to his homeland. This teacher should be a good model for his students in his work and behavior. He should be at a high level of professionalism. Learning instinct and love for the career should be part and parcel of him. He should be completely experienced and fully aware of his role in facilitating learning approaches. He should be continuously developing in his field of specialty as well as his teaching styles. He should have the traits of the strong leader who has the ability to convince others and to prove that his opinion is correct. He should attain the capacity of making a decision and of shouldering the responsibility. He should be able to plan well and to put into consideration individual differences among students. He should be a good thinker possessing all types of thinking skills. He should be able to develop these skills in his students. He should have the traits of a social pioneer who has the ability to communicate effectively with his society and to cooperate in solving its problems. He should be ever renewing in how to deal with modern technology and how to function it properly in all instructional settings. He should be a guide taking charge of directing the instructional process in fulfilling its targets and solving its problems.

## About:

Al-Rass Teachers' Faculty was inaugurated in1397AH under the title of The Intermediate Faculty for Preparing Teachers. It granted the graduates the diploma degree whether they were secondary school students(art and science sections and their equivalents), or general education teachers who joined the faculty to pursue their study. Study used to last for two academic years ,four semesters at least.

Beginning in 1409AH, the faculty started granting the degree of the bachelor emulating other graduating systems in other Saudi Universities.Study began to span eight semesters at least which the student had to pass successfully.

Al-Rass Teachers' Faculty progressed dramatically in all executive and scientific disciplines due to the increase in admission,in addition to its peculiar position in Qassim Province.The faculty provides services to numerous cities ,and a lot of students come from such cities as Buraida ,O'naiza , Rass , Badae' , Bakeeria , and other cities and villages all over Qassim to enroll in it.

A decree was issued joining faculties of teachers to the Ministryof Higher Education. After that

,Al-Rass Faculty of Teachers got adjunct to Qassim University.

In 1427/1428AH, his Excellency the Royal Prince endorsed the decree of the higher education council as for renaming Al-Rass Faculty of teachers as Al-Rass Faculty of Arts and Sciences, developing it and launching new academic departments in it.

## Degrees:

Bachelor

## Programs:

computer Science

Mathematics

Physics

Chemistry

## Faculty Members:

**Faculty of Mathematics**

Dr. Suweilam Bayoumi Ghanem Assistant Prof.

Dr. Munir Muh. Ash-Shahaf Assistant Prof.

Dr. Muh. Saad Sanad Assistant Prof.

Dr. Ali Muh. Seddik Assistant Prof.

Dr. Yusuf Muh. As-Said Assistant Prof.

Abdul Sattar Muh. Al-Kholify Assistant Prof.

Dr. Tarek Nasruddin Salama Assistant Prof.

Dr. Al-Bahry Belqassem Ash-Sharif Assistant Prof.

Mr. Gamil Abbass Salim Lecturer

Mr. Ahmad Hamidan Muh. Lecturer

M. Muh Yusuf An-Naqaa Demonstrator

Mr. Lu'ay Demonstrator

Dr. Mamdouh Muh. Abdel Aziz Associate Prof.

Dr. Muh. Al-Munther Al-Jabbary Assistant Prof.

Dr Sherif Rashad Mukhtar Assistant Prof.

Dr. Muh. Hesham Al-Qazzah Assistant Prof.

Dr. Tawfik Abdullah Ghabbarah Assistant Prof.

Dr. Muh. Al-Mizouny Awny Assistant Prof.

Dr. Mahmoud Hamed Helw Assistant Prof.

Mr. Muh. Moussa Al-Khaleq Lecturer

**Faculty of Computer Science**

Dr. Ashraf Hemeida A.Jawwad Associate Prof.

Dr. Tarek Ismail A.Latif Associate Prof.

Dr. Maher Al-Azrak Assistant Prof.

Dr. Muhammad Abdo Amasha Assistant Prof.

Dr. Jalaluddin Abbass At-Tayeb Assistant Prof.

Sheik Nasser Akhtar Lecturer

Eng. Wassim Rashid Doury Lecturer

Eng. Yahia Muh. Al-Wady Lecturer

Mr. Sufian SAleh Faker Lecturer

Mr. Muh. Mubarak Lecturer

Mr. Fayez Farah Al-Harby Lecturer

Mr. Muh. Abdel Maksoud Demonstrator

Mr. Mesa'id Muh. Al-Khalifah Demonstrator

**Faculty of Arabic**

Dr. Abdullah Saleh Al-Falah Assistant Prof.

Dr. Abdullah Saleh Al-Khalaf Assistant Prof.

Dr. Fahd Saleh Al-Jarbou'a Assistant Prof.

Dr. Mahmoud Muh. Muhammadain Assistant Prof.
Dr. Muh. Ramadhan Ahmad Assistant Prof.
Dr. Muh. Diyab Muh. GHazzawi Assistant Prof.
Dr. A. Hafeez Khedr Bady Assistant Prof.
Dr. Jamal Muh. Abdul Aziz Assistant Prof.
Dr. Hussain Muh. Hassan Assistant Prof.
Dr. Hussain Jouda H. Jouda Assistant Prof.
Dr. Mahmoud Ahmad Umar Assistant Prof.
Dr Azhar Ateyyah A.Qader Assistant Prof.
Dr. Suad A. Halim Ibrahim Assistant Prof.
Dr. Fatma A. Monem Ghazalah Assistant Prof.
Dr. Samasem Bassyouni Matar Assistant Prof.
Dr. Suad A. Halim Ibrahim Assistant Prof.
Mr. Abdullah Umair Al-Husayn Lecturer
Mr Ezzat Abdullah Ash-Shazly Lecturer
Mrs. Awatef Muh. Tabboul Lecturer
Mr. Abdul Rahman Saleh Al-Khamis Demonstrator
Mr. Saud Ahmad Al-Mani'a Demonstrator
Mr. Abdul Aziz Ahmad Al-Mani'a Demonstrator
Mr. Mansour A. Aziz Al-GHufaily Demonstrator
Mr. Abdullah A.Rahman Al-Mudhaibry Demonstrator
Ms. Hanan Ghalib Al-Mutairy Demonstrator
Ms. Abeer Muh. Al-Hamamah Demonstrator
Ms. Ibtesam Salem Al-Mutairy Demonstrator
Ms. Abeer Salem Al-Mutairy Demonstrator
Ms. Khadijah Saleh Al-Mejmah Demonstrator
Ms. A'ishah Nasser Al-Battah Demonstrator

**Faculty English**

Dr. Ayedh Al-Harby Assistant Prof.
Dr Khaled Al-Awadh Head of the Department
Curriculum and Instruction Assistant Prof.
Ziad Al-Khalifah Demonstrator
Dr Mahmud Abdul Naser Assistant Prof.
Hesham Abu Mustafa Lecturer
Mohammad Amer Lecturer
Mohammad Ajami Lecturer
Sultan Al-Ghufaily Demonstrator
Sumayya Idris Lecturer
Shoukat Husain Lecturer
Majda Al-Ayed Lecturer
Nawal Al-Harby Lecturer
Maryam Al-Johany Demonstrator
Jawaher Al-Harby Demonstrator
Ruqayya Al-Azzaz Demonstrator
Dalia Bakr Lecturer
Najlaa Al-Awaji Demonstrator
Ahlam Al-Saeedy Lecturer
Maimuna Al-Rumaih Demonstrator
Anila Rizvi Lecturer
Amani Al-Aqeel Demonstrator
Reem Al-Aamer Demonstrator

| | |
|---|---|
| Anisa Patel | Lecturer |
| Mezna Al-Thuwab | Demonstrator |
| Najwa Al-Zayyani | Lecturer |

## Study Plans:

BA Degree Program: **Computer sciences**
**Level 3**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC101** | Introduction to Islamic Culture | 2 |
| **Arab101** | Language Skills | 2 |
| **Phys104** | General Physics (2) | 4 |
| **Math105** | Differential Calculus | 3 |
| **CEN111** | Logic Design | 4 |
| **CSC152** | Concepts of Algorithms & Computer Programming | 4 |
| | Total | 19 |

**Level-4**

| Course Code | Course Title | Credit |
|---|---|---|
| **Arab103** | Expository Writing | 2 |
| **Math106** | Integral Calculus | 3 |
| **Math109** | Linear Algebra and Analytical Geometry | 3 |
| **IT125** | Database | 4 |
| **CEN126** | Computer Architecture | 3 |
| **CSC153** | Object Oriented Programming | 4 |
| | Total | 19 |

**Level-5**

| Course Code | Course Title | Credit |
|---|---|---|
| **Math203** | Differential and Integral Calculus | 3 |
| **Stat224** | Introduction to Statistics & Probability | 3 |
| **CSC225** | Assembly Language | 3 |
| **CSC244** | Concepts of Algorithms | 3 |
| **CSC276** | Computer Graphics | 4 |
| **CSC283** | Discrete Structures | 4 |
| | Total | 20 |

**Level-6**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC102** | Islam and Construction of Society | 2 |
| **Math207** | Differential Equations | 3 |
| **CSC214** | Data Structures | 4 |
| **IT224** | Visual Programming | 4 |
| **CSC237** | Programming Languages Concepts | 3 |

| | | |
|---|---|---|
| **CSC229** | Operating Systems | 4 |
| | Total | 20 |

**Level-7**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN301** | Signals and Systems Analysis | 4 |
| **CEN333** | Microprocessors Systems | 4 |
| **CSC338** | Compiler Design | 3 |
| **CEN345** | Computer Networks | 4 |
| **CSC346** | Software Engineering | 3 |
| | Total | 18 |

**Level-8**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC103** | The Islamic Economical System | 2 |
| **CSC313** | Algorithms Analysis & Design | 3 |
| **CSC327** | Operations Research and Programming Applications | 3 |
| **CSC357** | Internet Techniques & Web Programming | 3 |
| **CSC392** | Selected Topics in Computer Sciences | 3 |
| **CSC393** | Systems Programming | 3 |
| | Total | 17 |

**Level-9**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC104** | Fundamentals of the Islamic Political Systems | 2 |
| **CSC414** | Introduction to Unix/Lunix Systems | 3 |
| **IT463** | Knowledge Base Systems Applications | 3 |
| **CSC448** | Optimization Techniques | 3 |
| **IT481** | Communication Skills | 2 |
| **CSC498** | Graduation Project (1) | 2 |
| | Total | 15 |

**Level-10**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC445** | Introduction to Cryptography & Information Security | 3 |
| **IT450** | Multimedia Data Management | 3 |
| **CSC458** | Distributed Systems & Parallel Processing | 3 |
| **CSC463** | Artificial Intelligence | 4 |

| | | |
|---|---|---|
| **CSC499** | Graduation Project (2) | 4 |
| | Total | 17 |

## Course Description:

**Course Code :** **CSC 152**
**Course Title :** Concepts of Algorithms and Computer Programming
**Prerequisites :** non
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level : 3
**Course description:**
Problem-solving, algorithmic design, Introduction to Programming, Structured Program Development, Program Control, Functions, Arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.
**Textbook :**
C How to program , Deitel & Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004

**Course Code:** **CEN 111**
**Course Title:** Logic Design
**Prerequisites:** non
**Credit Hours**: 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: Level:3
**Course description:**
Digital computer and information (numbering systems, Arithmetic operations, Decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, Combinational circuits simplification, CMOS circuits), Combinational logic design (design procedure, decoders, multiplexes, Binary adder and subtracter), Sequential circuits (latches, flip flops, synchronous sequential circuits analysis and design), Analysis and design of synchronous sequential machines, Representation, state reduction and realization; Finite state machines.
**Textbook:**
M. Mano, Digital Design, 3rd Ed., 2002.

**Course Code :** **IS 125**
**Course Title:** Database
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4
**Prerequisites** : CSC 152
**Course discretion**
Database definition, Database system, Overview of database management, database system architecture, Introduction to Relational databases, An Introduction to Structured Query Language(SQL), Database Integrity, Views, Normalization, Database design, Practical Applications.
**Textbook:**
"An Introduction to Database Systems", Date, 2004, Addison-Wesley.

**Course Code:** **CEN 126**
**Course Title:** Computer Architecture
**Prerequisites:** CEN 111
**Credit Hours**: 3 Lecture Hrs: 3
Lab Hrs:0 Tut. Hrs: 0 Level:4
**Course description:**
Review of logic design principles. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design. System software. Micro-programmed CPU. Comparison between CISC, RISC and VLIW processors. Introduction to memory organization; I/O operations; Introduction to parallel processing techniques.
**Textbook:**
M. Mano, "Computer System Architecture," Prentice Hall, 2004.

**Course Code :** **CSC 153**
**Course Title :** Object Programming
**Prerequisites** : CSC152
**Credit Hours : 4** Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4
**Course description:**

Introduction to Object-Oriented Programming, Program Control Structures, Functions, Arrays, Pointers and Strings, Classes Part I Classes and data abstraction, Classes Part II: Operator Overloading, Inheritance Virtual Functions and Polymorphism.

**Textbook**:

C How to program ,Deitel & Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004.

**Course Code :** **CSC 244**

**Course Title :** Concepts of Algorithms

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:5

**Prerequisites**: CSC 152

**Course description:**

Growth function and Recurrence, Divide-and-Conquer: (Strassen, Fibonacci, Polynomial Multiplication), Heap Sort, Quick Sort, Bubble Sort, Insertion Sort, Merge Sort, Hash Table, Binary Search Tree, Dynamic Programming, Greedy Algorithms,

**Textbook**

Introduction to Algorithms, (Second Edition) Thomas Cormen, Charles Leiserson, Ronald Rivest, and Clifford Stein. MIT Press. ISBN: 0262032937

**Course Code :** **CSC 276**

**Course Title :** Computer Graphics

**Credit Hours** : 4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:5

**Prerequisites:** CSC 153

**Course Description:**

Computer Graphics Applications Survey. **Color models** (chromaticity diagram, RGB, CMY, YIQ, HSV, and HLS color models). **Graphics Output Primitives** (coordinate frames, DDA, Bresenham's algorithm, circle-drawing, fill-area primitives algorithms). **2D Graphics**(2D cartesian coordinates, curves and parametric equations, functions and transformations, inverse functions. **3D Graphics** (vectors in 3D, dot and cross product, homogeneous coordinates, correlation between Cartesian and homogeneous coordinates). **Geometric transformations**(2D geometric transformations, matrix representation and homogeneous coordinates, inverse transformations, 2D composite transformations).**Geometric representation** Lagrange polynomials of degree n, Hermit cubic polynomial, Bernstein polynomial, interpolation problem, Spline interpolation problem of approximation, Bezier-Bersnstein approximation, Bezier-B-Splineapproximation, quadric surfaces

**Graphics Lab**: modeling, rendering, animation using 3D Studio Max? from Autodesk?. Use of OpenGL?.

**Textbook:**

Hearn, D. and P. Baker "*Computer Graphics with OpenGL*". Pearson Prentice Hall, Pearson Education Inc., Upper Saddle River NJ07458, USA, 2004. PIE ISBN 0-13-120238-3

**Course Code :** **CSC 283**

**Course Title :** Discrete Structures

**Credit Hours** : 4 Lecture Hrs:

Lab Hrs: 0 Tut. Hrs: Level:5

**Prerequisites:** CSC 153

**Course description:**

**Introduction to Discrete Structures**: algorithmic language. **Logic**: propositions, predicate logic, proofs, mathematical induction. **Sets**: special sets, operations, properties and identities, application of logic to knowledge-based systems. **Relations**: graphical and matrix representations, equivalence and order relations, application to databases **Functions** types, cardinality, application to functional languages **Undirected Graphs** Simple graphs, Eulerian paths, Hamiltonian circuits, trees, application to syntax diagrams **Directed Graphs** digraphs, consistent labeling, paths problems, Wars hall's algorithm, shortest paths and Dijkstra's algorithm, application to routing in computer networks. **Machines and Computations**: automata as models, finite state automata (FSA) without outputs, FSA as language recognizers and their limits, introduction to Turing Machines, application of FSA to problem-solving.

**Textbook:**

Skvarcius, R. and W.B. Robinson "Discrete Mathematics with Computer Science Applications" The Benjamin / Cummings Publishing Co., 1986.

**Course Code : CSC 225**

**Course Title :** Assembly Language

**Prerequisites :** CEN 126

**Credit Hours :** 3 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:5

**Course description**

Introduction to PC hardware, PC software requirements, assembly language programmers requirements, program logical and control, string operations, arithmetic operations for processing binary data , assembling linking and executing a program.

**Textbook**

Peter Abel. IBM PC Assembly Language and Programming ". 1998

**Course Code : CSC 237**

**Course Title : Programming Languages Concepts**

**Prerequisites**: CSC 283

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0

**Course description:**

Preliminaries. Evolution of the Major Programming Languages. Describing Syntax and Semantics. Lexical and Syntax Analysis. Names, Binding, Type Checking, and Scopes. Data Types. Expressions and Assignment Statements. Statement-Level Control Structure. Subprograms. Implementing Subprograms. Abstract Data Types. Support for Object-Oriented Programming. Concurrency. Exception Handling and Event Handling. Functional Programming Languages. Logic Programming Languages. Project.

**Textbook**

Robert W. Sebesta. Concepts of programming languages, 2008 Addison-Wesley.

**Course Code : CSC 229**

**Course Title :** Operating Systems

**Prerequisites**: CEN 126

**Credit Hours** : 4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:6

**Course description:**

Computer System Structure, Operating System Concepts, Operating System Structure, Procedures, CPU Scheduling, ProcessSynchronization,BatchFiles,RecoveryConsole,MemoryManagement,VirtualMemory,File-System Interface, Storage Structure, Data Storage on Disks, File-Systems : Fat,Fat32, NTFS, Distributed Systems ,Hardware Protection, The Linux system

**Textbook**

Abraham Silberschatz, Peter Baer, Galvin, Greg Gagne. Operating Systems concepts , Pearson Educaion, Sixth Edition.

**Course Code : IS 224**

**Course Title :** Visual Programming

**Prerequisites** : CSC 153

**Credit Hours** : 3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0

**Course Description:**

Selecting a Visual Language, Knowing the concepts and procedures used in Visual Languages, Syntax and semantics of the language used. Types of Data, conditional statements, recursion, data structures, modular programming, review of Object-Oriented Programming concepts and techniques, User Interface Design rules, Materializing an interface into a set of visual objects, File types, File organizing techniques, File usages, Publishing an interface on the web, Basic concepts of Human Computer Interaction, Comparison between the selected language and other visual languages.

**Textbook:**

Diane Zak, Programming with Microsoft Visual Basic .NET 2005, Publisher Course Technology, ISBN 0-619-21718-9

**COURSE CODE : CSC 214**

**Course Title :** Data Structures

**Prerequisites :** CSC 283
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:6
**Course description:**
Functions in C - Structures and pointers - Memory Management functions , Concepts and Definition of abstract data type, Array as ADT, Stack and operations, Queue and operations Linked List and stack as list, Queue as list and applications, Sorting, recursion, Tree Introduction to Graphs, Projects and Exercises.
**Textbook :**
Data structures using C and C++. Second edition, YEDIDYAH LANGSAM and others Prentice Hall and others. 1996.

**Course Code:** **CSC346**
**Course Title:** Software Engineering**.**
**Prerequisites:** CSC 214
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:7
**Course description:**
Software Engineering Concepts, System Engineering Concepts, Software Process, Analysis Concepts and Principles, Analysis Modeling Design, Real-Time System Design, Software Testing Techniques, Technical Metrics for Software, Project
**Textbook:**
Ian Somerville, Software Engineering , Pearson Education, 7-th edition.

**Course Code :** **CSC 338**
**Course Title :** Compiler Design
**Prerequisites:** CSC237
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level: 7
**Course description**
The design and implementation of compilers. Compiler organization, algorithms for lexical, syntactic and semantic analysis, top-down and bottom-up parsing (e.g., recursive descent, LL, LR, LALR parsing). Symbol table organization, error detection and recovery, intermediate and object code generation, and code optimization. Student has to implement a compiler for a simple high level language as project.
**Textbook:**
A. V. Aho, R. Sethi, J. D. Ullman; *"Compilers: Principles, Techniques, and Tools";* 1986; Addison-Wesley; ISBN: 0-201-10088-6; (The dragon book).

**Course Code:** **CEN 333**
**Course Title:** Microprocessor Systems
**Prerequisites:** CEN 126
**Credit Hours**: 3 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level: 7
**Course description:**
Architecture and Instruction set of different 16 bit microprocessors; Microprocessor chips. **Supporting chips**: Buffers, decoders, system clock generator, reset system. Memory chips and subsystems Interfacing 16-bit Microcomputers. Architecture of Microprocessor based systems, design technique, memory and I/O devices interfacing to the microprocessor, interfacing technique. **I/O techniques**: Interrupts, Direct memory access; **System development and design tools techniques**: hardware and software.
**Textbook:**
B. Brey, " The Intel Microprocessors..", Prentice Hall, 5th Edition, 2000

**Course Code :** **CEN 301**
**Course Title:** Signals and Systems
**Prerequisites :** Math 207
**Credit Hours : 4** Lecture Hrs: 4
Lab Hrs: 0 Tut. : 0 Level:7
**Course description:**
Time-domain analysis of signals: Mathematical and graphical representation. Classifications. Basic operations. Basic signals. Sampling and aliasing. Time-domain analysis of systems: Block diagram representation. Differential and difference equation representation. Impulse and step responses. Frequency-domain analysis of signals: Spectra of continuous-time and discrete-time signals. Frequency-domain analysis of systems: Frequency response of continuous-

time systems: Bode plot, SyQuest plot, feedback and its effects on system stability. Frequency response of discrete-time systems. Laplace transform and its applications. Z-transform and its applications: Relationship with Laplace. Exercises should be solved using MATLAB

**Textbook:**

A. V. Oppenheim*, Signals and Systems,* Prentice Hall, 2nd edition, 1997

**Course Code:** **CEN 345**
**Course Title :** Computer Networks
Prerequisites: CEN 126
Credit Hours :4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:7

**Course description:**

**Introduction to computer networks**: Network Types, Overview of data transmission, Introduction to network protocols, The Internet protocol. **Network topologies**; Network architecture and the OSI reference model; The physical and Data Link Layer , flow and errors control, ARQ Stop/wait, Sliding window protocols, **DLC standards**: HDLC , PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, Hubs, routers, Ethernet Switches; **Network Layer Services**: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.

**Textbook:**

A. Tanenbaum Computer Networks. 4rd Ed., Prentice-Hall, 2003.

**Course Code :** **CSC 392**
**Course Title:** Selected Topics for Computer science
**Credit Hours** :3 Lecture Hrs:
Lab Hrs: Tut. Hrs: 0 Level:8
**Prerequisites :**

**Course description:**

In this course, advanced topics in computer sciences are proposed, like: Java Object-Oriented programming, **Object-Oriented Software Engineering,** Application Programs, Operating Systems Design and implementation, Distributed Operating Systems, Distributed Computing, Introduction to Parallel Computing.

**Textbooks:**

The text book depends on the topic of the course.

**Course Code:** **CSC 393**
**Course Title:** Systems Programming
**Credit Hours** :3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level : 8
**Prerequisites:** CSC338

**Course Description**

Study of one particular processor, assembly for this processor. Introduction to the assembly laguage of this processor. Design and implementation of an assembler (translation to machine code).

Linkers and loaders: Absolute loaders; Program relocation; Program linking; Data structures; Dynamic loading; Bootstrap loaders.

Macro processors: Data structures and logic flow for a simple one-pass macro processor; Concatenation of macro parameters; Generation of labels in macro expansions; Conditional macro expansion; Macro processing within an assembler; General-purpose macro processors. Project.

**Textbook :**

Leland Beck "An introduction to Systems programming", Addison Wesley, 1990.

**Course Code:** **CSC357**
**Course Title:** Internet Techniques web programming**.**
**Credit Hours** : 3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0 Level: 8.
**Prerequisites**: CEN 345

**Course description:**

An overview of connecting to and navigating within the Internet system and the World Wide Web: Navigation. Search Engines. Advanced search techniques. Design of web pages using HTML, XML and Java. TCP/IP. Client/Server architectures. Mastering Connectivity. Security.

**Textbook :**

Gary P. Schneider and Jessica Evans *The Internet -- 3rd Edition*, Course Technology, 2002.

**Course Code:** **CSC 327**
**Course Title:** Operations Research &Applications programming
**Credit Hours** :3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0 Level:8
**Prerequisites**: CSC 283
**Course description:**
OR Approach, Methodology And Applications : modeling, constraints, objective and criteia. Problems of multiple criteria optimization, model validation and systems design. Mathematical programming; simulation, gaming; heuristic programming. Examples,: theory of inventory. Production; linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. Theory of games for two-person competitive situations. Project management through PERT-CPM
**Textbook:**
Hamdi Taha , Operations Research: An Introduction (7th Edition), ISBN: 0130323748, 2002.

**Course Code :** **CSC 313**
**Course Title :** Algorithms Analysis and Design
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level : 8
**Prerequisites** : CSC 214
**Course description:**
Introduction to Algorithms Analysis and Design, General Algorithms: (1- Greater Common Divisor Algorithm, 2- Smaller Common Multiple Algorithm, 3- Pascal-Triangle Algorithm, 4- Inverse Number Algorithm, 5- Recursive Algorithm), Algorithms And Procedures, Algorithm Analysis: (Algorithm Efficiency, Algorithm Run-time, Algorithm Complexity, Computation Horner Algorithm Complexity Degree, Multiplication Two Polynomials Complexity Degree, Computation Using While Loop Algorithm Complexity Degree), Sorting Algorithms: (Insert Sort Algorithm, Selection Sort Algorithm, Bubble Sort Algorithm, Heap Sort Algorithm, Merge Sort Algorithm, Sort Algorithm, Files Sorting Algorithms), Searching Algorithms, Backtracking Algorithms: (8-th Queen Problem, Optimal Option Problem).
**Textbook**
Michael T.Goodrich, Roberto Tamassia , Algorithm Design: Foundations ,Analysis and Internet Examples, John Wiley & Sons Inc 0-471-38365-1, 2002.

**Course Code :** **IS 463**
**Course Title :** Knowledge base systems Application
**Prerequisites** : CS 214
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:9
**Course Description:**
Review of first-order logic, relational algebra, and relational calculus. Fundamentals of logic programming. Logic for knowledge representation. Architecture of a knowledge-base system. Fundamentals of deductive databases. Top-down and bottom-up query processing. Some important query processing strategies and their comparison. Project or term paper on current research topics.
**Textbook**
Richard A. Frost, Introduction to Knowledge Based Systems.

**Course Code :** **CSC 498**
**Course Title:** Project I
**Credit Hours : 2** Lecture Hrs:
Lab Hrs: Tut. Hrs: Level:9
**Prerequisites : 100 CH**
**Course description:**
Student will study, design and develop an integrated system, and he will be examined at the end of the semester.
**Textbooks**
Selected papers and researches related to the project topic.

**Course Code:** **IS 481**

**Course Title:** Communication skills
**Credit Hours** : Lecture Hrs: 2
Lab Hrs: 0 Tut. Hrs: 0 Level:
**Prerequisites: non**
**Course description**
This course covers written, oral, and interpersonal communication. Students will hand in short pieces of writing each week, will make oral presentations several times in the semester, and will work together in simulated project meetings and other realistic scenarios of pair and small group interaction.

**Course Code: CSC 448**
**Course title :** Optimization Techniques
**Perquisites:** CSC 327
**Credit Hours**: 3 Lecture Hrs 2: Lab Hours: 1
Tut. Hrs: 0
**Course description:**
Unconstrained optimization theory. Convex functions and convex sets. Algorithms for unconstrained optimization (Steepest descent Newton methods Conjugate gradient methods). Constrained optimization theory (Kuhn-Tucker conditions). Special problems: (Linear programming Quadratic Programming). Algorithms for constrained optimization.
Since this is a course on optimization *techniques* you will need to be able to program with high level programming languages (e.g C/C++, Java, C#)
**Textbook :**
Wright, S. and J. Necedah *Numerical Optimization* Springer.

**Course Code: CSC 414**
**Course title:** introduction to Unix and Linux
**Prerequisites: CSC 229**
**Credit Hours : 3.** Lecture Hrs:2. Lab Hrs:2. Level:9
**Course description:**
User/kernel interface, fundamental concepts of Unix, user authentication, basic and advanced I/O, file system, signals, process relationships, and inter-process communication. Fundamental development and debugging tools such as "make" and "gdb" will also be covered.
**Textbook:**
W. Richard Stevens, Advanced Programming in the UNIX Environment, Addison Wesley Professional, 1992.

**Course Code : IS 491**
**Course Title : Multimedia Data Management**
**Prerequisites** : IS 224
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 1 Level : 10
**Course Description:**
Significance and value of multimedia for a variety of end uses .Multimedia data storage. Use of multimedia hardware for capture and management of sound, graphics and video. Multimedia development tools, programming, scripting and design skills. Use of multimedia authoring tools for producing multimedia applications
**Textbook:**
Boyle, T. .*Design for Multimedia Learning.* London: Prentice Hall, 1997

**Course Code : CSC 463**
**Course Title:** Artificial Intelligence
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level : 10
**Prerequisites**: CSC 214
**Course description**
Introduction & Definitions. Agent and examples. Uninformed Search. Heuristic Search. Constrained Search Problems CSP). Logical agents. First Order Logic and examples Machine Learning. Project.
**Textbook**
Russell, S. J. and P. Norvig. Artificial Intelligence, A Modern Approach, Prentice Hall,2003,USA.

**Course Code : CSC 458**
**Course Title :** Distributed Systems and Parallel Processing
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0
**Prerequisites** : CSC 229

**Course description:**

Introduction to distributed systems, processes and processors, parallel architecture (multi-computers, multi-processors), communication in parallel systems, performance of parallel systems, examples of parallel programming, introduction to distributed systems, distributed algorithms, types of distributed systems, compatibility of distributed systems and discovery of the end of processes.

**Textbook:**

Coulouris, G., Jean Doll more, and Tim Kind berg Distributed Systems: Concepts and Design, Addison-Wesley, 3rd Edition, 2001-ISBN: 0-201-619180

**Course Code :** **CSC 499**
**Course Title:** Project II
**Credit Hours** :4 Lecture Hrs:
Lab Hrs: Tut. Hrs: Level: 10
**Prerequisites : CSC498**

**Course description:**

Student will study, design and develop an integrated system. Examination to be held at the end of the semester.

**Textbooks:**

Selected papers and researches related to the project topic.

## Second Program:

BA Degree Program: **Information technology**

**Study Plan:**

**Level 3**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC244** | Concepts of Algorithms | 3 |
| **CSC276** | Computer Graphics | 4 |
| **CSC283** | Discrete Structures | 4 |
| **IS226** | Information Systems Fundamentals | 3 |
| **MATH203** | Differential and Integral Calculus | 3 |
| **STAT224** | Introduction to Statistics & Probability | 3 |
| | Total | 20 |

**Level-4**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC214** | Data Structures | 4 |
| **CSC229** | Operating Systems | 4 |
| **CSC237** | Programming Languages Concepts | 3 |
| **IC102** | Islam and Construction of Society | 2 |
| **IS224** | Visual Programming | 4 |
| **MATH207** | Differential Equations | 3 |
| | Total | 20 |

**Level-5**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN345** | Computer Networks | 4 |
| **CSC346** | Software Engineering | 3 |
| **IS326** | Database (2) | 4 |
| **IS340** | Information Systems Analysis | 3 |

| | | |
|---|---|---|
| | and Design | |
| **IS344** | Design and Programming of GUI | 4 |
| | Total | 18 |

**Level-7**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC414** | Introduction to Unix and Linux Systems | 3 |
| **IC104** | Fundamentals of the Islamic Political System | 2 |
| **IS449** | Data Mining | 3 |
| **IS463** | Knowledge base Systems Application | 3 |
| **IS481** | Communication Skills | 2 |
| **IS498** | Graduation Project-1 | 2 |
| | Total | 15 |

**Level-8**

| Course Code | Course Title | Credit |
|---|---|---|
| **IS450** | Multimedia Data Management | 3 |
| **IS452** | Planning & Management of Information Resources | 3 |
| **IS465** | Decision Support Systems | 3 |
| **IS480** | Electronic Commerce Systems | 3 |
| **IS499** | Graduation Project-II | 4 |
| | Total | 16 |

## Course Description:

**Course Code :** **CSC 152**
**Course Title :** Concepts of Algorithms and Computer Programming
**Prerequisites :** non
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level : 3
**Course description:**
Problem-solving, algorithmic design, Introduction to Programming, Structured Program Development, Program Control, Functions, Arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.
**Textbook :**
C How to program ,Deitel&Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004

**Course Code:** **CEN 111**
**Course Title:** Logic Design
**Prerequisites:** non
**Credit Hours**: 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: Level:3
**Course description:**
Digital computer and information (numbering systems, Arithmetic operations, Decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, Combinational circuits simplification, CMOS circuits), Combinational logic design (design procedure, decoders, multiplexes, Binary adder and subtracted), Sequential circuits (latches, flip flops, synchronous sequential circuits analysis and design), Analysis and design of synchronous sequential machines, Representation, state reduction and realization; Finite state machines.

**Textbook:**
M. Mano, Digital Design, 3rd Ed., 2007.

**Course Code :** **IT 125**
**Course Title :** Database
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4
**Prerequisites** : CSC 152
**Course discretion:**
Database definition, Database system, Overview of database management, database system architecture, Introduction to Relational databases, An Introduction to Structured Query Language(SQL), Database Integrity, Views, Normalization, Database design, Practical Applications.
**Textbook:**
"An Introduction to Database Systems", Date, 2004, Addison-Wesley.

**Course Code:** **CEN 126**
**Course Title:** Computer Architecture
**Prerequisites:** CEN 111
**Credit Hours**: 3 Lecture Hrs: 3
Lab Hrs:0 Tut. Hrs: 0 Level:4
**Course description:**
Review of logic design principles. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design .System software .Micro-programmed CPU .Comparison between CISC, RISC and VLIW processors. Introduction to memory organization; I/O operations; Introduction to parallel processing techniques.
**Textbook:**
M. Mano, "Computer System Architecture," Prentice Hall, 2004.

**Course Code :** **CSC 153**
**Course Title :** Object Programming
**Prerequisites** : CSC152
**Credit Hours : 4** Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4
**Course description:**
Introduction to Object-Oriented Programming, Program Control Structures, Functions, Arrays, Pointers and Strings, Classes Part I Classes and data abstraction, Classes Part II :Operator Overloading, Inheritance Virtual Functions and Polymorphism.
**Textbook**:
C How to program ,Deitel&Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004.

**Course Code :** **CSC 244**
**Course Title :** Concepts of Algorithms
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:5
**Prerequisites**: CSC 152
**Course description:**
Growth function and Recurrence, Divide-and-Conquer: (Strassen, Fibonacci, Polynomial Multiplication), Heap Sort, Quick Sort, Bubble Sort, Insertion Sort, Merge Sort, Hash Table, Binary Search Tree, Dynamic Programming, Greedy Algorithms,
**Textbook**
Introduction to Algorithms, (Second Edition) Thomas Cormen, Charles Leiserson, Ronald Rivest, and Clifford Stein. MIT Press. ISBN: 0262032937

**Course Code :** **CSC 276**
**Course Title :** Computer Graphics
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:5
**Prerequisites:** CSC 153
**Course description:**
Computer Graphics Applications Survey.**Color models** (chromaticity diagram, RGB, CMY, YIQ, HSV, and HLS color models).**Graphics Output Primitives** (coordinate frames, DDA, Bresenham's algorithm, circle-drawing, fill-area primitives algorithms). **2D Graphics** (2D Cartesian coordinates, curves and parametric equations, functions and transformations, inverse functions. **3D Graphics** (vectors in 3D, dot and cross product, homogeneous

coordinates, correlation between cartesian and homogeneous coordinates). **Geometric transformations** (2D geometric transformations, matrix representation and homogeneous coordinates, inverse transformations, 2D composite transformations).**Geometric representation** (Lagrange polynomials of degree n, Hermite cubic polynomial, Bernstein polynomial, interpolation problem, Spline interpolation, problem of approximation, Bezier-Bersnstein approximation, Bezier-B-Spline approximation, quadric surfaces).

**Graphics Lab:** modeling, rendering, animation using 3D Studio Max from Autodesk. Use of OpenGL.

**Textbook:**

Hearn, D. and P. Baker "*Computer Graphics with OpenGL*".Pearson Prentice Hall, PearsonEducation Inc., Upper Saddle River, NJ07458, USA, 2004.PIE ISBN 0-13-120238-3.

**Course Code :** **CSC 283**

**Course Title :** Discrete Structures

**Credit Hours** : 4 Lecture Hrs:

Lab Hrs: 0 Tut. Hrs: Level:5

**Prerequisites:** CSC 153

**Course description:**

**Introduction to Discrete Structures**: algorithmic language. **Logic**: propositions, predicate logic, proofs, mathematical induction. **Sets**: special sets, operations, properties and identities, application of logic to knowledge-based systems. **Relations**: graphical and matrix representations, equivalence and order relations, application to databases. **Functions**: types, cardinality, application to functional languages. **Undirected Graphs**: Simple graphs, Eulerian paths, Hamiltonian circuits, trees, application to syntax diagrams. **Directed Graphs**: digraphs, consistent labeling, paths problems, Warshall's algorithm, shortest paths and Dijkstra's algorithm, application to routing in computer networks .**Machines and Computations**: automata as models, finite state automata (FSA) without outputs, FSA as language recognizers and their limits, introduction to Turing Machines, application of FSA to problem-solving.

**Textbook:**

Skvarcius, R. and W.B. Robinson "Discrete Mathematics with Computer Science Applications" The Benjamin / Cummings Publishing Co., 1986.

**Course Code :** **IT 226**

**Course Title :** Information Systems Fundamentals

**Prerequisites** : IT 125

**Credit Hours** :3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level: 5

**Course description:**

Definition of Information Systems ,Philosophy of IT Department, IT Courses Interrelations, Survey of information systems technology, Strategies for IT design, Strategic Role for Information and Information Systems, Organizational Structure and Information Systems, Organizational Modeling, Enterprise-wide computing and networking, Conceptual foundations, The Decision-making process, Information Systems Strategic Planning, Information system requirements, designing the information architecture of an organization, Information systems products and services, Managing of Information Systems.

**Textbook:**

O'Brien, J. A. (2003). Introduction to Information Systems (11th ed.). New York: McGraw Hill

**Course Code :** **CSC 237**

**Course Title :** Programming Languages Concepts

**Prerequisites**: CSC 283

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0

**Course description:**

To present an overview of several different paradigms of programming, To give some experience in writing programs in different languages, To introduce the concepts of syntax-directed translation, programming language semantics, parsing, and others.

**Textbook**

Robert W. Sebesta. Concepts of programming languages, 2008 Addison-Wesley.

**Course Code :** **CSC 229**
**Course Title :** Operating Systems
**Prerequisites**: CEN 126
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:6
**Course description:**
Computer System Structure ,Operating System Concepts ,Operating System Structure ,Procedures, CPU Scheduling, Process Synchronization,BatchFiles,RecoveryConsole,MemoryManagement,VirtualMemory,File-System Interface, Storage Structure, Data Storage on Disks ,File-Systems : Fat,Fat32, NTFS, Distributed Systems ,Hardware Protection ,The Linux system.
**Textbook**
Abraham Silberschatz, Peter Baer, Galvin, Greg Gagne. Operating Systems concepts , Pearson Educaion, Sixth Editio

**Course Code :** **ITS 224**
**Course Title :** Visual Programming
**Prerequisites** : CSC 153
**Credit Hours** : 3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0
**Course Description:**
Selecting a Visual Language, Knowing the concepts and procedures used in Visual Languages, Syntax and semantics of the language used. Types of Data, conditional statements, recursion, data structures, modular programming, review of Object-Oriented Programming concepts and techniques, User Interface Design rules, Materializing an interface into a set of visual objects, File types, File organizing techniques, File usages, Publishing an interface on the web, Basic concepts of Human Computer Interaction, Comparison between the selected language and other visual languages.
**Textbook:**
Diane Zak, Programming with Microsoft Visual Basic .NET 2005, Publisher Course Technology, ISBN 0-619-21718-9

**Course Code :** **CSC 214**
**Course Title :** Data Structures
**Prerequisites :** CSC 283
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:6
**Course description:**
Functions in C - Structures and pointers - Memory Management functions , Concepts and Definition of abstract data type, Array as ADT, Stack and operations, Queue and operations Linked List and stack as list, Queue as list and applications, Sorting, recursion, Tree Introduction to Graphs, Projects and Exercises.
**Textbook :**
Data structures using C and C++. Second edition, YEDIDYAH LANGSAM and others Prentice Hall and others. 1996.

**Course Code :** **IT 326**
**Course Title :** Database (2)
**Prerequisites** : IT 125
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 1 Level : 7
**Course Description:**
DBMS architecture and administration; Centralized and Client-Server approaches, System Catalog, Data Dictionary. Transaction management; Transactions: concepts, characteristics. Recovery techniques, Concurrency control techniques: Serializability, Deadlock, Locking schemes, Time-stamp ordering, Multi-version, Optimistic techniques; DB security; Distributed databases; Distributed DBMS, Data fragmentation and replication, Distributed transactions management. Object-Oriented databases. Introducing to new emerging DB technologies and applications; Web DBs, Multimedia DBs, Data Warehousing and Data Mining
**Textbook:**
Principles of Distributed Database Systems, Ozsu, M. Tamer And Valduriez, Patrick

**Course Code:** **CSC346**
**Course Title:** Software Engineering.

**Prerequisites:** CSC 214
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:7
**Course description:**
Software Engineering Concepts, System Engineering Concepts, Software Process, Analysis Concepts and Principles, Analysis Modeling Design, Real-Time System Design, Software Testing Techniques,Technical Metrics for Software, Project.
**Textbook:**
Ian Somerville, Software Engineering , Pearson Education, 7-th edition.

**Course Code : IT 340**
**Course Title :** Information Systems Analysis and Design
**Prerequisites** : IT 226.
**Credit Hours** : 3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0 Level:7
**Course Description:**
fundamental knowledge, methods and skills needed to analyze, design and implement computer-based systems. The role of the systems analyst and the techniques employed. Utilizing the structured software development life cycle approach, the development phases are comprehensively discussed and reviewed.The Modeling Techniques: Process Modeling (DFDs), Data Modeling (ERDs), Architectural System Design Modeling, Unified Modeling language forms and Object-Oriented Modeling. The Course includes an integrated project that covers the whole system analysis and design phases, which the students will fulfill on a groub base manner. The Course also emphasizes on developing and improving the skills of interrelating, documenting, and modeling for the students.
**Textbook:**
Modern System Analysis & Design, 3rd Edition, 2002, J. A. Hoffer, J. F. George, J. S. Valacich, ISBN 0130339903

**Course Code : IT 344**
**Course Title :** Design and programming of GUI
**Prerequisites** : IT 224
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:7
**Course Description:**
Fundamentals of programming and designing of business applications using Visual programming, Common controls and construction of menus in Visual programming, Concepts and applications of data structures and design of graphical user interfaces, adding Database access and Internet access to Visual programming programs.
**Textbook:**
Philip A. Koneman, Visual Basic.NET Programming for Business, Pearson Education, Prentice-Hall

**Course Code: CEN 345**
**Course Title :** Computer Networks
**Prerequisites:** CEN 126
**Credit Hours :**4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:7
**Course description:**
**Introduction to computer networks**: Network Types, Overview of data transmission, Introduction to network protocols, The Internet protocol. **Network topologies**; Network architecture and the OSI reference model; The physical and Data Link Layer , flow and errors control, ARQ Stop/wait, Sliding window protocols, **DLC standards**: HDLC , PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, Hubs, routers, Ethernet Switches; **Network Layer Services**: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.
**Textbook:**
A. Tanenbaum Computer Networks.4rd Ed., Prentice-Hall, 2003.

**Course Code : IT 324**

**Course Title :** Modern Concepts of Application Programming
**Prerequisites** : IT 224
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:8
**Course description:**
Modern programming Concepts and how to be used to build real world applications needed by Society Organizations. Understanding a problem and analyzing it, sketching a solution, implementing the solution, documenting it and finally presenting the work in a professional manner. Projects tobe selected in the domain of modern applications, e.g: Health Information Systems, E-Commerce applications, Academic field, … .
This course, however, is intended to develop the talents of students and to encourage the spirit of competition, creation, goodness of work, and prettiness of exposition This course includes 2 or 3 large programming projects per semester.
**Textbook**
To be determined according to the chosen projects.

**Course Code : IT 342**
**Course Title :** Information Systems Engineering
**Prerequisites** : IT 340
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:8
**Course description:**
Application systems implementation, functional testing, user acceptance testing, and installation strategies .The processes of maintaining information systems, types of maintenance, measuring and controlling of maintenance effectiveness.
Software quality assurance, quality concepts, the ISO quality factors, technical metrics for software and examples of function-based, specification quality, testing metrics. Technical metrics for object-oriented systems. Information Systems Development Methodologies. Requirements Gathering Engineering. Software Copying Management.
**Textbook:**
Kees M. van Hee, Information Systems Engineering, A Formal Approach, (ISBN-13: 9780521455145 | ISBN-10: 0521455146)

**Course Code : IT 392**
**Course Title :** Selected Topics in Information Systems
**Prerequisites** :80CH.
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:8
**Course Description:**
Special topics of current trends in information systems. Engineering Tools and Methods, Simulation, Virtual Reality, Internet Security, Data Warehousing and Mining, Geographic Information Systems, Telemedicine and Medical Informatics, Workflow Management, Quantitative and Qualitative Methods in Information Systems, Global Information Systems Management, Intelligent Agent Technology and Applications, Human Computer Interaction, Computer-Based Learning and Training, Philosophical Foundations of Information Systems, Absorbing Continuous IT Developments in Organizations, IT Professional and Organizational Needs, Organizational Learning and Collaborative Technologies, Understanding and Managing Information Users Behavior, Policy, Legal and Security Issues in IT , and Virtual Organizations.

**Course Code: CSC 357**
**Course Title:** Internet Techniques web programming**.**
**Credit Hours** : 3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0 Level: 8.
**Prerequisites**: CEN 345
**Course description:**
An overview of connecting to and navigating within the Internet system and the World Wide Web: Navigation. Search Engines. Advanced search techniques. Design of web pages using HTML, XML and Java.TCP/IP.Client/Server architectures. Mastering Connectivity. Security.
**Textbook :**

Gary P. Schneider and Jessica Evans*The Internet -- 3rd Edition*, Course Technology, 2002.

**Course Code:** **CSC 327**
**Course Title:** Operations Research &Applications programming
**Credit Hours** :3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0 Level:8
**Prerequisites**: CSC 283
**Course description:**
OR Approach, Methodology And Applications : modeling, constraints, objective and criteia. Problems of multiple criteria optimization, model validation and systems design.Mathematical programming; simulation, gaming; heuristic programming. Examples,: theory of inventory. Production; linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. Theory of games for two-person competitive situations. Project management through PERT-CPM
**Textbook:**
HamdiTaha, Operations Research: An Introduction (7th Edition), ISBN: 0130323748, 2002.

**Course Code :** **IT 449**
**Course Title :** Data Mining
**Prerequisites** : IT 326.
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:9
**Course description:**
Principles, algorithms and applications of data mining, including algorithms, methods, implementations and applications of mining sequential and structured data, text data, Web data, spatiotemporal data, biomedical data and other forms of complex data.
**Textbook:**
Jiawei Han and MichelineKamber*"**Data Mining**: Concepts and Techniques*" 2nd ed., Morgan Kaufmann, 2006

**Course Code:** **IT 481**
**Course Title:** Communication skills
**Credit Hours** :2 Lecture Hrs: 2
Lab Hrs: 0 Tut. Hrs: 0 Level: 9
**Prerequisites: non**
**Course description**
This course covers written, oral, and interpersonal communication. Students will hand in short pieces of writing each week, will make oral presentations several times in the semester, and will work together in simulated project meetings and other realistic scenarios of pair and small group interaction.

**Course Code :** **IT 463**
**Course Title :** Knowledge base systems Application
**Prerequisites** : CSC 214
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:9
**Course Description:**
Review of first-order logic, relational algebra, and relational calculus. Fundamentals of logic programming .Logic for knowledge representation .Architecture of a knowledge-base system .Fundamentals of deductive databases. Top-down and bottom-up query processing. Some important query processing strategies and their comparison .Project or term paper on current research topics.
**Textbook**
Richard A. Frost, Introduction to Knowledge Based Systems.

**Course Code :** **CSC 414**
**Course title:** introduction to Unix and Linux
**Prerequisites: CSC 229**
**Credit Hours** : 3. Lecture Hrs:2.
Lab Hrs:2. Level:9
**Course description:**
User/kernel interface, fundamental concepts of Unix, user authentication, basic and advanced I/O, file system, signals, process relationships, and inter-process communication. Fundamental development and debugging tools such as "make" and "gdb" will also be covered.
**Textbook:**

W. Richard Stevens, Advanced Programming in the UNIX Environment, Addison Wesley Professional, 1992.

**Course Code :** **IT 498**
**Course Title :** Graduation Project-1
**Prerequisites** : 100 CH.
**Credit Hours** : 2.
Level:9
**Course Description:**
The previous courses have provided the IT students with strong and sufficient knowledge to develop information systems. The next logical stage is that the IT student must acquire hands-on experiences on developing real world information systems. In addition, the students should be familiarized with real world problems encounter during the development of real world information systems. Furthermore, the students should be trained to work in teams. In this course, the students will be organized into groups. The number of students in each group should not exceed three students. For each group, a supervisor will be allocated to guide the group in developing a particular information system. In developing an information system, a particular information system development methodology should be used. Each group will develop a real world information system in two stages: The first stage will be carried out in IT 498 and the second stage will be carried out in IT 499. In IT 498, the students of each group must identify a problem domain, define a problem, identify the requirements in details, specify requirements in details, analyze and document the current system, proposed alternative systems, and design a particular system in details which includes the definitions of all the required system models such as the data model and the functional model. At the end of the course, each group must submit a formal report documenting the problem domain, the requirements, specifications, and the system models.

**Course Code :** **IT 450**
**Course Title :** Multimedia Data Management
**Prerequisites** : IT 224
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 1 Level : 10
**Course Description:**
Significance and value of multimedia for a variety of end uses .Multimedia data storage. Use of multimedia hardware for capture and management of sound, graphics and video. Multimedia development tools, programming, scripting and design skills. Use of multimedia authoring tools for producing multimedia applications.
**Textbook:**
Boyle, T. .*Design for Multimedia Learning.* London: Prentice Hall, 1997.

**Course Code :** **IT 452**
**Course Title :** Planning & Management of Information Resources
**Prerequisites** : IT 342
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level: 10
**Course Description:**
Definition of Information Resources and IT Infrastructure, Information Strategy Planning Components (Business Planning, Systems Planning, technical Planning). Strategic Planning Steps, used tools, managing the Feedback, Developing strategic Objectives and Rules. Organizing, Managing, and Developing of Information Resources for the Information Systems Departments, Cost Analysis, Outsourcing Management, IT Contingency Planning and Resources Safety. Human Factors and Performance Measurements. Security issues, Internal auditing, Standards and procedures of the Information Center, Continuous Improvement of IT Resources. Standards of Computer Networks, Planning of Networks, Business Requirements to Construct Networks, Requirements Analysis, Design of Networks, Choosing Network Technologies, Managing Networks, Measuring and continuous Evaluation of Network Performance, Network

Maintenance and Development, Economical and Legal Issues of Managing Networks, Network effects on the performance and Productivity of the Organization, Computer Networks and the Organization, Network Management Tools.

**Textbook:**

**Course Code :** **IT 465**
**Course Title :** Decision Support Systems
**Prerequisites** : IT 326
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 level:10

**Course description:**

Decision-making process, systems modeling and support .Categorization of problem-solving techniques .Data management and concepts of the data warehousing .**Modeling of managerial problems**; linear programming models, simulation models, heuristics and forecasting models. Model-base management systems. DSS user interface design and management. Decision support system construction methods.DSS Hardware, software, and technology Levels. Knowledge-based and expert systems, expert system architecture; representation of knowledge; forward and backward chaining; inferences making process; Applications of expert systems in decision making Group, distributed, and executive decision support systems.

**Textbook:**

Turban, E. & Aronson J. E., Decision Support Systems & Intelligent Systems, Seventh Edition. Upper Saddle River, NJ: Prentice Hall. ISBN: 0-13-046106-7

**Course Code :** **IT 480**
**Course Title :** Electronic Commerce Systems
**Prerequisites** : IT 340
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:10

**Course description:**

Strategic planning for EC adoption; Business design and architecture for EC applications; Web-based marketing strategies and models; E-Commerce Project Management; Public Policy and Legal Issues of Privacy; Socio-Technical Infrastructure for E-Commerce; Risk Management in E-Commerce Initiatives; E-Transformation; Measuring Effectiveness of E-Commerce Projects; EC and organizational change management; EC and competitiveness; Success and failure in EC implementation; Retailing in E-Commerce; E-Commerce in Banking; Advertisement in E-Commerce; E-Commerce and Online Publishing; E-Commerce in Manufacturing; E-Commerce and Supply Chain Management; E-Commerce and Customer Asset Management; Electronic Payment Systems; Mobile E-Commerce; Modern trends in developing E-commerce systems.

**Textbook:**

Daniel Amor. (1999). *The E-business (R)evoltion: Living and Working in an Interconnected World*. Upper Saddle River, NJ: Prentice Hall.

**Course Code :** **IT 499**
**Course Title :** Graduation Project-II
**Prerequisites** : IT 498
**Credit Hours** : 4

**Course description:**

In this course, each group will continue developing the information systems that started in IT 498. Each group must use a particular tool to implement its information system in a good programming practice. This implementation tool must be new and the students have not been experienced in the previous courses. Furthermore, the students must generate a user manual for their information system in an appropriate format. At the end of the term, each group must submit a final report, which documents completely the information system from the problem definition phase to the test and implementation phase and contains a user manual for the information system.

## Program: Mathematic

**Study plan:**

**The first and second level is the nature science preparation**

**Level 3**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration(2)** | Math.202 | 4 |
| **Principal of Probability Distribution Theorem** | Stat212 | 4 |
| **Basics of Mathematics** | Math.231 | 3 |
| **Introduction to Geometry** | Math.273 | 3 |

**Level 4**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration in many variables** | Math.203 | 4 |
| **Mathematical applications on computers** | Math.251 | 2 |
| **Vectors** | Math.204 | 3 |
| **Linear algebra** | Math.242 | 4 |
| **Theory of numbers** | Math.243 | 3 |

**Level 5**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Linear Programming** | Math.213 | 4 |
| **History of Mathematics** | Math.232 | 3 |
| **Introduction to Differential Equations** | Math.321 | 4 |
| **Numerical analysis** | Math.351 | 4 |

**Level 6**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Mathematical Methods** | Math.326 | 4 |
| **Group Theory** | Math.343 | 4 |
| **Real Analysis (1)** | Math.382 | 4 |

**Level 7**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Rings and Fields** | Math.444 | 4 |
| **Introduction to Topology** | Math.471 | 4 |
| **Real Analysis (2)** | Math.483 | 4 |

| Project | Math.499 | 4 |
|---|---|---|

Level 8

| Course name | Course code & number | Studying Hours |
|---|---|---|
| Introduction to Partial Differential Equations | Math.422 | 4 |
| Introduction to Differential Geometry | Math.472 | 4 |
| Complex Analysis | Math.484 | 4 |

## COURSE DESCRIPTION:

**Level 3**

**Math .202 Differentiation & Integration(2) :** This course aims at giving students definite integral and its properties , mean value theorem of integral and the fundamental theorem of calculus. It also discusses indefinite integral , standard integrals, derivatives & integrals of hyperbolic and inverse hyperbolic functions, integration methods such as: integration by substitution , integration by parts , integration by partial fractions and other substitutions. Also L'Hospitals Rule , evaluation of area and volume of revolution, arc length, Numerical integration (Trapezoidal rule), Polar coordinates, Polar curves graphs and areas using polar coordinates.

**Stat212 Principal of probability distribution theorem:**
This course discusses the discrete and continuous probability distributions (The mass and density probability functions and their properties, expectation, variance, standard deviation and the moment generating functions) . The discrete and continuous bi variety random variables and their properties (expectation, covariance, correlation coefficient, variance of sum or difference of two random variables and the moment generating
functions of bi variety random variables) . Bi variety distributions (marginal and conditional distributions ,independence of random variables , conditional expectation) .Also distribution functions of random vectors and random samples (distribution of sample mean – law of large number – central limit theorem) are discussed.

**Math.231 Basics of mathematics :**
This course aims at introducing mathematical logic, methods of proofs, mathematical induction, set theory, the product of sets, binary operations, equivalence relations , equivalence classes and partitions ,
mappings , the images and inverse images of sets under mappings , equivalence sets, countable and finite sets. Binary operations, morphisms, definition and examples of groups-definition and examples of rings and fields, polynomials and partial fractions.

**Math.273 Introduction to geometry:**
This course provides students with the main concepts of plane Euclidean geometry such as: coordinates, transformation, reflections ,translation, isometrics and similarity. Theorems on triangles, circles, tangents and angles. Polygons, polyhedral, regular polyhedral, their classification, and properties. Spherical geometry such as: sum of angle formula for spherical triangles, projection, conservative functions. Affine geometry : linear and affine transformation, isometrics, finite affine planes.

**Level 4**

**Math.203 Differentiation & integration in many variables:**This course studies the functions in two or more variables, domain of the function, three dimension rectangular coordinates, limits, continuity, partial derivative, higher-order partial derivatives, differentiation of composed function, maxima and minima-method of Lagrange multipliers for maxima and minima. Double integrals in Cartesian and polar coordinates , triple integrals in spherical and cylindrical coordinates,

infinite series, convergence tests, representations of functions by power series, Taylor , Maclaurin, and the binomial series.

**Math.251 Mathematical applications on computers**

This course provides an introduction to mathematics software as Mathematica, Mat lap and solving some problems in calculus and linear

algebra by mathematica and Mat lap. Applications: modeling , simulation and visualization , internet research . Writing mathematical reports and projects using scientific work place.

**Math.204 Vectors:**

Students studies vectors in two and three dimensions, scalar and vector products, equations of lines and planes in 3-dimensional space. Surfaces of revolution and their equations in cylindrical and spherical Coordinates. Vector valued functions of a real variable, curves in space, curvature, rates of change in tangent and normal directions, directional derivatives and gradient of a function. Application to equations of normal and tangent space to a surface at a point. Vector fields, divergence, curl of a vector, line and surface integrals, Green's theorem, Gauss' divergence theorem and Stock's theorem.

**Math.242 Linear algebra**

This course studies matrices and their operations, types of matrices, elementary transformations, determinants, elementary properties of determinants, inverse of a matrix, rank of matrix, linear systems of

equations, vector spaces, linear independence , finite dimensional spaces , linear subspaces, inner product spaces, linear mappings, Kernel and image of a linear mapping- Eigen values and Eigen vectors of a matrix and of a linear operator mapping.

**Math.243 Theory of numbers:**

Students study the first and second principle of mathematical induction, well-ordering principle , divisibility, Euclidean algorithm, prime numbers and their properties, linear Diophantine equations, congruencies and their properties, linear congruencies- the Chinese remainder theorem, Fermat's

little theorem, Euler's theorem, Wilson's theorem, arithmetic functions and Pythagorean triples.

**Level 5**

**Math. 213 Linear programming:**

This course gives introduction to operations research, mathematical model for some real problems and mathematical formulation of linear programming problem. Graphical method for solving linear programming problems, convex sets, polygons, extreme point and optimality theorem. Analytical method (Simplex method) , big-M method , Two-phase method, formulation mistakes, dual problem, sensitivity

analysis, application to transportation and network problems.

**Math.232 History of mathematics:**

This course aims at giving students some knowledge about the evolution of some mathematical concepts ,facts and algorithms in arithmetic , algebra, trigonometry ,Euclidean geometry, analytic geometry and calculus through early civilizations such as ancient Egyptian , Babylonians, Greeks, Indians, Chinese, Muslims and Europeans . Evolution of solutions of some conjectures and open problems.

**Math.321 Introduction to differential equations**:

This course gives basic definitions and construction of an ordinary differential equation. Methods of solving ordinary differential equations of first order . Orthogonal trajectories, ordinary differential equations of high orders with constant coefficients and with variable coefficients, types of solutions, linear systems of ordinary differential equations, series solutions of a linear ordinary differential equation of second

order with polynomial coefficient and Laplace transform.

**Math. 351 Numerical analysis:**

Students study numerical methods for solving nonlinear equations (bisection – iteration – Newton – false position … ), errors and rates of convergence. Direct methods for solving linear systems (Gauss

elimination, LU decomposition) and iterative methods (Jacobi –Gauss Seidel – Relaxation). Errors iteration matrices and convergence of iterative methods, polynomial interpolation (Lagrange-
Newton's methods: divided differences- forward and backward differences) and analysis of errors. Numerical differentiation and integration, errors and accuracy. Gaussian integration formulas.

**Level 6**

**Math.326 Mathematical Methods :**

This course discusses series solutions of ordinary differential equations with variable coefficients, inner product space of functions, self- ad joint operator, Sturm-Lowville theory, orthogonal polynomials and special

functions( Legendre, Hermit, gamma, beta, Bessel). Generalized theory of Fourier series and Fourier integrals.

**Math.343 Group Theory:**

This course studies the axioms of group theory and some examples of groups. Subgroups, cyclic groups, Lagrange theorem, normal subgroup, factor group, homomorphism, fundamental theorems of isomorphism, auto morphisms, Caley theorem and its generalization, simple groups, permutation groups, class equation, group action on a set, p-groups, Cauchy theorem- Sylow's theorems, external and internal direct product of group, Burnside theorem, dihedral- quaternion, groups of

auto morphisms on finite and infinite cyclic groups.

**Math.382 Real Analysis (1):**

This course introduces basic properties of the field of real numbers , completeness axiom , series and their convergence ,

monotone sequence , Bolzano-Weirstrass theorem , Cauchy criterion, basic topological properties of the real numbers, limit of a function , continuous functions and their properties . Uniform continuity , compact sets and its properties. The derivative of a function ,mean value theorem and Lupital rule and Taylor theorem.

**Level 7**

**Math.444 Ring and Fields:**

Students study rings, group of units, group of auto morphisms of a ring , ideals and factor rings and principal ring. They also study prime and maximal ideals, field of quotient of integral domain, characteristic of a ring, direct sum of rings, modules, Euclidean rings, ring of polynomials, roots of polynomials over a field, fields extensions, finite and simple extensions of fields, algebraic closure of a field, splitting fields and finite fields.

**Math.471 Introduction to Topology:**

This course introduces topological spaces, examples, closure of a set, derived set, topological subspaces, bases ,finite product topology, sub-bases, metric spaces , examples, metrizability, continuous functions , characterization of continuous functions on topological and metric spaces, homeomorphisms and examples. Topological property, compact spaces, examples , limit point and sequentially compact spaces.

**Math.483 Real Analysis (2):**

This course studies definition of Riemann integral, Darboux theorem , Riemann sums , properties and the principle theorem in calculus. Series of functions, point twice convergence , uniform convergence, algebra
and σ – algebra (sigma algebra), finite additivity and countable additivity, main extension theorem and outer measure. Measurable sets , measure , Lebesgue measure and its properties, simple functions, measurable functions, Lebesgue integral, theorems of convergence, the relation between Lebesgue and Riemann integral.

**Math.499 Project:**

A student prepares a research project in one of the Math. topics under the supervision of the staff.
The student should submit a report for an oral exam.

**Level 8**

**Math.422 Introduction to partial differential equations:**

This course discusses classification and formation of partial differential equation , first order linear partial differential equation , solution
using Lagrange's method , Cauchy problem , second order linear partial differential equation in several variables , physical application using separation of variables , classifications of partial differential equation , some boundary value problems and Green’s function.

**Math.472 Introduction to differential geometry:**

This course discusses theory of curves in $R^3$, regular curves , arc length and reparameterization , natural parameterization, Serret-Frenet apparatus, existence and uniqueness theorem for space curves, Bertrand curves. Involutes and evolutes, local theory of surfaces, simple surfaces, coordinate transformations, tangent vectors & tangent spaces . First and second fundamental forms, normal and geodesic curvature , Weingarten map, principal Gaussian and mean curvatures, geodesics, equations of Gauss and Godazzi-Mainardi.

**Math.484 Complex Analysis:**

This course discusses complex numbers, Cartesian and polar representation of complex numbers, powers and roots of complex numbers, limits and continuity of complex functions, analytic functions , Cauchy-Riemann equations. Harmonic functions, exponential, trigonometric , hyperbolic functions and logarithmic functions. Complex integration, contour integral , Cauchy's theorem, Cauchy's integral
Formula, bounds on analytic functions ,Taylor and Laurent series, power series, zeros and singularities. Residue theory and applications to real and improper integrals.

## BA Degree Program : Physics

The first year for these program is the preparatory year of natural Science

**Level 1**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 101** | Language Skills | 2 | - |
| **CHEM101** | General Chemistry (1) | 4 | - |
| **ENG101** | English Language | 3 | - |
| **IC101** | Introduction to Islamic Culture | 2 | - |
| **MATH101** | Calculus (1) | 4 | - |
| **PSY101** | Thinking Skills | 2 | - |
| **Total** | 17 | | |

**Level 2**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 103** | Arabic Editing | 2 | - |
| **CSC101** | Introduction to Computers and Programming | 3 | - |
| **ENG103** | English Language (2) | 3 | ENG101 |
| **IC102** | Islamic and Society Building | 2 | IC101 |
| **PHYS101** | General Physics (1) | 4 | - |
| **STAT101** | Statistical Probability | 3 | - |
| **Total** | 17 | | |

**Level 3**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC103** | Economic System in Islam | 2 | IC101 |
| **MATH201** | Calculus for Science (2) | 3 | MATH101 |
| **PHYS243** | General Physics (2) | 4 | PHYS101 |
| **PHYS211** | Classical Mechanics (1) | 3 | MATH101 PHYS101 |
| **PHYS231** | Vibrations and Waves | 2 | MATH101 PHYS101 |
| **PHYS243** | Thermodynamics | 3 | PHYS101 |
| **Total** | 17 | | |

**Level 4**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **MATH205** | Calculus for Physics (3) | 3 | MATH201 |
| **PHYS232** | Physical Optics | 3 | Phys231 |
| **PHYS234** | Health Physics | 2 | - |
| **PHYS203** | Mathematical Physics (1) | 3 | MATH201 |
| **PHYS212** | Classical | 3 | PHYS211 |

| | | | |
|---|---|---|---|
| | Mechanics (2) | | |
| **PHYS221** | Electromagnetism (1) | 3 | PHYS202 |
| **Total** | 17 | | |

**Level 5**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **BUS103** | Communication Skills | 2 | - |
| **MATH210** | Differential Equations | 3 | MATH205 |
| **PHYS302** | Mathematical Physics (2) | 3 | PHYS203 |
| **PHYS321** | Electromagnetism (2) | 3 | PHYS212 |
| **PHYS351** | Modern Physics | 3 | PHYS232 |
| **PHYS393** | Optics Physics | 3 | PHYS232 |
| **BIO314** | Healthy Culture | 2 | - |
| **Total** | 18 | | |

**Level 6**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC104** | Political System in Islam | 2 | IC101 |
| **PHYS303** | Mathematical Physics (3) | 3 | PHYS30 |
| **PHYS350** | Quantum Mechanics (1) | 3 | PHYS212<br>PHYS351 |
| **PHYS391** | Electromagnetism Lab | 2 | PHYS221 |
| **PHYS393** | Modern Physics Lab | 2 | PHYS351 |
| **PHYS342** | Statistical Physics | 3 | PHYS243 |
| **PQUR126** | Islamic Morals | 2 | |
| **Total** | 17 | | |

**Level 7**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS422** | Electronics | 4 | PHYS243 |
| **PHYS452** | Quantum Mechanics (2) | 3 | PHYS350 |
| **PHYS471** | Solid State Physics (1) | 3 | PHYS350 |
| **PHYS481** | Nuclear Physics (1) | 3 | PHYS351 |
| | Selective Course (Faculty) | 2 | - |
| **Total** | 16 | | |

**Level 8**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS455** | Molecular and Atomic Spectra | 3 | PHYS452 |
| **PHYS495** | Solid State Lab | 2 | PHYS471 |
| **PHYS497** | Nuclear Physics Lab | 2 | PHYS481 |
| **PHYS498** | Project | 2 | PHYS497<br>PHYS495 |

| | | | |
|---|---|---|---|
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course | 2 | - |
| **Total** | 17 | | |

## Course Description:

**CHEM 10 : General Chemistry**

Theoretical part : Chemical calculations, gasea, liquid state, thermochemistry, solutions, chemical kinetics, chemical and ionic equilibria Bohr Theory and electronic configuration of atoms and periodic table . An Introduction to types of chemical bonds .

Practical part : some experiments on properties of matter : density , viscosity, qualitative analysis : identification of acidic and basic radicals for inorganic salts .

**Course Number : CSC 101 Introductions to Computer and Programming**

Credit Hours ( lecture and Lab ) : 3 (2+ 1)

Level : Second

Theoretical parts : Introduction to programming , structured program development, program control, functions, array. Assignments in algorithm design and translation of algorithms in high level language like C language

Practical part: Excercices on the theoretical part.

**Course Number :** ENG **101 - English Language**

The course aims to introduce students to :

An awareness of the basics of the English language in general .

An understanding of the basics of English grammar .

The basics of English pronunciation.

Specialized academic topics in the students, respective disciplines.

Proposed Teaching Methods

The course will be conducted via lectures in the main seminar, workshops and group discussions will also be used .

**Course Number : Math 101 - Calculus -1**

Real number and real line – Inequality. Function – The graph of a function- even and odd functions- composite of functions- Review of Trigonometric functions – inverse functions- Limits – The definition of a limit – Properties of Limits- Techniques for Evaluaring Limits – Infinites Limits. Continuity at a point on an open interval - one sided limits and continuity on a closed interval – Properties of continuity . The Derivative of a function – Differentiability and continuity – chain Rule – Derivatives of Trigonometric function – Logarithmic and Exponential functios ( Differentiation ) - Hyperbolic functions – inverse Trigonometric functions Differentiation . Exterma on an interval- Rolle,s Theorem and mean value theorem – Increasing and Decreasing functions and the first derivative test – concavity and second derivative test- related rates .

**PHYS 101 General Physics (1) (3 + 1) h.**

<u>Theoretical part:</u> Physics and measurements, Units and dimensions, Dynamics of particle in one dimension (displacement, average velocity, instantaneous velocity, acceleration, free fall), vector algebra and geometry, Motion in two dimensions, Projectile motion, Uniform circular motion, Tangential and radial accelerations, Newton's first law and inertial frames, Mass and weight, Newton's second law, Newton's third law, Friction, Work and energy, Vector scalar products, Work of variable forces, Kinetic energy and work-energy theorem, Conservative and

non-conservative forces and potential energy, Power, Conservation of mechanical energy, The conservation law of linear momentum, Impulse, Collisions, Collision in one and two dimensions, Rotational motion with constant angular acceleration, Angular quantities, Moment of inertia, Torque and angular momentum, Work of rotational motion, Properties of matter: Elasticity, Stress, Strain, Modulus's, Strain energy, Fluid mechanics: Density and relative density, the concept of pressure, Pascal law, Archimedes principle, Fluid flow, Bernoulli's equation and its applications. State of matters, heat and Temperature and zero law of thermodynamics, Phase transitions, Latent heats, Ideal gases.

Practical part: Error and measurements, Force table, Hook’s Law, Free fall, Projectile motion, Boyle’s Law, Young’s Modulus, Specific Heat of a Solid, Coefficient of Thermal expansion, Surface tension in capillary tube, viscosity, Newton's law of cooling, Determination of the Paraffin wax fusion temperature.

**PHYS 202 General Physics (2) (3 + 1) h.**

Theoretical part: Electric Charge, Insulators and conductors, Coulomb's law, Point charge, The electric field, Electric field of multiple point charges, The electric field of continuous charge distribution, examples of various shapes (disks, rings, spheres, planes), The parallel plate capacitor, Electric dipole, motion of point charge and electric dipole in electric field, Electric flux, Gauss's law, Applications of Gauss's law, Conductor in electrostatic equilibrium, Electric potential, The potential of point charges, The potential of dipole, The electric potential of many charges, Capacitance and capacitors, Energy stored in a capacitor, Fundamental circuits, The electric current, Batteries, current density, Conductivity and resistivity, Ohm's law, Series resistors, Parallel resistors, Kirchhoff's laws, RC circuits, Magnetism and magnetic force, source of magnetic fields, Magnetic field of a current, Magnetic dipoles, Ampere's law and solenoids, The magnetic force on a moving charge, The magnetic force on a current-carrying wire, Forces and torques on current loops, Induced current, Motional emf, Magnetic flux, Lenz's law, Faraday's law, Induced fields and EM waves, Inductors, LC circuits, LR circuits, AC circuits and phase, Capacitors in AC circuits, RC filter circuits, Inductor circuits, The RLC circuits, Power in AC circuits, Wave phenomena, geometrical optics, speed of light, Longitudinal and transverse waves, Sound, The nature of light and the laws of geometric optics, reflection and refraction, Fermat’s principle, Snell’s law, Image formation.

Practical part: Verification of Ohm’s Law, Metric bridge, Charge and discharge of capacitors, Inductive Reactance, Capacitive Reactance, RCL circuits, Transformers, Speed of sound in air , Refractive Index of a Prism, Focal length of Lenses, Focal Length of Mirrors.

**PHYS 211 Classical Mechanics (1) (3 + 0) h.**

Space time, Review of Newton's law and conservation of linear momentum in Cartesian and polar coordinate system, applications on projectile motion in a linear air resistance medium, Quadratic air resistance. Motion of charges in a uniform magnetic field, The center of mass, angular momentum of several particles, Kinetic energy and work, Potential energy and conservative forces, Gradient relation, Time dependent potential energy, Energy for one dimensional linear system, Curvilinear one-dimensional systems, Central forces, The energy of interaction of two particles, The energy of multi-particle systems, CM and relative coordinates, The equation of the orbit, Kepler orbits, The unbound Kepler orbits, Change of orbits, Mechanics in non inertial frames, The tides, Rotating frames and angular velocity vector. Newton's second law in rotating frame, The centrifugal force, Coriolis force, Coriolis force and

free fall, The Foucault pendulum, Coriolis acceleration.

**PHYS 231 Vibration and Waves (2 +0) h.**

Periodic motion, Simple harmonic oscillation, Damped oscillation, Forced oscillation, Application of damped and forced oscillations, Superposition of simple harmonic oscillations, traveling waves, standing, Beats, Transverse wave in wires, Longitudinal wave in rods, Application of longitudinal wave in open and closed air columns, Fourier analysis, Doppler effect.

**PHYS 243 Thermodynamics (3 + 0) h.**

Fundamental concept in heat and thermodynamics, Thermal Equilibrium and zeroth law of thermodynamics, Ideal gases, Kinetic theory of gases, First law of thermodynamic, Application of first law of thermodynamic, isothermal and adiabatic processes. Irreversible process and reversible processes, Carrnot cycle, Otto cycle-cleapeyron latent heat equation, Second law of thermodynamic, Heat Engines, Refrigerators, Entropy, Thermodynamic functions, Maxwell relations, Third law of thermodynamic, Phase change, Applications on thermodynamic laws.

**PHYS 203 Mathematical Physics I (3 + 0) h.**

Determinants, Matrices, Solving linear equations and differential equations by matrices, Application on the motion of the rotation of the rigid body, Vector Algebra: Vector products, Position, Displacement, Vector transformation, Gradient, The Divergence, The Curl, Laplace operator, Line, Surface, and Volume Integrals, Gauss theorem, Stock's theorem, Green's theorem, Spherical polar coordinates, Cylindrical coordinates.

**PHYS 212 Classical Mechanics II (3 + 0) h.**

Calculus of variations, The Euler-Lagrange equation and applications, Lagrange's equations for Unconstrained motion, Constrained systems, Generalized momenta and Ignorable coordinates, Lagrange multipliers and constraint forces, Rotational motion of rigid body, The inertial tensor, Principal axes of Inertia, Precession of a top by weak torque, Euler's equations, Euler's angles, Coupled oscillations and normal modes, The double pendulum, Three coupled pendulum, Hamiltonian mechanics for one dimensional systems, Hamiltonian mechanics in several dimensions, Ignorable coordinates, Phase space orbits, Liouville's Theorem.

**PHYS 221 Electromagnetism I (3 + 0) h.**

Review of vector Operations and algebra, Linear and rotational transformation of vectors, Vector field, Review of vector differential calculus: (gradient, the divergence, the curl, product rules of algebra , Second Derivatives,), Review of integral Calculus: (linear, surface, and volume integrals of vector functions), The fundamental theorem for: (calculus, gradient, divergence, curl), Curvilinear Coordinates: (spherical polar and cylindrical coordinates), The Dirac delta function in one and three dimension, The divergence of reciprocal square of radial distance, The Helmholtz theorem, Coulomb's law, The electric field, Continuous charge distributions, Divergence and curl of electrostatic field, Field lines and flux, Gauss's law and its applications, Electric potential, The potential of a localized charge distribution, The work done to move a charge, The energy of a point charge distribution, The energy of a continuous charge distribution, Properties of conductors and induced charges, Surface charge and the force on a conductor, Capacitors, Poisson's equation, Laplace's equation in one, two and three dimensions, Boundary conditions and uniqueness theorems, Conductors and the second uniqueness theorem, The Method of images and induced surface charge and calculating force and energy, Multipole expansion and approximate potentials at large distances, The monopole and dipole terms, The electric field of a dipole, Polarization, Field of a polarized object, Induced dipole and dielectrics, Polar molecules, Bound charges, The field inside a dielectric and the electric displacement, Gauss's law in the presence of dielectrics, Boundary conditions, Linear Dielectrics:

(susceptibility, permittivity, dielectric constant), Boundary value problems with linear dielectrics, Force and energy in dielectric systems, Magnetostatics and the Lorentz law , Magnetic fields and magnetic forces, The Biot-Savart law, The magnetic field of a steady current, The divergence and curl of the magnetic field, Ampere's law and its applications, Magnetic vector potential, Magnetostatic boundary conditions, Multipole expansion of the vector potential, Magnetic fields in matter and the magnetization, Magnetic materials: (diamagnets, paramagnets, ferromagnets), Torques and forces on magnetic dipoles, Effect of magnetic field on atomic orbits, The field of a magnetized object, Bound currents, The magnetic field inside matter and the auxiliary field, Ampere's law in magnetized materials, Boundary Conditions, Linear and nonlinear media, Magnetic susceptibility and permeability, Ferromagnetism.

**PHYS 232 Physical Optics (3 + 0) h.**

The nature of light , The superposition of waves, Interference of two-beams of light (division of the wave front & division of amplitude) Interferometers( Young , Fresnel's biprism , loyed mirror, Fresnel's double mirrors , wedge interferometer , Newton rings , Michelson interferometer , Jamin & Mach-Zehnder refractometers ), Interference of multiple beams , Fabry-Perot interferometer , Applications of interferometry, Diffraction , Fraunhofer diffraction (single slit, two slits, multiple slits) – diffraction grating - Fresnel diffraction (circular aperture & circular Obstacle ), Polarization - polarization by absorption , reflection , refraction & double refraction, Optical active materials & polarometer .Interference of polarized light , Analysis of polarized light , Electro-optics (Kerr effect & Pockels effect ) , Magneto- optics (Faraday effect).

**PHYS 302 Mathematical Physics II (3 + 0) h.**

Complex numbers, Analytic functions, Limits and Continuity, Analyticity, The Cauchy, Riemann Equations, Elementary Functions, Complex Integration, Contoursm, Independence of path-Cauchy integral theorem- Bounds for analytic Functions, Series representations for analytic functions, Residue Theory, Conformal Mapping, Invariance of Laplace's Equation, Geometric Considerations, Bilinear Transformations, The Schwartz, Christoffel Transformations.

**PHYS 321 Electromagnetism II (3+0) h.**

Electromotive force, Ohm's law, Motional electromotive force, Electromagnetic induction, Faraday's law, The induced electric field, Inductance, Energy stored in magnetic fields, The modified Ampere's law, Maxwell's equations in vacuum, Maxwell's equations in matter, Boundary conditions, Conservation laws and the continuity equation, Poynting's theorem, Newton's third law in electrodynamics and momentum, Maxwell's stress tensor, Conservation of momentum, Angular momentum, Electromagnetic waves in one dimension, The wave equation, Sinusoidal waves, Boundary conditions: reflection and transmission, Polarization, Electromagnetic waves in vacuum, Monochromatic plane waves, Energy and momentum in electromagnetic waves, Electromagnetic waves in matter, Propagation in linear media, Reflection and transmission at normal incidence, Reflection and transmission at oblique incidence, Absorption and dispersion, Electromagnetic waves in conductors, Reflection at a conducting surface, The frequency dependence of permittivity, Guided waves and wave guides, TE waves in a rectangular wave guide, The coaxial transmission lines, Electric dipole radiation, Magnetic dipole radiation, Radiation from an arbitrary source, Power radiated by a point charge, Radiation reaction with matter.

**PHYS 351 Modern Physics (3 + 0) h.**

Special Theory of Relativity: wave propagation, Michelson Morley experiment, Galilean transformation, Lorentz transformations, Relative velocity, Lorentz contraction, Time Dilation, relativity of mass,  Mass and energy, Applications, The particle like properties of Electromagnetic radiation: Electromagnetic waves, The photoelectric effect, black body radition, The Compton Effect, X-rays Waves like properties of particles: De-Broglie hypothesis, Electron diffraction experiment of Davison and Germer, Electron microscope, Uncertainity principle, quantum theory, Atomic Structure: atomic properties, The Thomson model, Rutherford Model for atomic nuclei, alpha particle scattering, Atomic Spectra, Bohr theory of the hydrogen atom, Sommerfeld's Model, Failure of the Bohr theory Frank-Hertz experiment, The basic ideas of the Quantum Mechanics.

**PHYS 393 Optics Lab (0 + 2) h.**

Prism spectrometer (refractive index and dispersion), Grating spectrometer, Fresnel's biprism with He-Ne laser, Fresnel's double mirrors with He-Ne laser, Newton's rings, Michelson interferometer, Mach-Zehnder-interferometer, Diffraction at a single slit, Diffraction at double slits, Diffraction at one-and two dimensional gratings, Diffraction at a single slit measuring and evaluating with Video Com, Polarimter and optical activity, Abbe's refractometer, Inverse square law of light radiation and absorption coefficient of glass or plastic materials, Polarization of light.

**PHYS 303 Mathematical Physics III (3+0) h.**

Series Method for solving linear differential equations, Fuch's theorem, Second solution, Legendre polynomials, Hermite polynomials, Lagurre polynomials, Bessel Functions, Fourier transformation and its application, Laplace transformation and its application, Eigenvalue problem, Differentional equations of Boundary value problem.

**PHYS 342 Statistical Physics (3 + 0) h.**

Probability, One random variable, Some important probability distributions, Many random variables, Sums of random variables and the central limit theorem, Rules for large numbers, entropy, Kinetic theory of gases, Maxwell's distribution of the velocities of gas molecules and its applications, Distribution function of the energy of molecules, Liouville's theorem, Equilibrium properties, The microcanonical ensemble, Two-level systems, The ideal gas, Mixing entropy and the Gibbs paradox, The canonical ensemble, Canonical examples, The Gibbs canonical ensemblem, The grand canonical ensemble, Quantum statistical mechanics, Maxwell-Boltzmann distribution, Bose Einstein distribution, Fermi-Dirac distribution, Vibrations of a solid, Black-body radiation, Quantum microstates, Quantum macrostates, Ideal quantum gases, Hilbert space of identical particles, Canonical formulation, Grand canonical formulation, The degenerate fermi gas, The degenerate bose gas.

**PHYS 352 Quantum Mechanics (3 + 0) h.**

Reviews of the fundamental experiments in modern physics, the need for quantum mechanics. Wave packet and uncertainty principle, Schrödinger equation for free particle, Continuity relation, The dynamical variables and calculating the expectation values, Schrödinger equation with a potential in one dimension, Dynamical variables and calculating the expectation values in momentum space, Commutation relations, Hermitian operators, Linear operators, Completeness relation and orthonormality, Schrödinger equation in three dimensions, The fundamental postulates of quantum mechanics, Particle in an infinite well, Spectral expansion theory, The parity, Constants of motion and conservation laws, Momentum eigen functions and free body, One-dimensional potentials:(The potential step, The finite potential well at scattering and bound states, The potential barrier, The delta function potential at Scattering and Bound states, Simple harmonic oscillator, Oscillator eigen functions and eigen values, Ladder operators and dynamical variables, Schrödinger equation in three dimensions in Cartesian coordinates, Schrödinger equation in three dimension curvilinear coordinate system, Angular momentum and its eigen functions and eigen values, The addition of angular momentum, The central potentials.

**PHYS 392 Electromagnetism Lab (0 + 2) h.**
Measurement of e/m of the electron, Verification of Biot - Savart law , Verification of Faraday's law, Transformers , Measuring the force on current carrying conductors in a homogenous magnetic fields, RLC circuits, Generators, Motors, Transformers, Magnetic moment of magnetized rod, Helmholtz coils, Magnetic induction.

**PHYS 395 Modern Physics lab (0 + 2) h.**
Characteristics of microwaves, Franck- Hertz experiment, Stefan-Boltzmann law for heat radiation, Determination of Planck's constant by means of the photoelectric effect using the compact arrangement, Faraday effect, Fabry – Perot interferometer, Kerr effect, The Balmer series of hydrogen and determination of Rydbergs constant, Pockels effect, Zeeman effect.

**PHYS 422 Electronics (3 + 1) h.**
Theoretical part: Analog Electronics: The P-N junction diode and Zener diode with their applications Junction Field effect transistor - Bipolar junction transistor (Bias and amplifiers: JFET & BJT) – Differential and Operational Amplifiers, Introduction to Feedback Circuits, Multivibrators and Oscillators, Digital Electronics: Binary and Hexadecimal System, Logic Gates, Karnaugh Maps, Flip Flops, Shift Registers, Counters, Memories. Practical part: P-N junction application (half-wave rectifier, full-wave rectifier, clampers and limiters, Zener regulation) - Transistors JFET & BJT amplifiers. Amplifiers with 741(Inverting & Non inverting Amplifiers, Active Filters, Wien Oscillator, Astable Multivibrator). Half and Full Adder (7483), Flip Flop (7474-7476), Shift Register (7495-74194), Counters (7493-74193).

**PHYS 452 Quantum Mechanics II (3 + 0) h.**
Dirac notation, Vector space algebra and Hilbert space, Rephrasing wave mechanics and operator methods in abstract view, Angular momentum commutation relations, Raising and lowering operators for angular momentum, Expansion theory in abstract view, Matrix representation of angular momentum operators, General relations in matrix mechanics, Eigen states of spin ½, The intrinsic magnetic moment of spin ½ particles, Addition of two spins, Addition of Spin ½ and orbital angular momentum, Time independent perturbation theory and energy shifts, Degenerate perturbation theory, The Stark effect, Hyperfined splitting, Variational principle and its applications, The WKB approximation, Time-dependent perturbation theory, The interaction of charged particle with electromagnetic field, Two level-system, emission and absorption of radiations, spontaneous emission, Transition rate, selection rule, scattering theory, Partial wave analysis, The Born approximation.

**PHYS 471 Solid State Physics I (3 + 0) h.**
Different states of matter, classification of solids, crystal structure (Bravais lattices & Miller indices), methods of determination of crystal structure (X-ray diffraction, electron and neutron diffraction), crystal defects, crystal binding (interatomic forces, types crystal bonds), Methods of crystal growth, lattice dynamics (crystal vibration modes and phonons), thermal properties of insulators (specific heat of insulators: classical model, Einstein's model, Debye model,-thermal conductivity of insulators), Dependence of thermal conductivity on temperature, Free electron theory (classical model of free electron, Fermi gas of free electrons, Maxwell-Boltzmann distribution, Fermi-Dirac distribution function), band theory (zone theory and tight binding theory).

**PHYS 481 Nuclear Physics I (3 + 0) h.**
Properties of the nucleus: determination of nuclear charge, radius and mass, Nuclear

binding energy, Natural Radioactivity: Decay law, Nuclear stability, Radioactivity and theory of transformation .Artificial Radioactivity: Discovery of artificial radionuclides, Transuranium elements, Interaction of radiation with matter: Interaction of heavy elements, interaction of light electrons, interaction of gamma rays with matter, interaction of neutrons with matter, Radiation Detectors: Gas detectors, Scintillation detectors, solid state detectors, Nuclear Reactions: Reactions of matter by gamma rays, reactions by alpha particles, reactions by protons, reactions by neutrons, Nuclear fission: Discovery of Nuclear fission, theory of Nuclear fission, Nuclear fusion: Energy production in stars, control of thermonuclear reactions.

**PHYS 455 Molecular and Atomic Spectra (3 + 0) h.**

Introduction: Comparing between atomic emission spectroscopy and atomic absorption spectroscopy; Optical spectroscopy, Atomic spectrum, Quantization of hydrogen atom, Atomic emission / absorption spectrophotometry Molecular spectroscopy , Spectroscopy of inner electrons. Zeemen’s effect, Sodium spectrum, Effect of magnetic field on the energy levels of atom. Theory of magnetic energy, Anomalous Zeeman’s effect and Lande splitting factor. Molecular Spectra of diatomic molecules, Vibrational energy levels in both classical mechanics and quantum mechanics. Rotational spectra of diatomic molecule in gaseous state and rotational energy levels, Molecular spectra; harmonic Oscillator, Non Rigid Rotator, Infrared Vibration, Rotation spectra, spectrum, IR spectrum, RBS spectra, XRD spectrum, measurements of Absorbance, Transmitting and Reflecting using double beam Spectrophotometers in all ranges of wavelengths (UV-VIS-NIR-IR), Normal modes of vibrations; Natural of infrared absorption, Basic Laser principles, Laser behavior, Properties of laser radiations, Different types of lasers, Laser spectroscopy, The total losses of the laser system, Transmission at the mirrors, Absorption and scattering by the mirrors, Absorption in the laser medium, Diffraction losses at the mirrors, The Ruby Laser, Three Level Laser (Helium-Neon Laser)-Four Level Laser ( Carbon dioxide Laser), Laser applications.

**PHYS 497 Solid State Physics lab (0 + 2) h.**

Studying the characteristics of the solar cell, electron diffraction experiments characteristics curves of an optical (photo) resistor, studying the electron spin resonance (ESR), calculation of the energy gap of germanium by an electrical method determination of the thermal coefficient of resistance of a noble metal (platinum) by computer, the magnetic susceptibility of some materials and its classification, X-ray spectroscopy and calculation of Planck's constant and Miller indices of crystal planes in NaCl single crystal, thermoelectric effect in semiconductors (calculation of Seebeck, Peltier and Thomson coefficients), superconductivity and determination of the transformation temperature TC of YBCO specimen by computer, determination of the absorption coefficient of aluminum for X-ray, Hall effect, studying the crystalline structure by using the field effect microscope.

**PHYS 498 Nuclear Physics Lab (0 + 2) h.**

Statistical nature of Radioactive decay law, Rutherford Scattering, Attenuation of gamma radiation, Absorption of beta radiation passing through different materials, Inverse square law in case of gamma-rays, Determination of the range of beta particles in absorbers by beta gamma source, Backscattering of beta particles, determination of the dead time of GM tube, Effect of a magnetic field on beta particles motion, Assessment of natural radionuclide in NaCl, Compton scattering.

**PHYS 499 Project (2 + 0) h.**

The student carries out a research under the supervision of one of the Staff members in one of the following branches: Theoretical Physics, Nuclear Physics, Solid State Physics, Fiber Optics, Laser, Plasma, Electronics. The student submit a a report about his work, and is evaluated by a committee selected by the department.

## Study Plans:

**The Study Plan of Chemistry Program**

| Requirements | | | Credit hour | Total | Percentage % |
|---|---|---|---|---|---|
| **University Requirements** | | | 12 | 12 | 8.82 |
| **Faculty Requirements** | Compulsory | | 44 | 49 | 36.03 |
| | Elective | | 5 | | |
| **Pre. Requisites** | Necessary Courses from other Departments | | 9 | 69 | 50.72 |
| | From the Department | Necessary | 54 | | |
| | | Optionally | 6 | | |
| **Free Courses** | | | 6 | 6 | 4.41 |
| Total | | | **136** | **136** | **100** |

**University Requirement 12 Credit Hours**

| Code No. | Course | Credit Hours: Theory | Practical | Total | Pre-Requisite |
|---|---|---|---|---|---|
| **IC 101** | Islamic culture 1 | 2 | - | 2 | - |
| **IC 102** | Islamic culture 2 | 2 | - | 2 | IC 101 |
| **IC 103** | Islamic culture 3 | 2 | - | 2 | IC 101 |
| **IC 104** | Islamic culture 4 | 2 | - | 2 | IC 101 |
| **ARAB 101** | Language skills | 2 | - | 2 | - |
| **ARAB 103** | Arabic | 2 | - | 2 | - |
| | Total | **12** | **-** | **12 hours** | |

**Faculty Requirements 44 Credit hours**

| Code No. | Course Name | Distribution of Credit hours: The | Prac | Trai | Total | Pre-Requisite | |
|---|---|---|---|---|---|---|---|
| **PSY 101** | Thinking skills and educational methods | 2 | - | - | 2 | - | - |
| **ENG 101** | English 1 | 3 | - | - | 3 | - | - |
| **ENG 103** | English 2 | 3 | - | - | 3 | ENG101 | Pre. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | Req. |
| **CSC 101** | Introduction to computer sciences | 2 | 1 | - | 3 | - | - |
| **MGMT 103** | Communication skills | 2 | - | - | 2 | - | - |
| **MATH. 101** | Mathematics 1 | 3 | | 1 | 4 | - | - |
| **STAT 101** | Statistics | 2 | - | 1 | 3 | - | - |
| **CHEM 101** | General chemistry 1 | 3 | 1 | - | 4 | - | - |
| **PHYS 101** | Physics 1 | 3 | 1 | - | 4 | - | - |
| **MATH. 201** | Mathematics 2 | 2 | - | 1 | 3 | MATH. 101 | Pre. Req. |
| **CHEM 202** | General chemistry 2 | 3 | 1 | - | 4 | CHEM 101 | Pre. Req. |
| **PHYS 202** | Physics 2 | 3 | 1 | - | 4 | PHYS 101 | Pre. Req. |
| **CHEM 230** | Chemical Thermodynamics | 2 | 1 | - | 3 | CHEM 101<br>MATH. 201 | Pre. Req. |
| **CHEM 332** | Quantum Chemistry | 2 | - | - | 2 | CHEM 202<br>MATH 201 | Pre. Req. |
| Total | | **35** | **6** | **3** | **44** | | |

**Faculty Optional Hours 5 Credit hours**

| Code No. | Course Name | Distribution of Credit hours | | | | Pre-Requisite | |
|---|---|---|---|---|---|---|---|
| | | **Theo.** | **Pract.** | **Train.** | **Total** | | |
| **ENG 203** | Scientific expressions | 2 | - | - | 2 | ENG 101 | Pre-Req. |
| **CSC 202** | Skills in using Internet | 1 | 1 | - | 2 | | Pre-Req. |
| **CHEM 307** | Management of laboratories and safety | 2 | 1 | - | 2 | - | - |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CHEM 429** | Applied inorganic chemistry | 2 | 1 | - | 3 | CHEM 322 | Pre-Req. |
| **CHEM 431** | Photochemistry | 2 | - | - | 2 | CHEM 352 | Pre-Req. |
| **CHEM 451** | Environmental chemistry and pollution | 1 | 1 | - | 2 | CHEM 250 | Pre-Req. |
| | Total | **10** | **4** | **-** | **14** | | |

**Necessary Department Courses**

| Code /No. | Course Name | Distribution of Credit hours | | | | Pre-Requisite | |
|---|---|---|---|---|---|---|---|
| | | Theo. | Prac. | Train. | Total | | |
| **CHEM 220** | Chemistry of main group elements | 3 | - | - | 3 | CHEM 202 | Pre-Req. |
| **CHEM 231** | Phases of matter and solution | 2 | 1 | - | 3 | CHEM 230 | Pre-Req. |
| **CHEM 244** | Organic Chemistry 1 | 2 | 1 | - | 3 | CHEM 202 | Pre-Req. |
| **CHEM 250** | Volumetric and gravimetric analysis | 2 | 2 | - | 4 | CHEM 101 | Pre-Req. |
| **CHEM 320** | Chemistry of transition elements | 2 | - | - | 2 | CHEM 220 | Pre-Req. |
| **CHEM 322** | Coordination chemistry | 1 | 1 | - | 2 | CHEM 320 | Pre-Req. |
| **CHEM 330** | Kinetic chemistry | 1 | 2 | - | 3 | CHEM 250 | Pre-Req. |
| **CHEM 331** | Electrochemistry | 2 | 1 | - | 3 | CHEM 231 | Pre-Req. |
| **CHEM 340** | Organic chemistry2 | 2 | 1 | - | 3 | CHEM 244 | Pre-Req. |
| **CHEM 345** | Heterocyclic chemistry | 2 | 1 | - | 3 | CHEM 340 | Pre-Req. |
| **CHEM 351** | Optical methods of analysis | 2 | 1 | - | 3 | CHEM 250 | Pre-Req. |
| **CHEM** | Electro analytical methods | 2 | 1 | - | 3 | CHEM | Pre-Re |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 352 | of analysis | | | | | 331 | q. |
| CHEM 397 | Filed training | - | - | 2 | 2 | -- | -- |
| CHEM 420 | Inorganic reaction mechanism | 2 | - | - | 2 | CHEM 322 | Pre-Req. |
| CHEM 423 | Organo-metallic chemistry | 2 | - | - | 2 | CHEM 322 | Pre-Req. |
| CHEM 433 | Surface chemistry and catalysis | 2 | - | - | 2 | CHEM 330 | Pre-Req. |
| CHEM 441 | Organic reaction mechanism | 2 | - | - | 2 | CHEM 345 | Pre-Req. |
| CHEM 442 | Spectra of organic chemistry | 2 | 1 | - | 3 | CHEM 345 | Pre-Req. |
| CHEM 449 | Chemistry of Natural products | 2 | - | - | 2 | CHEM 345 | Pre-Req. |
| CHEM 452 | Separation methods and Chromatography | 2 | 1 | - | 3 | CHEM 250 | Pre-Req. |
| CHEM 498 | Research project | 2 | - | - | 2 | CHEM 345 | Pre-Req. |
| | Total | **37** | **15** | **2** | **54** | | |

**Necessary courses outside the**

**Department requirements**

| Code No. | Course Name | Distribution of Credit hours | | | | Pre-Requisite | |
|---|---|---|---|---|---|---|---|
| | | **Theo.** | **Pract.** | **Train.** | **Total** | | |
| **BIOL 102** | Biology 1 | 2 | 1 | - | 3 | - | - |
| **BCH 402** | Principles of biochemistry | 2 | 1 | - | 3 | BIOL 102<br>CHEM 340 | Pre-Req. |
| **STAT 406** | Statistics and data entering | 2 | - | 1 | 3 | STAT 101 | Pre-Req |
| Total | | **6** | **2** | **1** | **9** | | |

**Elective Courses from the department**

| Code /No. | Course Name | Distribution of Credit hours | | | | Pre-Requisite | |
|---|---|---|---|---|---|---|---|
| | | Theo. | Prac. | Train. | Total | | |
| **CHEM 334** | Solid stat chemistry | 2 | - | - | 2 | CHEM 202 | Pre-Req |
| **CHEM 421** | Spectra of inorganic chemistry | 2 | - | - | 2 | CHEM 322 | Pre-Req |
| **CHEM 425** | Nuclear chemistry | 2 | - | - | 2 | CHEM 202 | Pre-Req |
| **CHEM 428** | Bioinorganic chemistry | 2 | - | - | 2 | CHEM 322 | Pre-Req |
| **CHEM 434** | Corrosion | 2 | - | - | 2 | CHEM 230<br>CHEM 331 | Pre-Req |
| **CHEM 443** | Polymer chemistry | 2 | - | - | 2 | CHEM 340 | Pre-Req |
| **CHEM 445** | Photo organic chemistry | 2 | - | - | 2 | CHEM 345 | Pre-Req |
| **CHEM 447** | Petroleum chemistry | 2 | - | - | 2 | CHEM 345 | Pre-Req |
| **CHEM 448** | Applied organic chemistry | 2 | - | - | 2 | CHEM 345 | Pre-Req |
| **CHEM 458** | Analysis of materials | 1 | 1 | - | 2 | CHEM 351<br>CHEM 352 | Pre-Req |
| | Total | **19** | **1** | **-** | **20** | | |

## Free courses

Can be selected by the student and his academic advisor.

### The Study Plan of Chemistry Program

FIRST LEVEL

| Code/No | **Course Name** | **Units** | **Pre-Req.** |
|---|---|---|---|
| **IC 101** | Islamic culture 1 | 2 | 2 |
| **ARAB 101** | Language skills | 2 | 2 |
| **PSY 101** | Thinking skills and educational methods | 2 | 2 |
| **ENG 101** | English 1 | 3 | 3 |
| **MATH 101** | Mathematics 1 | 4 | 4 |
| **CHEM 101** | General Chemistry 1 | 4 | 4 |
| | Total Units | **17** | |

SECOND LEVEL

| Code/No | **Course Name** | **Units** | **Pre-Req.** |
|---|---|---|---|
| **IC 102** | Islamic culture 1 | 2 | IC 101 |
| **ARAB 103** | Arabic 2 | 2 | - |
| **ENG 102** | English 2 | 3 | ENG 101 |
| **CSC 101** | Introduction to computer sciences | 3 | - |
| **STAT 101** | Statistics | 3 | - |
| **PYS 101** | General Physics 1 | 4 | - |
| | Total Units | **17** | |

| THIRD LEVEL | | | |
|---|---|---|---|
| Code/No | **Course Name** | **Units** | **Pre-Req.** |
| **IC 102** | Islamic culture 3 | 2 | IC 101 |
| **MATH 201** | Mathematics 2 | 3 | MATH 101 |
| **CHEM 202** | General Chemistry 1 | 4 | CHEM 101 |
| **PYS 202** | General Physics 2 | 4 | PYS 101 |
| **CHEM 230** | Chemical Thermodynamic s | 3 | CHEM 101 Pre-Req. MATH. 201 Co-Req. |
| **MGMT 103** | Communication skills | 2 | - |
| Total Units | | **18** | |

| FOURTH LEVEL | | | |
|---|---|---|---|
| Code/No | **Course Name** | **Units** | **Pre-Req.** |
| **CHEM 220** | Chemistry of main group elements | 3 | CHEM 202 |
| **CHEM 231** | Phases of matter and solution | 3 | CHEM 230 |
| **CHEM 244** | Organic Chemistry 1 | 3 | CHEM 202 |
| **CHEM 250** | Volumetric and gravimetric analysis | 4 | CHEM 101 |
| **BIOL 102** | General Biology 1 | 3 | - |
| - | Faculty optional course | 2 | **-** |
| | **Total Units** | 18 | |

| FIFTH LEVEL | | | |
|---|---|---|---|
| Code/No. | **Course Name** | **Units** | **Pre-Req.** |
| **IC 104** | Islamic culture 4 | 2 | IC 101 |
| **CHEM 320** | Chemistry of transition elements | **2** | CHEM 220 |
| **CHEM 330** | Kinetic chemistry | **3** | CHEM 250 |
| **CHEM 331** | Electrochemis try | **3** | CHEM 231 |
| **CHEM 340** | Organic Chemistry 1 | **3** | CHEM 244 |
| **CHEM 352** | Spectra methods of analysis | **3** | CHEM 250 |
| - | Department optional course | **2** | **-** |
| | Total Units | **18** | |

| SIXTH LEVEL | | | |
|---|---|---|---|
| Code/No. | **Course Name** | **Units** | **Pre-Req.** |
| **CHEM 322** | Coordination chemistry | 2 | CHEM 320 |
| **CHEM 332** | Quantum Chemistry | 2 | CHEM 322+MAT H 201 |
| **CHEM 345** | Heterocyclic chemistry | 3 | CHEM 340 |
| **CHEM 351** | Electro | 3 | CHEM |

| | | | |
|---|---|---|---|
| | analytical methods of analysis | | 331 |
| **CHEM 397** | Filed training | 2 | **-** |
| - | Department optional course | 2 | **-** |
| - | Free Course | 2 | **-** |
| Total Units | | 16 | |
| SEVENTH LEVEL | | | |
| Code/No. | **Course Name** | **Units** | **Pre-Req.** |
| **CHEM 423** | Organo-metallic chemistry | 2 | CHEM 322 |
| **CHEM 441** | Organic reaction mechanism | 2 | CHEM 345 |
| **CHEM 453** | Separation methods and Chromatography | 3 | CHEM 250 |
| **STAT 406** | Statistics and data entering | 3 | STAT 101 |
| - | Faculty Optional course | 3 | **-** |
| - | Free Course | 2 | **-** |
| Total Units | | **15** | |
| EIGHTH LEVEL | | | |
| Code/No. | **Course Name** | **Units** | **Pre-Req.** |
| **BCH 402** | Principles of biochemistry | 3 | CHEM 340+ BIOL 102 |
| **CHEM 420** | Inorganic reaction mechanism | 2 | CHEM 322 |
| **CHEM 442** | Spectra of organic chemistry | 3 | CHEM 345 |
| **CHEM 432** | Surface chemistry and catalysis | 2 | CHEM 330 |
| **CHEM 449** | Chemistry of Natural products | 2 | CHEM 345 |
| **CHEM 499** | Research project | 1 | **-** |
| - | Department optional course | 2 | **-** |
| - | Free Course | 2 | **-** |
| Total Units | | **17** | |

## Course Description

**CHEM 101: General Chemistry (1) Credit Hours (lecture + lab): 4(3+1)**

Chemical calculations, gases, liquid state, thermochemistry, solutions, chemical kinetics, chemical and ionic equilibria, Bohr Theory and electronic configuration of atoms and periodic table. An introduction to types of chemical bonds.

**CSC 101: Introduction to Computer Credit Hours (lecture + lab): 3(2+1)**

Introduction to programming, structured program development, program control, functions, arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.

**CHEM 202: General Chemistry (2) Credit Hours (lecture + lab): 4(3+1)**

Chemical bonding, chemistry of elements, chemical reactions in aqueous solutions, electrochemistry, nuclear chemistry and organic chemistry. (Pre-requisite: CHEM 101)

**CHEM 230: Chemical Thermodynamics Credit Hours (lecture + lab): 3(2+1)**

Importance and expressions, Work and heat, zero low, fist low of thermodynamic and its applications, the second low and its applications, the third low of thermodynamic, chemical potential, free energy, chemical and physical equilibrium, thermodynamic statistics. (Pre-requisite: CHEM 101 + MATH. 202 (Co-requisite))

**BIOL 102: General Biology Credit Hours (lecture + lab): 3(2+1)**

Plant cell structure, properties and classification of plant kingdom, metabolism, anatomy, photosynthesis. Structure of microbial cell, properties of microorganisms, its importance for human and environment, viruses, bacteria, fungi, algae and lichens. Animal cell structure, properties and classification of animal kingdom, protozoa, vertebrate and invertebrates.

**CHEM 220: Course Name: Chemistry of Main Group Elements, Credit Hours (lecture + lab): 3(3+0)**

Modern theories of covalent bond, periodic table, principles of periodic arrangement of elements, Group IA, Alkali metals (lithium - ceasium), Group II A Alkaline earth metals (beryllium - barium), Group III A (boron - thallium), Group IV A (carbon – lead), Group VA (nitrogen – bismuth), Group VIA (oxygen – selenium), Group VII A (fluorine – iodine), Group VIIIA (noble gases), compounds of representative elements. (Pre-requisite: CHEM 202)

**CHEM 231: Course Name: Phase Rule and Solutions, Credit Hours (lecture + lab): 3(2+1)**

Fractional molar quantities, evaporation pressure, boiling and freezing. Solid material and its composition, phase equilibrium and equilibrium in gaseous phase, mixing, thermodynamics of real and ideal non electrolytic solutions, collegative properties, solute and solvent activities, hydrolysis of ions, activity coefficient, electrolytic conduction, ionic mobility, transportation number, diffusion, transition and transfer, clapiron-clausus equation, phase rule; one component system, two component systems, and three component systems.(Pre-requisite: CHEM 230)

**CHEM 244: Course Name: Principles of Organic Chemistry -1, Credit Hours (lecture + lab): 3(2+1)**

Aliphatic hydrocarbons (alkanes, cyclic alkanes, alkenes and alkynes), aromatic hydrocarbons (electrophilic substitution reactions, activity and direction, polynuclear aromatic hydrocarbons), alkyl and aryl halides (nomenclature, physical properties, preparation methods, nucleophilic substitution reactions). (Pre-requisite: CHEM 202 ).

**CHEM 250: Volumetric and Gravimetric Analysis, Credit Hours (lecture + lab): 4(2+2)**

Introduction to volumetric analysis, methods of expressing concentration, calculations in analytical chemistry, neutralization reactions, precipitation reactions, compleximetric titration, redox reactions, principles of gravimetric analysis, solubility product, preliminary treatment of precipitation process, calculations in gravimetric analysis.(Pre-requisite: CHEM 101).

**CHEM 320: Chemistry of Transition Elements, Credit Hours (lecture + lab): 2(2+0)**

Transition elements, definition, general properties of transition elements and study of groups of d- block transition elements .Study of elements of group IV ( titanium, zirconium and hafnium), elements of group V ( vanadium, niobium and tantalum), elements of group VI ( chromium, molybdenum and tungsten), elements of group VII ( manganese, technetium and rhenium ), elements of group VIII (iron, cobalt and nickel ( the first triad of group VIII ), elements of group $I_B$ ( copper, silver and gold ), elements of group $II_B$ ( zinc, cadmium and mercury ). Elements of f- block elements ( lanthanides and actinides ) .Definition and general properties of lanthanides and actinides, magnetic properties and spectra of lanthanides and actinides. Separation and industrial uses of lanthanides . Metal complexes of lanthanides and actinides. Radioactivity of actinides.(Pre-requisite: CHEM 220 ).

**CHEM 330: Course Name: Chemical Kinetics, Credit Hours (lecture + lab): 3(1+2)**

Rate of chemical reactions, factors affecting the rate of reaction, order of reaction and half life time, determination of rate, order and rate constant of chemical reaction, Arhenius equation, determination of activation energy, collision theory, transition state, chain reaction and reaction mechanism.(Pre-requisite: CHEM 250 ).

**CHEM 331: Electrochemistry, Credit Hours (lecture + lab): 3(2+1)**

Potentiometric measurements, electrochemical reactions and Nernest equation, reference electrodes, standard potentials, thermodynamics of electrochemical reactions, diffusion and electrochemical reactions, voltammetry, mechanism of electrode reactions, physical and chemical meaning of corrosion, study of the effect of media on the corrosion. (Pre-requisite: CHEM 231).

**CHEM 340: Principles of Organic Chemistry (2), Credit Hours (lecture + lab): 3(2+1**

Introduction to stereochemistry, classification, properties, preparation methods and reactions of (aldehydes, ketones, carboxylic acids and their derivatives, amines). Carbohydrates (monosaccharide, disaccharides, polysaccharides) amino acids and proteins(acidic character, basic character of amino acids, preparation methods and reactions). (Pre-requisite: CHEM 244 ).

**CHEM 351: Spectrophotometric Methods of Analysis, Credit Hours (lecture + lab): 3(2+1)**

Molecular (UV-VIS) and atomic spectral analysis methods, single and double beam spectral instruments, components of instruments (sources- monochromators- detectors …. etc.), qualitative and quantitative spectral analysis aspects, Beer`s low and its application, spectrophotometric titrations, interferences, fluorescence and phosphorescence. Flame atomic absorption spectroscopy apparatus, interference and their elimination, methods applications of flame atomic absorption, fluorescence and emission spectra for qualitative analysis. (Pre-requisite: CHEM 250).

**CHEM 322: Chemistry of Metal Complexes, Credit hours (lecture + lab ): 2(1 + 1)**

Definition of a metal complex. Types of ligands . Coordination numbers and structure. Polynuclear metal complexes. Isomerism in metal complexes .Nomenclature of metal complexes . Theories of bonding in metal complexes, magnetic properties of metal complexes, valence bond theory, molecular orbital theory and crystal field theory. Ligand field theory in application. Crystal field stabilization energies. Jan- Teller effect. Reactions of metal complexes. Coordination equilibria in solutions and determination of formation and dissociation constants. Electronic spectra of metal complexes.(Pre-requisite: CHEM 320).

**CHEM 332:Quantum Chemistry, Credit Hours (lecture + lab): 2(2+0)**

Electromagnetic radiation and the quantum theory, Bohr's atomic theory, the foundation of quantum mechanics, Schrodinger's equation, wave mechanic, quantum mechanic's postulates, quantum mechanic's of some simple systems, quantum mechanic's of hydrogen like atoms, angular momentum and magnetic moment, the rigid linear rotor, spin quantum numbers, many-electron atoms, approximate methods in quantum mechanic's. (Pre-requisites: CHEM 202 + MATH 201).

**CHEM 345: Heterocyclic Organic Chemistry, Credit Hours (lecture + lab): 3(2+1)**

Nomenclature, methods of preparation, study the physical and chemical properties of five and six-membered rings heterocyclic compounds which contain one or more hetero atoms, study the heterocyclic compounds which contain more than one fused ring. Study the different applications of these compounds.( Pre-requisite: CHEM 340).

**CHEM 352: Electroanalytical Methods, Credit Hours (lecture + lab): 3(2+1)**

Classification of electrochemical methods of analysis, potentiometric methods, ion selective electrodes (ISE), molecular selective electrodes (MES), electrochemical sensors, voltumeteric methods of analysis and polarography, stiripping voltammeter methods, amperometric methods of analysis, coluometry, electrolytic conductance, electrogravimetry. (Pre-requisite: CHEM 331).

**CHEM 397: Field Training , Credit Hours (lecture + lab): 2(0+2)**

The students spend a training period in a suitable industrial company, or in university laboratories, or in the hospital's laboratories, or water plants and submit a report, under the supervision of a professor from the Department. The students will be evaluated according to Department regulations.

**STAT 406: Statistical Treatment of Chemical Data ,Credit Hours (lecture + ex.): 3(2+1)**

Standard deviation, relative standard deviation, random error and its sources, confidence, precision and accuracy, (t) test, (f) test, calibration curves for determination of concentration of solution, application of available PC-software to solve numerical problems in the various areas of chemistry and to treat laboratory data, implementation of ready-to-use PC- programs in chemistry. (Pre-requisites: STAT 101).

**CHEM 423: Organometallic Chemistry, Credit Hours (lecture + lab): 2(2+0)**

Definition, classification, and stability of organometallic compounds, nature of organometallics for essential elements (classifications, preparation methods), derivatives for one element from each group, study of organometallic compounds of transition elements, bonding nature in transition element complexes, reactions of bond cleavage, reactions of oxidation and addition, applications on catalysis. Pre-requisite: CHEM 322.

**CHEM 441: Mechanism of Organic Reactions, Credit Hours: 2(2+0)**

Study the chemical and physical methods to follow the reaction mechanism, nucleophilic and electrophilic substitution reactions, elimination reactions, electrophilic addition to a double bond, addition to a carbonyl group, rearrangement in organic compounds. (Pre-requisite: CHEM 345).

**CHEM 452: Separation Methods and Chromatography, Credit Hours (lecture + lab): 3(2+1)**

Basic principles of separation methods: using distillation, precipitation, solvent extraction, chromatographic methods, chromatographic columns, high pressure columns, capillary columns, thin layer chromatography, paper chromatography, gel chromatography, gas and liquid chromatography, chromatogram, apparatus components, qualitative and quantitative chromatographic analysis. (Pre-requisite: CHEM 250).

**BCH 402: Principles of biochemistry, Credit Hours (lecture + lab): 3(2+1)**

Biological buffer solutions, carbohydrates, amino acids, peptides, polypeptides and proteins, lipids, enzymes, hermones, nucleic acids, cations, trace elements in blood. (Pre-requisite: BIOL 102 + CHEM 340).

**CHEM 420: Mechanism of Inorganic Reactions, Credit Hours (lecture + lab): 2(2+0)**

Coordination compounds and coordination numbers. Substitution reactions in metal complexes of octahedral geometry. Substitution reactions in metal complexes of square planar geometry. Neucleophlic substitution reactions for tetrahedral complexes. Oxidation and reduction reactions. Determination of reactions rates experimentally. (Pre-requisite: CHEM 322).

**CHEM 433: Surface Chemistry and Catalysis, Credit Hours (lecture + lab): 2(2+0)**

Solid–gas interface, solid–liquid interface, liquid–liquid interface, changed surface interface, introduction to types of catalysis, Heterogeneous catalysis for solid gas interface and solid–liquid interface, homogeneous catalysis, chemical kinetics in heterogeneous catalysis, types of catalysts, their preparations, and properties, industrial catalytic reactions. (Pre-requisite: CHEM 330).

**CHEM 442: Spectra of Organic Compounds, Credit Hours (lecture + lab): 3(2+1)**

Different spectroscopic methods for the identification of structure of organic compounds, study the spectra of (ultraviolet, visible, infrared, nuclear magnetic resonance for $^{1}H$ and $^{13}C$, and mass spectrum), applications including the different types of spectra.(Pre-requisite: CHEM 345).

**CHEM 449: Chemistry of Natural Products, Credit Hours (lecture + lab): 2(2+0)**

Introduction to natural products, extraction methods from their sources. Separation and determination of their structures, Terpines (classifications, examples, their importance). Alkaloids (classifications, examples of five and six-membered heterocyclic rings), identification of natural phenolic compounds. (Pre-requisite : CHEM 345).

**CHEM 498: Research Project, Credit Hours (lecture + lab): 1(1+0)**

The students conduct a research work in certain scientific subject and submit an essay; The students will be evaluated according to Department regulations.

## ELECTIVE COURSES

**CHEM 307: Laboratory Management and Safety Rules, Credit Hours (lecture + lab): 2(2+1)**

Detailed description of managements of chemistry lab. and activity including collection, transportation and storage of samples, quality control tests, communication tools, analysis of obtained results, emergency and safety rules.

**CHEM 334 : Solid State Chemistry, Credit Hours (lecture + lab): 2(2+0)**

An introduction to crystal structures, Physical methods for characterizing solids, Preparative methods, bonding in solids and electronic properties, Defects and non-stoichiometry, Carbon-based electronics, Zeolites and related structures, Optical properties of solids, Magnetic and dielectric properties, Superconductivity, Nanoscience. (Pre-requisite: CHEM 202).

**CHEM 421: Spectra of Inorganic Compounds, Credit Hours (lecture + lab): 2(2+0)**

Vibration spectra, group theory, symmetry elements, groups and their representation, classification of compounds and their point group, use of species character tables for calculation of principal vibrations, selection rules for vibration, activity of vibrations in Infrared and Raman regions, use of spectra in inorganic chemistry, electronic spectra, instruction of molecular orbitals, selection rules for electronic transitions, uses of electronic spectra in inorganic chemistry, Mossbauer spectra, sources of gamma rays, applications.(Pre-requisite: CHEM 322).

**CHEM: Nuclear and radiation Chemistry, Credit hours (lecture + lab): 2 (2 + 0)**

Origin of nuclear Science. Nuclei, isotopes and isotope isolation. Nuclear mass and stability. Unstable nuclei and radioactive decay. Absorption of nuclear radiation. Radiation effects on matter. Uses of radioactive tracers. Energetics of nuclear reactors. Particle accelerators . Mechanisms and models of nuclear reactions. The transuranium elements. Thermonuclear reactions : the beginning and future. Radiation biology and radiation protection. Principles of nuclear power. Nuclear power reactors. Nuclear fuel cycle. (Pre-requisite: CHEM 202).

**CHEM 428: Bioinorganic Chemistry, Credit Hours (lecture + lab): 2(2+0)**

Bioinorganic chemistry and includes: non oxidizing, reducing metal enzymes, nitrogen fixation, oxygen carriers Applications of metal and non-metal compounds and their complexes in medicine and biology. (Pre-requisite: CHEM 322 ).

**CHEM 429: Applied Inorganic Chemistry, Credit hours ( lecture + lab ) : 2 ( 2 + 0 )**

This course concerned with the different applications of inorganic materials such as : Industry of fertilizers,1-phosphorous cements 2-nitrogen containing fertilizers as ammonium sulphate, ammonium nitrate and urea 3-potassium-containing fertilizers. Industry of aluminium. Industrial silicon products as; silicon oils, silicon rubbers and silicon resins. Industry of silicate products as glass. Inorganic fibres as asbestos fibres, textile glass fibres, optical fibres. carbon fibres, metal fibres, oxide fibres and non-oxide fibres. Industry of construction materials; as cement, gypsum, enamels and ceramics. Inorganic pigments. (Pre-requisite: CHEM 322).

**CHEM 431: Photochemistry, Credit Hours (lecture + lab): 2(2+0)**

Electronic excitation of atoms and molecules, excited states of polyatomic molecules. Kinetics of electronic excited state, electronic energy transition, chemical reactivity of excited electronic molecules, photoelectronic and photoionic spectra, diffraction of light in laboratory and outdoor (environment). (Pre-requisite CHEM 352).

**CHEM 434: Corrosion, Credit Hours (lecture + lab): 2(2+0)**

General introduction - types of corrosion – corrosion environments- forms of corrosion - local corrosion - uniform corrosion - atmospheric corrosion - thermodynamic of corrosion - Pourpaix diagrams - electrochemistry of corrosion - mixed potential theory - corrosion of iron, corrosion inhibition – cathodic protection – anodic protection - corrosion of iron in concrete – pipeline corrosion - corrosion inhibitors. (Pre-requisites: CHEM 230 + CHEM 331).

**CHEM 443: Polymer Chemistry, Credit Hours (lecture + lab): 2(2+0)**

Basic concepts of polymer chemistry, condensation and addition polymerization, copolymerization, polymer structure and properties, molecular weight determination of polymers, analysis and testing of polymers, important industrial polymers, copolymers and plastic technology.(Pre-requisite: CHEM 340).

**CHEM 445:Organic Photochemistry, Credit Hours (lecture + lab): 2(2+0)**

Introduction– excited states– photochemical and photophysical processes – photochemical reactions- isomeric transformation in alkenes and alkynes- photochemical rearrangement, photocyclic addition and photo substitution reaction of aromatic compounds- photoreduction, Norich type I, and Norich type II, reactions of oxygenated compounds – isomeric transformation, photochemical cracking, photo rearrangement and photoreduction of nitrogenated compounds- electrocyclic reactions – addition cyclization reactions – classification of addition cyclization (Pre-requisite: CHEM 345).

**CHEM 447: Petroleum Chemistry, Credit Hours (lecture + lab): 2(2+0)**

Introduction to petroleum, theories of formation of petroleum- physical and chemical properties, methods of analysis, chemical processes ( thermal and catalytic cracking- catalytic alkylation) natural gas ( its use- classifications- methods of purifications), lubricating oils, distillation of petroleum ( purification- methods of improvement), artificial petroleum and methods of preparation, saturated and unsaturated hydrocarbons as starting materials in petrochemical industries, polymers derived from petroleum. (Pre-requisite: CHEM 345).

**CHEM 448: Applied Organic Chemistry, Credit Hours (lecture + lab): 2(2+0)**

Oils, fats and soaps: chemical constitution, distinction between oils and fats, chemical analysis of oils and fats acid, acid saponification and iodine values, definition, determination and significances. Dyes: theory of color and constitution, chromophore and auxochrome, classification of dyes based on applications, synthesis of acid dye (congo red), basic dye (malchite green), moderate dye (alizarin), ingrain dye (bismark brown), vat dye (indigo), disperse dye (celliton–B) reactive dye (copper phthalocyanine), sulphur dyes (sulphur black), azo dye (aniline yellow). Effluent in dyeing industry. (Pre-requisite: CHEM 345).

**CHEM 451: Environmental Chemistry and Pollution, Credit Hours (lecture + lab): 2(1+1)**

Introduction about environment, type of pollutants in air, water, soil and agricultural products, surface and underground water pollution, factors required to insure water quality for different uses. Soil analysis and determination of environmental pollutants such as pesticides, fertilizers, polycyclic hydrocarbons, analysis of agricultural products.(Pre-requisite: CHEM 250 ).

**CHEM 458: Ore Analysis, Credit Hours (lecture + lab): 2(1+1)**

General relationships of a mineral ore with types of matter, classification of ores, methods of ore separation, Rules for obtaining a true sample, methods of sampling, preliminary treatment of sample. Decompose of sample. Reduction of sample weight. Concentration of ores. Selectivity factor, major and minor constituents to be determined. General characteristics of analysis, accuracy of analysis, statement of analysis, measurements of systematic and random errors... Examples of ore analysis. (Pre-requisite: CHEM 351 CHEM 352).

# College of Sciences and Arts in Uqlat Al-Sokoor

## Vision:

A college educationally superior in science and arts in Qassim, contributory to empirical research, and supportive to sustainable development in the local community.

## Mission:

The college aims at offering accredited and developed university instruction in science and arts that provide the labor market with qualified, proficient, and national workforce; providing empirical research; and activating societal partnership by using the various modern administrative, technological, and information techniques and by developing the college resources that will eventually contribute to the development of the local community.

## Aims:

1- Development of professional performance of faculty members to keep up with the imaginative ways of teaching in the field of education and scientific research and using of the modern methods of copying with global standards.

2- Application of a variety of academic programs according to the quality specifications capable of development of society and proportionate to the needs of labor market.

3- Providing conducive environment for academic excellence.

4- Providing the students with the skills necessary for using modern technology and its applications, then qualifying them to pursue their graduate studies and scientific research.

5- Avalability of graduate studies programs in different specializations of the college.

6- Providing training and academic programs to the local community .

7- Providing the graduators with continuous programs which suit the labor market.

8- Availability of good qualified experts of citizens who are qualified scientifically according to the improvement plans of the kingdom.

9- Graduation of students whose high qualification of using new technologies in their majors and capable to compete the students of other universities and capable of pursue of graduate studies and strongly entering the labor market.

10- The cooperation with the governmental and private sectors to benefit of the opportunities and minimizes the threats.

## About:

The Royal Approval (numbered 10/50/1429) to establish the College of Sciences and Arts in Uqlat Al-Sokoor was issued on 10/07/1429 (AH ). It is meant to be a beacon of science and community service in Qassim Area; and also become another brick in the edifice of higher education in Qassim University.

The study started in college in 1430/1431 (AH) and now the college contains four scientific departments: Mathematics Department, Physics Department, Computer Department, and Basic Education Department. In addition, the college have some of the distinguished faculty members in the Kingdom .The total number is 60 staff members and 21 lecturers in various scientific fields. The total number of students is about 2700 .The college offers its services to more than 45 centers and villages.

## Degrees:

Bachelor

## Programs:

1. Computer Science
2. Mathematics
3. Physics

## Departments:

Computer Science, Mathematics, Physics, Biology, English, Islamic Studies, Arabic Language & Literature, Basic Education, Private Education, Family & Childhood Science

## First program:

BA Degree Program: **Computer sciences**

**Level 3**

| Course Code | Course Title | Credit |
| --- | --- | --- |
| **IC101** | Introduction to Islamic Culture | 2 |
| **Arab101** | Language Skills | 2 |
| **Phys104** | General Physics (2) | 4 |
| **Math105** | Differential Calculus | 3 |
| **CEN111** | Logic Design | 4 |
| **CSC152** | Concepts of Algorithms & Computer Programming | 4 |
| | Total | 19 |

**Level-4**

| Course Code | Course Title | Credit |
| --- | --- | --- |
| **Arab103** | Expository Writing | 2 |
| **Math106** | Integral Calculus | 3 |
| **Math109** | Linear Algebra and Analytical Geometry | 3 |
| **IT125** | Database | 4 |
| **CEN126** | Computer Architecture | 3 |
| **CSC153** | Object Oriented Programming | 4 |
| | Total | 19 |

**Level-5**

| Course Code | Course Title | Credit |
| --- | --- | --- |
| **Math203** | Differential and Integral Calculus | 3 |
| **Stat224** | Introduction to Statistics & Probability | 3 |
| **CSC225** | Assembly Language | 3 |
| **CSC244** | Concepts of Algorithms | 3 |
| **CSC276** | Computer Graphics | 4 |
| **CSC283** | Discrete Structures | 4 |
| | Total | 20 |

**Level-6**

| Course Code | Course Title | Credit |
| --- | --- | --- |
| **IC102** | Islam and Construction of Society | 2 |

| | | |
|---|---|---|
| **Math207** | Differential Equations | 3 |
| **CSC214** | Data Structures | 4 |
| **IT224** | Visual Programming | 4 |
| **CSC237** | Programming Languages Concepts | 3 |
| **CSC229** | Operating Systems | 4 |
| | Total | 20 |

**Level-7**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN301** | Signals and Systems Analysis | 4 |
| **CEN333** | Microprocessors Systems | 4 |
| **CSC338** | Compiler Design | 3 |
| **CEN345** | Computer Networks | 4 |
| **CSC346** | Software Engineering | 3 |
| | Total | 18 |

**Level-8**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC103** | The Islamic Economical System | 2 |
| **CSC313** | Algorithms Analysis & Design | 3 |
| **CSC327** | Operations Research and Programming | 3 |
| | Applications | |
| **CSC357** | Internet Techniques & Web Programming | 3 |
| **CSC392** | Selected Topics in Computer Sciences | 3 |
| **CSC393** | Systems Programming | 3 |
| | Total | 17 |

**Level-9**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC104** | Fundamentals of the Islamic Political Systems | 2 |
| **CSC414** | Introduction to Unix/Lunix Systems | 3 |
| **IT463** | Knowledge Base Systems Applications | 3 |
| **CSC448** | Optimization Techniques | 3 |
| **IT481** | Communication Skills | 2 |
| **CSC498** | Graduation Project (1) | 2 |
| | Total | 15 |

**Level-10**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC445** | Introduction to Cryptography & | 3 |

| | | |
|---|---|---|
| | Information Security | |
| IT450 | Multimedia Data Management | 3 |
| CSC458 | Distributed Systems & Parallel Processing | 3 |
| CSC463 | Artificial Intelligence | 4 |
| CSC499 | Graduation Project (2) | 4 |
| | Total | 17 |

## Course Description:

**Course Code :** **CSC 152**
**Course Title :** Concepts of Algorithms and Computer Programming
**Prerequisites :** non
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level : 3
**Course description:**
Problem-solving, algorithmic design, Introduction to Programming, Structured Program Development, Program Control, Functions, Arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.
**Textbook :**
C How to program , Deitel & Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004

**Course Code:** **CEN 111**
**Course Title:** Logic Design
**Prerequisites:** non
**Credit Hours**: 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: Level:3
**Course description:**
Digital computer and information (numbering systems, Arithmetic operations, Decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, Combinational circuits simplification, CMOS circuits), Combinational logic design (design procedure, decoders, multiplexes, Binary adder and subtracter), Sequential circuits (latches, flip flops, synchronous sequential circuits analysis and design), Analysis and design of synchronous sequential machines, Representation, state reduction and realization; Finite state machines.
**Textbook:**
M. Mano, Digital Design, 3rd Ed., 2002.

**Course Code :** **IS 125**
**Course Title:** Database
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4
**Prerequisites** : CSC 152
**Course discretion**
Database definition, Database system, Overview of database management, database system architecture, Introduction to Relational databases, An Introduction to Structured Query Language(SQL), Database Integrity, Views, Normalization, Database design, Practical Applications.
**Textbook:**
"An Introduction to Database Systems", Date, 2004, Addison-Wesley.

**Course Code:** **CEN 126**
**Course Title:** Computer Architecture
**Prerequisites:** CEN 111
**Credit Hours**: 3 Lecture Hrs: 3
Lab Hrs:0 Tut. Hrs: 0 Level:4
**Course description:**
Review of logic design principles. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design. System software. Micro-programmed CPU. Comparison between CISC, RISC and VLIW processors. Introduction to memory

organization; I/O operations; Introduction to parallel processing techniques.

**Textbook:**

M. Mano, "Computer System Architecture," Prentice Hall, 2004.

**Course Code :** **CSC 153**

**Course Title :** Object Programming

**Prerequisites** : CSC152

**Credit Hours : 4** Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:4

**Course description:**

Introduction to Object-Oriented Programming, Program Control Structures, Functions, Arrays, Pointers and Strings, Classes Part I Classes and data abstraction, Classes Part II: Operator Overloading, Inheritance Virtual Functions and Polymorphism.

**Textbook**:

C How to program ,Deitel & Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004.

**Course Code :** **CSC 244**

**Course Title :** Concepts of Algorithms

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:5

**Prerequisites**: CSC 152

**Course description:**

Growth function and Recurrence, Divide-and-Conquer: (Strassen, Fibonacci, Polynomial Multiplication), Heap Sort, Quick Sort, Bubble Sort, Insertion Sort, Merge Sort, Hash Table, Binary Search Tree, Dynamic Programming, Greedy Algorithms,

**Textbook**

Introduction to Algorithms, (Second Edition) Thomas Cormen, Charles Leiserson, Ronald Rivest, and Clifford Stein. MIT Press. ISBN: 0262032937

**Course Code :** **CSC 276**

**Course Title :** Computer Graphics

**Credit Hours** : 4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:5

**Prerequisites:** CSC 153

**Course Description:**

Computer Graphics Applications Survey. **Color models** (chromaticity diagram, RGB, CMY, YIQ, HSV, and HLS color models). **Graphics Output Primitives** (coordinate frames, DDA, Bresenham’s algorithm, circle-drawing, fill-area primitives algorithms). **2D Graphics**(2D cartesian coordinates, curves and parametric equations, functions and transformations, inverse functions. **3D Graphics** (vectors in 3D, dot and cross product, homogeneous coordinates, correlation between Cartesian and homogeneous coordinates). **Geometric transformations**(2D geometric transformations, matrix representation and homogeneous coordinates, inverse transformations, 2D composite transformations).**Geometric representation** Lagrange polynomials of degree n, Hermit cubic polynomial, Bernstein polynomial, interpolation problem, Spline interpolation problem of approximation, Bezier-Bersnstein approximation, Bezier-B-Splineapproximation, quadric surfaces

**Graphics Lab**: modeling, rendering, animation using 3D Studio Max? from Autodesk?. Use of OpenGL?.

**Textbook:**

Hearn, D. and P. Baker “*Computer Graphics with OpenGL*”. Pearson Prentice Hall, Pearson Education Inc., Upper Saddle River NJ07458, USA, 2004. PIE ISBN 0-13-120238-3

**Course Code :** **CSC 283**

**Course Title :** Discrete Structures

**Credit Hours** : 4 Lecture Hrs:

Lab Hrs: 0 Tut. Hrs: Level:5

**Prerequisites:** CSC 153

**Course description:**

**Introduction to Discrete Structures**: algorithmic language. **Logic**: propositions, predicate logic, proofs, mathematical induction. **Sets**: special sets, operations, properties and identities, application of logic to knowledge-based systems. **Relations**: graphical and matrix representations, equivalence and order relations, application to databases **Functions** types, cardinality, application to functional languages **Undirected Graphs** Simple graphs, Eulerian paths, Hamiltonian circuits, trees, application to syntax diagrams **Directed Graphs** digraphs, consistent labeling, paths problems, Wars hall's algorithm, shortest paths and Dijkstra's algorithm, application to routing in computer networks. **Machines and Computations**: automata as models, finite state automata (FSA) without outputs, FSA as language recognizers and their limits, introduction to Turing Machines, application of FSA to problem-solving.

**Textbook:**

Skvarcius, R. and W.B. Robinson "Discrete Mathematics with Computer Science Applications" The Benjamin / Cummings Publishing Co., 1986.

**Course Code :** **CSC 225**

**Course Title :** Assembly Language

**Prerequisites :** CEN 126

**Credit Hours :** 3 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:5

**Course description**

Introduction to PC hardware, PC software requirements, assembly language programmers requirements, program logical and control, string operations, arithmetic operations for processing binary data , assembling linking and executing a program.

**Textbook**

Peter Abel. IBM PC Assembly Language and Programming ". 1998

**Course Code : CSC 237**

**Course Title : Programming Languages Concepts**

**Prerequisites**: CSC 283

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0

**Course description:**

Preliminaries. Evolution of the Major Programming Languages. Describing Syntax and Semantics. Lexical and Syntax Analysis. Names, Binding, Type Checking, and Scopes. Data Types. Expressions and Assignment Statements. Statement-Level Control Structure. Subprograms. Implementing Subprograms. Abstract Data Types. Support for Object-Oriented Programming. Concurrency. Exception Handling and Event Handling. Functional Programming Languages. Logic Programming Languages. Project.

**Textbook**

Robert W. Sebesta. Concepts of programming languages, 2008 Addison-Wesley.

**Course Code :** **CSC 229**

**Course Title :** Operating Systems

**Prerequisites**: CEN 126

**Credit Hours** : 4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:6

**Course description:**

Computer System Structure, Operating System Concepts, Operating System Structure, Procedures, CPU Scheduling, ProcessSynchronization,BatchFiles,RecoveryConsole,MemoryManagement,VirtualMemory,File-System Interface, Storage Structure, Data Storage on Disks, File-Systems : Fat,Fat32, NTFS, Distributed Systems ,Hardware Protection, The Linux system

**Textbook**

Abraham Silberschatz, Peter Baer, Galvin, Greg Gagne. Operating Systems concepts , Pearson Educaion, Sixth Edition.

**Course Code :** **IS 224**

**Course Title :** Visual Programming

**Prerequisites** : CSC 153

**Credit Hours** : 3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0

**Course Description:**

Selecting a Visual Language, Knowing the concepts and procedures used in Visual Languages, Syntax and semantics of the language used. Types of Data, conditional statements, recursion, data structures, modular programming, review of Object-Oriented Programming concepts and techniques, User Interface Design rules, Materializing an interface into a set of visual objects, File types, File organizing techniques, File usages, Publishing an interface on the web, Basic concepts of Human Computer Interaction, Comparison between the selected language and other visual languages.

**Textbook:**

Diane Zak, Programming with Microsoft Visual Basic .NET 2005, Publisher Course Technology, ISBN 0-619-21718-9

**COURSE CODE : CSC 214**

**Course Title :** Data Structures

**Prerequisites :** CSC 283

**Credit Hours** : 4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:6

**Course description:**

Functions in C - Structures and pointers - Memory Management functions , Concepts and Definition of abstract data type, Array as ADT, Stack and operations, Queue and operations Linked List and stack as list, Queue as list and applications, Sorting, recursion, Tree Introduction to Graphs, Projects and Exercises.

**Textbook :**

Data structures using C and C++. Second edition, YEDIDYAH LANGSAM and others Prentice Hall and others. 1996.

**Course Code: CSC346**

**Course Title:** Software Engineering**.**

**Prerequisites:** CSC 214

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:7

**Course description:**

Software Engineering Concepts, System Engineering Concepts, Software Process, Analysis Concepts and Principles, Analysis Modeling Design, Real-Time System Design, Software Testing Techniques, Technical Metrics for Software, Project

**Textbook:**

Ian Somerville, Software Engineering , Pearson Education, 7-th edition.

**Course Code : CSC 338**

**Course Title :** Compiler Design

**Prerequisites:** CSC237

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level: 7

**Course description**

The design and implementation of compilers. Compiler organization, algorithms for lexical, syntactic and semantic analysis, top-down and bottom-up parsing (e.g., recursive descent, LL, LR, LALR parsing). Symbol table organization, error detection and recovery, intermediate and object code generation, and code optimization. Student has to implement a compiler for a simple high level language as project.

**Textbook:**

A. V. Aho, R. Sethi, J. D. Ullman; *"Compilers: Principles, Techniques, and Tools";* 1986; Addison-Wesley; ISBN: 0-201-10088-6; (The dragon book).

**Course Code: CEN 333**

**Course Title:** Microprocessor Systems

**Prerequisites:** CEN 126

**Credit Hours**: 3 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level: 7

**Course description:**

Architecture and Instruction set of different 16 bit microprocessors; Microprocessor chips. **Supporting chips**: Buffers, decoders, system clock generator, reset system. Memory chips and subsystems Interfacing 16-bit Microcomputers. Architecture of Microprocessor based systems, design technique, memory and I/O devices interfacing to the microprocessor, interfacing technique. **I/O techniques**: Interrupts, Direct memory access; **System development and design tools techniques**: hardware and software.

**Textbook:**

B. Brey, " The Intel Microprocessors..", Prentice Hall, 5$^{th}$ Edition, 2000

**Course Code : CEN 301**

**Course Title:** Signals and Systems

**Prerequisites :** Math 207

**Credit Hours : 4** Lecture Hrs: 4

Lab Hrs: 0 Tut. : 0 Level:7

**Course description:**

Time-domain analysis of signals: Mathematical and graphical representation. Classifications. Basic operations. Basic signals. Sampling and aliasing. Time-domain analysis of systems: Block diagram representation. Differential and difference equation representation. Impulse and step responses. Frequency-domain analysis of signals: Spectra of continuous-time and discrete-time signals. Frequency-domain analysis of systems: Frequency response of continuous-time systems: Bode plot, SyQuest plot, feedback and its effects on system stability. Frequency response of discrete-time systems. Laplace transform and its applications. Z-transform and its applications: Relationship with Laplace. Exercises should be solved using MATLAB

**Textbook:**

A. V. Oppenheim*, Signals and Systems,* Prentice Hall, 2$^{nd}$ edition, 1997

**Course Code:** **CEN 345**

**Course Title :** Computer Networks

Prerequisites: CEN 126

Credit Hours :4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:7

**Course description:**

**Introduction to computer networks**: Network Types, Overview of data transmission, Introduction to network protocols, The Internet protocol. **Network topologies**; Network architecture and the OSI reference model; The physical and Data Link Layer , flow and errors control, ARQ Stop/wait, Sliding window protocols, **DLC standards**: HDLC , PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, Hubs, routers, Ethernet Switches; **Network Layer Services**: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.

**Textbook:**

A. Tanenbaum Computer Networks. 4rd Ed., Prentice-Hall, 2003.

**Course Code :** **CSC 392**

**Course Title:** Selected Topics for Computer science

**Credit Hours** :3 Lecture Hrs:

Lab Hrs: Tut. Hrs: 0 Level:8

**Prerequisites :**

**Course description:**

In this course, advanced topics in computer sciences are proposed, like: Java Object-Oriented programming, **Object-Oriented Software Engineering,** Application Programs, Operating Systems Design and implementation, Distributed Operating Systems, Distributed Computing, Introduction to Parallel Computing.

**Textbooks:**

The text book depends on the topic of the course.

**Course Code:** **CSC 393**

**Course Title:** Systems Programming

**Credit Hours** :3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level : 8

**Prerequisites:** CSC338

**Course description**

Study of one particular processor, assembly for this processor. Introduction to the assembly laguage of this processor. Design and implementation of an assembler (translation to machine code).

Linkers and loaders: Absolute loaders; Program relocation; Program linking; Data structures; Dynamic loading; Bootstrap loaders.

Macro processors: Data structures and logic flow for a simple one-pass macro processor; Concatenation of macro parameters; Generation of labels in macro expansions; Conditional macro expansion; Macro processing within an assembler; General-purpose macro processors. Project.

**Textbook :**

Leland Beck "An introduction to Systems programming", Addison Wesley, 1990.

**Course Code:** **CSC357**

**Course Title:** Internet Techniques web programming**.**

**Credit Hours** : 3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0 Level: 8.
**Prerequisites**: CEN 345
**Course description:**
An overview of connecting to and navigating within the Internet system and the World Wide Web: Navigation. Search Engines. Advanced search techniques. Design of web pages using HTML, XML and Java. TCP/IP. Client/Server architectures. Mastering Connectivity. Security.
**Textbook :**
Gary P. Schneider and Jessica Evans *The Internet -- 3rd Edition*, Course Technology, 2002.

**Course Code:** **CSC 327**
**Course Title:** Operations Research &Applications programming
**Credit Hours** :3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0 Level:8
**Prerequisites**: CSC 283
**Course description:**
OR Approach, Methodology And Applications : modeling, constraints, objective and criteia. Problems of multiple criteria optimization, model validation and systems design. Mathematical programming; simulation, gaming; heuristic programming. Examples,: theory of inventory. Production; linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. Theory of games for two-person competitive situations. Project management through PERT-CPM
**Textbook:**
Hamdi Taha , Operations Research: An Introduction (7th Edition), ISBN: 0130323748, 2002.

**Course Code :** **CSC 313**
**Course Title :** Algorithms Analysis and Design
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level : 8
**Prerequisites** : CSC 214
**Course description:**
Introduction to Algorithms Analysis and Design, General Algorithms: (1- Greater Common Divisor Algorithm, 2- Smaller Common Multiple Algorithm, 3- Pascal-Triangle Algorithm, 4- Inverse Number Algorithm, 5- Recursive Algorithm), Algorithms And Procedures, Algorithm Analysis: (Algorithm Efficiency, Algorithm Run-time, Algorithm Complexity, Computation Horner Algorithm Complexity Degree, Multiplication Two Polynomials Complexity Degree, Computation Using While Loop Algorithm Complexity Degree), Sorting Algorithms: (Insert Sort Algorithm, Selection Sort Algorithm, Bubble Sort Algorithm, Heap Sort Algorithm, Merge Sort Algorithm, Sort Algorithm, Files Sorting Algorithms), Searching Algorithms, Backtracking Algorithms: (8-th Queen Problem, Optimal Option Problem).
**Textbook**
Michael T.Goodrich, Roberto Tamassia , Algorithm Design: Foundations ,Analysis and Internet Examples, John Wiley & Sons Inc 0-471-38365-1, 2002.

**Course Code :** **IS 463**
**Course Title :** Knowledge base systems Application
**Prerequisites** : CS 214
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:9
**Course Description:**
Review of first-order logic, relational algebra, and relational calculus. Fundamentals of logic programming. Logic for knowledge representation. Architecture of a knowledge-base system. Fundamentals of deductive databases. Top-down and bottom-up query processing. Some important query processing strategies and their comparison. Project or term paper on current research topics.
**Textbook**
Richard A. Frost, Introduction to Knowledge Based Systems.

**Course Code :** **CSC 498**
**Course Title:** Project I

**Credit Hours : 2** Lecture Hrs:
Lab Hrs: Tut. Hrs: Level:9
**Prerequisites : 100 CH**
**Course description:**
Student will study, design and develop an integrated system, and he will be examined at the end of the semester.
**Textbooks**
Selected papers and researches related to the project topic.

**Course Code:** **IS 481**
**Course Title:** Communication skills
**Credit Hours** : Lecture Hrs: 2
Lab Hrs: 0 Tut. Hrs: 0 Level:
**Prerequisites: non**
**Course description**
This course covers written, oral, and interpersonal communication. Students will hand in short pieces of writing each week, will make oral presentations several times in the semester, and will work together in simulated project meetings and other realistic scenarios of pair and small group interaction.

**Course Code:** **CSC 448**
**Course title :** Optimization Techniques
**Perquisites:** CSC 327
**Credit Hours**: 3 Lecture Hrs 2: Lab Hours: 1
Tut. Hrs: 0
**Course description:**
Unconstrained optimization theory. Convex functions and convex sets. Algorithms for unconstrained optimization (Steepest descent Newton methods Conjugate gradient methods). Constrained optimization theory (Kuhn-Tucker conditions). Special problems: (Linear programming Quadratic Programming). Algorithms for constrained optimization.
Since this is a course on optimization *techniques* you will need to be able to program with high level programming languages (e.g C/C++, Java, C#)
**Textbook :**
Wright, S. and J. Necedah *Numerical Optimization* Springer.

**Course Code:** **CSC 414**
**Course title:** introduction to Unix and Linux
**Prerequisites: CSC 229**
**Credit Hours : 3.** Lecture Hrs:2.
Lab Hrs:2. Level:9
**Course description:**
User/kernel interface, fundamental concepts of Unix, user authentication, basic and advanced I/O, file system, signals, process relationships, and inter-process communication. Fundamental development and debugging tools such as "make" and "gdb" will also be covered.
**Textbook:**
W. Richard Stevens, Advanced Programming in the UNIX Environment, Addison Wesley Professional, 1992.

**Course Code :** **IS 491**
**Course Title : Multimedia Data Management**
**Prerequisites** : IS 224
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 1 Level : 10
**Course Description:**
Significance and value of multimedia for a variety of end uses .Multimedia data storage. Use of multimedia hardware for capture and management of sound, graphics and video. Multimedia development tools, programming, scripting and design skills. Use of multimedia authoring tools for producing multimedia applications
**Textbook:**
Boyle, T. .*Design for Multimedia Learning.* London: Prentice Hall, 1997

**Course Code :** **CSC 463**
**Course Title:** Artificial Intelligence
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level : 10
**Prerequisites**: CSC 214
**Course description**
Introduction & Definitions. Agent and examples. Uninformed Search. Heuristic Search. Constrained Search Problems CSP). Logical

agents. First Order Logic and examples Machine Learning. Project.

**Textbook**

Russell, S. J. and P. Norvig. Artificial Intelligence, A Modern Approach, Prentice Hall,2003,USA.

**Course Code :** **CSC 458**

**Course Title :** Distributed Systems and Parallel Processing

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0

**Prerequisites** : CSC 229

**Course description:**

Introduction to distributed systems, processes and processors, parallel architecture (multi-computers, multi-processors), communication in parallel systems, performance of parallel systems, examples of parallel programming, introduction to distributed systems, distributed algorithms, types of distributed systems, compatibility of distributed systems and discovery of the end of processes.

**Textbook:**

Coulouris, G., Jean Doll more, and Tim Kind berg Distributed Systems: Concepts and Design, Addison-Wesley, 3rd Edition, 2001-ISBN: 0-201-619180

**Course Code :** **CSC 499**

**Course Title:** Project II

**Credit Hours** :4 Lecture Hrs:

Lab Hrs: Tut. Hrs: Level: 10

**Prerequisites : CSC498**

**Course description:**

Student will study, design and develop an integrated system. Examination to be held at the end of the semester.

**Textbooks:**

Selected papers and researches related to the project topic.

## Second Program:

BA Degree Program: **Information technology**

**Study Plan:**

**Level 3**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC244** | Concepts of Algorithms | 3 |
| **CSC276** | Computer Graphics | 4 |
| **CSC283** | Discrete Structures | 4 |
| **IS226** | Information Systems Fundamentals | 3 |
| **MATH203** | Differential and Integral Calculus | 3 |
| **STAT224** | Introduction to Statistics & Probability | 3 |
| | Total | 20 |

**Level-4**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC214** | Data Structures | 4 |
| **CSC229** | Operating Systems | 4 |
| **CSC237** | Programming Languages Concepts | 3 |
| **IC102** | Islam and Construction of Society | 2 |
| **IS224** | Visual Programming | 4 |
| **MATH207** | Differential Equations | 3 |
| | Total | 20 |

**Level-5**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN345** | Computer Networks | 4 |
| **CSC346** | Software Engineering | 3 |
| **IS326** | Database (2) | 4 |
| **IS340** | Information Systems Analysis and Design | 3 |
| **IS344** | Design and Programming of GUI | 4 |
| | Total | 18 |

**Level-7**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC414** | Introduction to Unix and Linux Systems | 3 |
| **IC104** | Fundamentals of the Islamic Political System | 2 |
| **IS449** | Data Mining | 3 |
| **IS463** | Knowledge base Systems Application | 3 |
| **IS481** | Communication Skills | 2 |
| **IS498** | Graduation Project-1 | 2 |
| | Total | 15 |

**Level-8**

| Course Code | Course Title | Credit |
|---|---|---|
| **IS450** | Multimedia Data Management | 3 |
| **IS452** | Planning & Management of Information Resources | 3 |
| **IS465** | Decision Support Systems | 3 |
| **IS480** | Electronic Commerce Systems | 3 |
| **IS499** | Graduation Project-II | 4 |
| | Total | 16 |

## Course Description:

**Course Code :** **CSC 152**
**Course Title :** Concepts of Algorithms and Computer Programming
**Prerequisites :** non
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level : 3
**Course description:**
Problem-solving, algorithmic design, Introduction to Programming, Structured Program Development, Program Control, Functions, Arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.
**Textbook :**
C How to program ,Deitel&Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004

**Course Code:** **CEN 111**
**Course Title:** Logic Design
**Prerequisites:** non
**Credit Hours**: 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: Level:3

**Course description:**

Digital computer and information (numbering systems, Arithmetic operations, Decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, Combinational circuits simplification, CMOS circuits), Combinational logic design (design procedure, decoders, multiplexes, Binary adder and subtracted), Sequential circuits (latches, flip flops, synchronous sequential circuits analysis and design), Analysis and design of synchronous sequential machines, Representation, state reduction and realization; Finite state machines.

**Textbook:**

M. Mano, Digital Design, 3rd Ed., 2007.

**Course Code :** **IT 125**
**Course Title :** Database
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4
**Prerequisites** : CSC 152

**Course discretion:**

Database definition, Database system, Overview of database management, database system architecture, Introduction to Relational databases, An Introduction to Structured Query Language(SQL), Database Integrity, Views, Normalization, Database design, Practical Applications.

**Textbook:**

"An Introduction to Database Systems", Date, 2004, Addison-Wesley.

**Course Code:** **CEN 126**
**Course Title:** Computer Architecture
**Prerequisites:** CEN 111
**Credit Hours**: 3 Lecture Hrs: 3
Lab Hrs:0 Tut. Hrs: 0 Level:4

**Course description:**

Review of logic design principles. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design .System software .Micro-programmed CPU .Comparison between CISC, RISC and VLIW processors. Introduction to memory organization; I/O operations; Introduction to parallel processing techniques.

**Textbook:**

M. Mano, "Computer System Architecture," Prentice Hall, 2004.

**Course Code :** **CSC 153**
**Course Title :** Object Programming
**Prerequisites** : CSC152
**Credit Hours : 4** Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4

**Course description:**

Introduction to Object-Oriented Programming, Program Control Structures, Functions, Arrays, Pointers and Strings, Classes Part I Classes and data abstraction, Classes Part II :Operator Overloading, Inheritance Virtual Functions and Polymorphism.

**Textbook**:

C How to program ,Deitel&Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004.

**Course Code :** **CSC 244**
**Course Title :** Concepts of Algorithms
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:5
**Prerequisites**: CSC 152

**Course description:**

Growth function and Recurrence, Divide-and-Conquer: (Strassen, Fibonacci, Polynomial Multiplication), Heap Sort, Quick Sort, Bubble Sort, Insertion Sort, Merge Sort, Hash Table, Binary Search Tree, Dynamic Programming, Greedy Algorithms,

**Textbook**

Introduction to Algorithms, (Second Edition) Thomas Cormen, Charles Leiserson, Ronald Rivest, and Clifford Stein. MIT Press. ISBN: 0262032937

**Course Code :** **CSC 276**
**Course Title :** Computer Graphics
**Credit Hours** : 4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:5
**Prerequisites:** CSC 153
**Course description:**
Computer Graphics Applications Survey.**Color models** (chromaticity diagram, RGB, CMY, YIQ, HSV, and HLS color models).**Graphics Output Primitives** (coordinate frames, DDA, Bresenham's algorithm, circle-drawing, fill-area primitives algorithms). **2D Graphics** (2D Cartesian coordinates, curves and parametric equations, functions and transformations, inverse functions. **3D Graphics** (vectors in 3D, dot and cross product, homogeneous coordinates, correlation between cartesian and homogeneous coordinates). **Geometric transformations** (2D geometric transformations, matrix representation and homogeneous coordinates, inverse transformations, 2D composite transformations).**Geometric representation** (Lagrange polynomials of degree n, Hermite cubic polynomial, Bernstein polynomial, interpolation problem, Spline interpolation, problem of approximation, Bezier-Bersnstein approximation, Bezier-B-Spline approximation, quadric surfaces).
**Graphics Lab:** modeling, rendering, animation using 3D Studio Max from Autodesk. Use of OpenGL.
**Textbook:**
Hearn, D. and P. Baker "*Computer Graphics with OpenGL*".Pearson Prentice Hall, PearsonEducation Inc., Upper Saddle River, NJ07458, USA, 2004.PIE ISBN 0-13-120238-3.

**Course Code :** **CSC 283**
**Course Title :** Discrete Structures
**Credit Hours** : 4 Lecture Hrs:
Lab Hrs: 0 Tut. Hrs: Level:5
**Prerequisites:** CSC 153
**Course description:**
**Introduction to Discrete Structures**: algorithmic language. **Logic**: propositions, predicate logic, proofs, mathematical induction. **Sets**: special sets, operations, properties and identities, application of logic to knowledge-based systems. **Relations**: graphical and matrix representations, equivalence and order relations, application to databases. **Functions**: types, cardinality, application to functional languages. **Undirected Graphs**: Simple graphs, Eulerian paths, Hamiltonian circuits, trees, application to syntax diagrams. **Directed Graphs**: digraphs, consistent labeling, paths problems, Warshall's algorithm, shortest paths and Dijkstra's algorithm, application to routing in computer networks .**Machines and Computations**: automata as models, finite state automata (FSA) without outputs, FSA as language recognizers and their limits, introduction to Turing Machines, application of FSA to problem-solving.
**Textbook:**
Skvarcius, R. and W.B. Robinson "Discrete Mathematics with Computer Science Applications" The Benjamin / Cummings Publishing Co., 1986.
**Course Code :** **IT 226**
**Course Title :** Information Systems Fundamentals
**Prerequisites** : IT 125
**Credit Hours** :3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level: 5
**Course description:**
Definition of Information Systems ,Philosophy of IT Department, IT Courses Interrelations, Survey of information systems technology, Strategies for IT design, Strategic Role for Information and Information Systems, Organizational Structure and Information Systems, Organizational Modeling, Enterprise-wide computing and networking, Conceptual foundations, The Decision-making process, Information Systems Strategic Planning, Information system requirements, designing the information architecture of an organization, Information systems products and services, Managing of Information Systems.
**Textbook:**
O'Brien, J. A. (2003). Introduction to Information Systems (11th ed.). New York: McGraw Hill

**Course Code :** **CSC 237**

**Course Title :** Programming Languages Concepts
**Prerequisites**: CSC 283
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0
**Course description:**
To present an overview of several different paradigms of programming, To give some experience in writing programs in different languages, To introduce the concepts of syntax-directed translation, programming language semantics, parsing, and others.
**Textbook**
Robert W. Sebesta. Concepts of programming languages, 2008 Addison-Wesley.

**Course Code :** **CSC 229**
**Course Title :** Operating Systems
**Prerequisites**: CEN 126
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:6
**Course description:**
Computer System Structure ,Operating System Concepts ,Operating System Structure ,Procedures, CPU Scheduling, Process Synchronization,BatchFiles,RecoveryConsole,MemoryManagement,VirtualMemory,File-System Interface, Storage Structure, Data Storage on Disks ,File-Systems : Fat,Fat32, NTFS, Distributed Systems ,Hardware Protection ,The Linux system.
**Textbook**
Abraham Silberschatz, Peter Baer, Galvin, Greg Gagne. Operating Systems concepts , Pearson Educaion, Sixth Editio

**Course Code :** **ITS 224**
**Course Title :** Visual Programming
**Prerequisites** : CSC 153
**Credit Hours** : 3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0
**Course Description:**
Selecting a Visual Language, Knowing the concepts and procedures used in Visual Languages, Syntax and semantics of the language used. Types of Data, conditional statements, recursion, data structures, modular programming, review of Object-Oriented Programming concepts and techniques, User Interface Design rules, Materializing an interface into a set of visual objects, File types, File organizing techniques, File usages, Publishing an interface on the web, Basic concepts of Human Computer Interaction, Comparison between the selected language and other visual languages.
**Textbook:**
Diane Zak, Programming with Microsoft Visual Basic .NET 2005, Publisher Course Technology, ISBN 0-619-21718-9

**Course Code :** **CSC 214**
**Course Title :** Data Structures
**Prerequisites :** CSC 283
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:6
**Course description:**
Functions in C - Structures and pointers - Memory Management functions , Concepts and Definition of abstract data type, Array as ADT, Stack and operations, Queue and operations Linked List and stack as list, Queue as list and applications, Sorting, recursion, Tree Introduction to Graphs, Projects and Exercises.
**Textbook :**
Data structures using C and C++. Second edition, YEDIDYAH LANGSAM and others Prentice Hall and others. 1996.

**Course Code :** **IT 326**
**Course Title :** Database (2)
**Prerequisites** : IT 125
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 1 Level : 7
**Course Description:**
DBMS architecture and administration; Centralized and Client-Server approaches, System Catalog, Data Dictionary. Transaction management; Transactions: concepts, characteristics. Recovery techniques, Concurrency control techniques: Serializability, Deadlock, Locking schemes, Time-stamp ordering, Multi-version, Optimistic techniques;

DB security; Distributed databases; Distributed DBMS, Data fragmentation and replication, Distributed transactions management. Object-Oriented databases. Introducing to new emerging DB technologies and applications; Web DBs, Multimedia DBs, Data Warehousing and Data Mining

**Textbook:**

Principles of Distributed Database Systems, Ozsu, M. Tamer And Valduriez, Patrick

**Course Code:** **CSC346**

**Course Title:** Software Engineering.

**Prerequisites:** CSC 214

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:7

**Course description:**

Software Engineering Concepts, System Engineering Concepts, Software Process, Analysis Concepts and Principles, Analysis Modeling Design, Real-Time System Design, Software Testing Techniques,Technical Metrics for Software, Project.

**Textbook:**

Ian Somerville, Software Engineering , Pearson Education, 7-th edition.

**Course Code :** **IT 340**

**Course Title :** Information Systems Analysis and Design

**Prerequisites** : IT 226.

**Credit Hours** : 3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0 Level:7

**Course Description:**

fundamental knowledge, methods and skills needed to analyze, design and implement computer-based systems. The role of the systems analyst and the techniques employed. Utilizing the structured software development life cycle approach, the development phases are comprehensively discussed and reviewed.The Modeling Techniques: Process Modeling (DFDs), Data Modeling (ERDs), Architectural System Design Modeling, Unified Modeling language forms and Object-Oriented Modeling. The Course includes an integrated project that covers the whole system analysis and design phases, which the students will fulfill on a groub base manner. The Course also emphasizes on developing and improving the skills of interrelating, documenting, and modeling for the students.

**Textbook:**

Modern System Analysis & Design, 3rd Edition, 2002, J. A. Hoffer, J. F. George, J. S. Valacich, ISBN 0130339903

**Course Code :** **IT 344**

**Course Title :** Design and programming of GUI

**Prerequisites** : IT 224

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:7

**Course Description:**

Fundamentals of programming and designing of business applications using Visual programming, Common controls and construction of menus in Visual programming, Concepts and applications of data structures and design of graphical user interfaces, adding Database access and Internet access to Visual programming programs.

**Textbook:**

Philip A. Koneman, Visual Basic.NET Programming for Business, Pearson Education, Prentice-Hall

**Course Code:** **CEN 345**

**Course Title :** Computer Networks

**Prerequisites:** CEN 126

**Credit Hours :**4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:7

**Course description:**

**Introduction to computer networks**: Network Types, Overview of data transmission, Introduction to network protocols, The Internet protocol. **Network topologies**; Network architecture and the OSI reference model; The physical and Data Link Layer , flow and errors control, ARQ Stop/wait, Sliding window protocols, **DLC standards**: HDLC , PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, Hubs, routers, Ethernet Switches; **Network Layer Services**: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.

**Textbook:**

A. Tanenbaum Computer Networks.4rd Ed., Prentice-Hall, 2003.

**Course Code : IT 324**

**Course Title :** Modern Concepts of Application Programming

**Prerequisites** : IT 224

**Credit Hours** : 4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:8

**Course description:**

Modern programming Concepts and how to be used to build real world applications needed by Society Organizations. Understanding a problem and analyzing it, sketching a solution, implementing the solution, documenting it and finally presenting the work in a professional manner. Projects tobe selected in the domain of modern applications, e.g: Health Information Systems, E-Commerce applications, Academic field, … .

This course, however, is intended to develop the talents of students and to encourage the spirit of competition, creation, goodness of work, and prettiness of exposition This course includes 2 or 3 large programming projects per semester.

**Textbook**

To be determined according to the chosen projects.

**Course Code : IT 342**

**Course Title :** Information Systems Engineering

**Prerequisites** : IT 340

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:8

**Course description:**

Application systems implementation, functional testing, user acceptance testing, and installation strategies .The processes of maintaining information systems, types of maintenance, measuring and controlling of maintenance effectiveness.

Software quality assurance, quality concepts, the ISO quality factors, technical metrics for software and examples of function-based, specification quality, testing metrics. Technical metrics for object-oriented systems. Information Systems Development Methodologies. Requirements Gathering Engineering. Software Copying Management.

**Textbook:**

Kees M. van Hee, Information Systems Engineering, A Formal Approach, (ISBN-13: 9780521455145 | ISBN-10: 0521455146)

**Course Code : IT 392**

**Course Title :** Selected Topics in Information Systems

**Prerequisites** :80CH.

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:8

**Course Description:**

Special topics of current trends in information systems. Engineering Tools and Methods, Simulation, Virtual Reality, Internet Security, Data Warehousing and Mining, Geographic Information Systems, Telemedicine and Medical Informatics, Workflow Management, Quantitative and Qualitative Methods in Information Systems, Global Information Systems Management, Intelligent Agent Technology and Applications, Human Computer Interaction, Computer-Based Learning and Training, Philosophical Foundations of Information Systems, Absorbing Continuous IT Developments in Organizations, IT Professional and Organizational Needs, Organizational Learning and Collaborative Technologies, Understanding and Managing Information Users Behavior, Policy, Legal and Security Issues in IT , and Virtual Organizations.

**Course Code: CSC 357**

**Course Title:** Internet Techniques web programming**.**

**Credit Hours** : 3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0 Level: 8.
**Prerequisites**: CEN 345
**Course description:**
An overview of connecting to and navigating within the Internet system and the World Wide Web: Navigation. Search Engines. Advanced search techniques. Design of web pages using HTML, XML and Java.TCP/IP.Client/Server architectures. Mastering Connectivity. Security.
**Textbook :**
Gary P. Schneider and Jessica Evans*The Internet -- 3rd Edition*, Course Technology, 2002.

**Course Code:** **CSC 327**
**Course Title:** Operations Research &Applications programming
**Credit Hours** :3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0 Level:8
**Prerequisites**: CSC 283
**Course description:**
OR Approach, Methodology And Applications : modeling, constraints, objective and criteria. Problems of multiple criteria optimization, model validation and systems design.Mathematical programming; simulation, gaming; heuristic programming. Examples,: theory of inventory. Production; linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. Theory of games for two-person competitive situations. Project management through PERT-CPM
**Textbook:**
HamdiTaha, Operations Research: An Introduction (7th Edition), ISBN: 0130323748, 2002.

**Course Code :** **IT 449**
**Course Title :** Data Mining
**Prerequisites** : IT 326.
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:9
**Course description:**
Principles, algorithms and applications of data mining, including algorithms, methods, implementations and applications of mining sequential and structured data, text data, Web data, spatiotemporal data, biomedical data and other forms of complex data.
**Textbook:**
Jiawei Han and MichelineKamber*"**Data Mining**: Concepts and Techniques*" 2nd ed., Morgan Kaufmann, 2006

**Course Code:** **IT 481**
**Course Title:** Communication skills
**Credit Hours** :2 Lecture Hrs: 2
Lab Hrs: 0 Tut. Hrs: 0 Level: 9
**Prerequisites: non**
**Course description**
This course covers written, oral, and interpersonal communication. Students will hand in short pieces of writing each week, will make oral presentations several times in the semester, and will work together in simulated project meetings and other realistic scenarios of pair and small group interaction.

**Course Code :** **IT 463**
**Course Title :** Knowledge base systems Application
**Prerequisites** : CSC 214
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:9
**Course Description:**
Review of first-order logic, relational algebra, and relational calculus. Fundamentals of logic programming .Logic for knowledge representation .Architecture of a knowledge-base system .Fundamentals of deductive databases. Top-down and bottom-up query processing. Some important query processing strategies and their comparison .Project or term paper on current research topics.
**Textbook**
Richard A. Frost, Introduction to Knowledge Based Systems.

**Course Code :** **CSC 414**
**Course title:** introduction to Unix and Linux
**Prerequisites: CSC 229**

**Credit Hours** : 3. Lecture Hrs:2.
Lab Hrs:2. Level:9

**Course description:**

User/kernel interface, fundamental concepts of Unix, user authentication, basic and advanced I/O, file system, signals, process relationships, and inter-process communication. Fundamental development and debugging tools such as "make" and "gdb" will also be covered.

**Textbook:**

W. Richard Stevens, Advanced Programming in the UNIX Environment, Addison Wesley Professional, 1992.

**Course Code :** **IT 498**
**Course Title :** Graduation Project-1
**Prerequisites** : 100 CH.
**Credit Hours** : 2.
Level:9

**Course Description:**

The previous courses have provided the IT students with strong and sufficient knowledge to develop information systems. The next logical stage is that the IT student must acquire hands-on experiences on developing real world information systems. In addition, the students should be familiarized with real world problems encounter during the development of real world information systems. Furthermore, the students should be trained to work in teams. In this course, the students will be organized into groups. The number of students in each group should not exceed three students. For each group, a supervisor will be allocated to guide the group in developing a particular information system. In developing an information system, a particular information system development methodology should be used. Each group will develop a real world information system in two stages: The first stage will be carried out in IT 498 and the second stage will be carried out in IT 499. In IT 498, the students of each group must identify a problem domain, define a problem, identify the requirements in details, specify requirements in details, analyze and document the current system, proposed alternative systems, and design a particular system in details which includes the definitions of all the required system models such as the data model and the functional model. At the end of the course, each group must submit a formal report documenting the problem domain, the requirements, specifications, and the system models.

**Course Code :** **IT 450**
**Course Title :** Multimedia Data Management
**Prerequisites** : IT 224
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 1 Level : 10

**Course Description:**

Significance and value of multimedia for a variety of end uses .Multimedia data storage. Use of multimedia hardware for capture and management of sound, graphics and video. Multimedia development tools, programming, scripting and design skills. Use of multimedia authoring tools for producing multimedia applications.

**Textbook:**

Boyle, T. .*Design for Multimedia Learning*. London: Prentice Hall, 1997.

**Course Code :** **IT 452**
**Course Title :** Planning & Management of Information Resources
**Prerequisites** : IT 342
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level: 10

**Course Description:**

Definition of Information Resources and IT Infrastructure, Information Strategy Planning Components (Business Planning, Systems Planning, technical Planning). Strategic Planning Steps, used tools, managing the Feedback, Developing strategic Objectives and Rules. Organizing, Managing, and Developing of Information Resources for the Information Systems Departments, Cost Analysis, Outsourcing Management, IT Contingency Planning and Resources Safety. Human Factors and Performance Measurements. Security issues, Internal auditing, Standards and procedures of the Information Center, Continuous Improvement of IT Resources. Standards of Computer Networks, Planning of Networks, Business Requirements to Construct Networks, Requirements Analysis, Design of Networks, Choosing Network Technologies, Managing Networks, Measuring and continuous Evaluation of Network Performance, Network Maintenance and Development, Economical and Legal Issues of Managing Networks, Network effects on the performance and Productivity of the Organization, Computer Networks and the Organization, Network Management Tools.

**Textbook:**

**Course Code :** **IT 465**
**Course Title :** Decision Support Systems
**Prerequisites** : IT 326
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 level:10

**Course description:**

Decision-making process, systems modeling and support .Categorization of problem-solving techniques .Data management and concepts of the data warehousing .**Modeling of managerial problems**; linear programming models, simulation models, heuristics and forecasting models. Model-base management systems. DSS user interface design and management. Decision support system construction methods.DSS Hardware, software, and technology Levels. Knowledge-based and expert systems, expert system architecture; representation of knowledge; forward and backward chaining; inferences making process; Applications of expert systems in decision making Group, distributed, and executive decision support systems.

**Textbook:**

Turban, E. & Aronson J. E., Decision Support Systems & Intelligent Systems, Seventh Edition. Upper Saddle River, NJ: Prentice Hall. ISBN: 0-13-046106-7

**Course Code :** **IT 480**
**Course Title :** Electronic Commerce Systems
**Prerequisites** : IT 340
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:10

**Course description:**

Strategic planning for EC adoption; Business design and architecture for EC applications; Web-based marketing strategies and models; E-Commerce Project Management; Public Policy and Legal Issues of Privacy; Socio-Technical Infrastructure for E-Commerce; Risk Management in E-Commerce Initiatives; E-Transformation; Measuring Effectiveness of E-Commerce Projects; EC and organizational change management; EC and competitiveness; Success and failure in EC implementation; Retailing in E-Commerce; E-Commerce in Banking; Advertisement in E-Commerce; E-Commerce and Online Publishing; E-Commerce in Manufacturing; E-Commerce and Supply Chain Management; E-Commerce and Customer Asset Management; Electronic Payment Systems; Mobile E-Commerce; Modern trends in developing E-commerce systems.

**Textbook:**

Daniel Amor. (1999). *The E-business (R)evoltion: Living and Working in an Interconnected World*. Upper Saddle River, NJ: Prentice Hall.

**Course Code :** **IT 499**
**Course Title :** Graduation Project-II
**Prerequisites** : IT 498
**Credit Hours** : 4

**Course description:**

In this course, each group will continue developing the information systems that started in IT 498. Each group must use a particular tool to implement its information system in a good programming practice. This implementation tool must be new and the students have not been experienced in the previous courses. Furthermore, the students must generate a user manual for their information system in an appropriate format. At the end of the term, each group must submit a final report, which documents completely the information system from the problem definition phase to the test and implementation phase and contains a user manual for the information system.

## Program: Mathematics

**Study plan:**

**The first and second level is the nature science preparation**

**Level 3**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration(2)** | Math.202 | 4 |
| **Principal of Probability Distribution Theorem** | Stat212 | 4 |
| **Basics of Mathematics** | Math.231 | 3 |
| **Introduction to Geometry** | Math.273 | 3 |

**Level 4**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration in many variables** | Math.203 | 4 |
| **Mathematical applications on computers** | Math.251 | 2 |
| **Vectors** | Math.204 | 3 |
| **Linear algebra** | Math.242 | 4 |
| **Theory of numbers** | Math.243 | 3 |

**Level 5**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Linear Programming** | Math.213 | 4 |
| **History of Mathematics** | Math.232 | 3 |
| **Introduction to Differential Equations** | Math.321 | 4 |
| **Numerical analysis** | Math.351 | 4 |

**Level 6**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Mathematical Methods** | Math.326 | 4 |
| **Group Theory** | Math.343 | 4 |
| **Real Analysis (1)** | Math.382 | 4 |

**Level 7**

| Course name | Course code & number | Studying Hours |
|---|---|---|

| | | |
|---|---|---|
| **Rings and Fields** | Math.444 | 4 |
| **Introduction to Topology** | Math.471 | 4 |
| **Real Analysis (2)** | Math.483 | 4 |
| **Project** | Math.499 | 4 |

**Level 8**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Introduction to Partial Differential Equations** | Math.422 | 4 |
| **Introduction to Differential Geometry** | Math.472 | 4 |
| **Complex Analysis** | Math.484 | 4 |

## COURSE DESCRIPTION:

**Level 3**

**Math .202 Differentiation & Integration(2) :** This course aims at giving students definite integral and its properties , mean value theorem of integral and the fundamental theorem of calculus. It also discusses indefinite integral , standard integrals, derivatives & integrals of hyperbolic and inverse hyperbolic functions, integration methods such as: integration by substitution , integration by parts , integration by partial fractions and other substitutions. Also L'Hospitals Rule , evaluation of area and volume of revolution, arc length, Numerical integration (Trapezoidal rule), Polar coordinates, Polar curves graphs and areas using polar coordinates.

**Stat212 Principal of probability distribution theorem:**
This course discusses the discrete and continuous probability distributions (The mass and density probability functions and their properties, expectation, variance, standard deviation and the moment generating functions) . The discrete and continuous bi variety random variables and their properties (expectation, covariance, correlation coefficient, variance of sum or difference of two random variables and the moment generating
functions of bi variety random variables) . Bi variety distributions (marginal and conditional distributions ,independence of random variables , conditional expectation) .Also distribution functions of random vectors and random samples (distribution of sample mean – law of large number – central limit theorem) are discussed.

**Math.231 Basics of mathematics :**
This course aims at introducing mathematical logic, methods of proofs, mathematical induction, set theory, the product of sets, binary operations, equivalence relations , equivalence classes and partitions ,
mappings , the images and inverse images of sets under mappings , equivalence sets, countable and finite sets. Binary operations, morphisms, definition and examples of groups- definition and examples of rings and fields, polynomials and partial fractions.

**Math.273 Introduction to geometry:**
This course provides students with the main concepts of plane Euclidean geometry such as: coordinates, transformation, reflections ,translation, isometrics and similarity. Theorems on triangles, circles, tangents and angles. Polygons, polyhedral, regular polyhedral, their

classification, and properties. Spherical geometry such as: sum of angle formula for spherical triangles, projection, conservative functions. Affine geometry : linear and affine transformation, isometrics, finite affine planes.

**Level 4**

**Math.203 Differentiation & integration in many variables:**This course studies the functions in two or more variables, domain of the function, three dimension rectangular coordinates, limits, continuity, partial derivative, higher-order partial derivatives, differentiation of composed function, maxima and minima-method of Lagrange multipliers for maxima and minima. Double integrals in Cartesian and polar coordinates , triple integrals in spherical and cylindrical coordinates,

infinite series, convergence tests, representations of functions by power series, Taylor , Maclaurin, and the binomial series.

**Math.251 Mathematical applications on computers**

This course provides an introduction to mathematics software as Mathematica, Mat lap and solving some problems in calculus and linear

algebra by mathematica and Mat lap. Applications: modeling , simulation and visualization , internet research . Writing mathematical reports and projects using scientific work place.

**Math.204 Vectors:**

Students studies vectors in two and three dimensions, scalar and vector products, equations of lines and planes in 3-dimensional space. Surfaces of revolution and their equations in cylindrical and spherical Coordinates. Vector valued functions of a real variable, curves in space, curvature, rates of change in tangent and normal directions, directional derivatives and gradient of a function. Application to equations of normal and tangent space to a surface at a point. Vector fields, divergence, curl of a vector, line and surface integrals, Green's theorem, Gauss' divergence theorem and Stock's theorem.

**Math.242 Linear algebra**

This course studies matrices and their operations, types of matrices, elementary transformations, determinants, elementary properties of determinants, inverse of a matrix, rank of matrix, linear systems of

equations, vector spaces, linear independence , finite dimensional spaces , linear subspaces, inner product spaces, linear mappings, Kernel and image of a linear mapping- Eigen values and Eigen vectors of a matrix and of a linear operator mapping.

**Math.243 Theory of numbers:**

Students study the first and second principle of mathematical induction, well-ordering principle , divisibility, Euclidean algorithm, prime numbers and their properties, linear Diophantine equations, congruencies and their properties, linear congruencies- the Chinese remainder theorem, Fermat's

little theorem, Euler's theorem, Wilson's theorem, arithmetic functions and Pythagorean triples.

**Level 5**

**Math. 213 Linear programming:**

This course gives introduction to operations research, mathematical model for some real problems and mathematical formulation of linear programming problem. Graphical method for solving linear programming problems, convex sets, polygons, extreme point and optimality theorem. Analytical method (Simplex method) , big-M method , Two-phase method, formulation mistakes, dual problem, sensitivity

analysis, application to transportation and network problems.

**Math.232 History of mathematics:**

This course aims at giving students some knowledge about the evolution of some mathematical concepts ,facts and algorithms in arithmetic , algebra, trigonometry ,Euclidean geometry, analytic geometry and calculus through early civilizations such as ancient Egyptian , Babylonians, Greeks, Indians, Chinese, Muslims and Europeans . Evolution of solutions of some conjectures and open problems.

**Math.321 Introduction to differential equations**:

This course gives basic definitions and construction of an ordinary differential equation. Methods of solving ordinary differential equations of first order . Orthogonal trajectories, ordinary differential equations of high orders with constant coefficients and with variable coefficients, types of solutions, linear systems of ordinary differential equations, series solutions of a linear ordinary differential equation of second

order with polynomial coefficient and Laplace transform.

**Math. 351 Numerical analysis:**

Students study numerical methods for solving nonlinear equations (bisection – iteration – Newton – false position … ), errors and rates of convergence. Direct methods for solving linear systems (Gauss

elimination, LU decomposition) and iterative methods (Jacobi –Gauss Seidel – Relaxation). Errors iteration matrices and convergence of iterative methods, polynomial interpolation (Lagrange-
Newton's methods: divided differences- forward and backward differences) and analysis of errors. Numerical differentiation and integration, errors and accuracy. Gaussian integration formulas.

**Level 6**

**Math.326 Mathematical Methods :**

This course discusses series solutions of ordinary differential equations with variable coefficients, inner product space of functions, self- ad joint operator, Sturm-Lowville theory, orthogonal polynomials and special

functions( Legendre, Hermit, gamma, beta, Bessel). Generalized theory of Fourier series and Fourier integrals.

**Math.343 Group Theory:**

This course studies the axioms of group theory and some examples of groups. Subgroups, cyclic groups, Lagrange theorem, normal subgroup, factor group, homomorphism, fundamental theorems of isomorphism, auto morphisms, Caley theorem and its generalization, simple groups, permutation groups, class equation, group action on a set, p-groups, Cauchy theorem- Sylow's theorems, external and internal direct product of group, Burnside theorem, dihedral- quaternion, groups of

auto morphisms on finite and infinite cyclic groups.

**Math.382 Real Analysis (1):**

This course introduces basic properties of the field of real numbers , completeness axiom , series and their convergence ,

monotone sequence , Bolzano-Weirstrass theorem , Cauchy criterion, basic topological properties of the real numbers, limit of a function , continuous functions and their properties . Uniform continuity , compact sets and its properties. The derivative of a function ,mean value theorem and Lupital rule and Taylor theorem.

**Level 7**

**Math.444 Ring and Fields:**

Students study rings, group of units, group of auto morphisms of a ring , ideals and factor rings and principal ring. They also study prime and maximal ideals, field of quotient of integral domain, characteristic of a ring, direct sum of rings, modules, Euclidean rings, ring of polynomials, roots of polynomials over a field, fields extensions, finite and simple extensions of fields, algebraic closure of a field, splitting fields and finite fields.

**Math.471 Introduction to Topology:**

This course introduces topological spaces, examples, closure of a set, derived set, topological subspaces, bases ,finite product topology, sub-bases, metric spaces , examples, metrizability, continuous functions , characterization of continuous functions on topological and metric spaces, homeomorphisms and examples. Topological property, compact spaces, examples , limit point and sequentially compact spaces.

**Math.483 Real Analysis (2):**

This course studies definition of Riemann integral, Darboux theorem , Riemann sums , properties and the principle theorem in calculus. Series of functions, point twice convergence , uniform convergence, algebra
and σ – algebra (sigma algebra), finite additivity and countable additivity, main extension theorem and outer measure. Measurable sets , measure , Lebesgue measure and its properties, simple functions, measurable functions, Lebesgue integral, theorems of convergence, the relation between Lebesgue and Riemann integral.

**Math.499 Project:**

A student prepares a research project in one of the Math. topics under the supervision of the staff.
The student should submit a report for an oral exam.

**Level 8**

**Math.422 Introduction to partial differential equations:**

This course discusses classification and formation of partial differential equation , first order linear partial differential equation , solution
using Lagrange's method , Cauchy problem , second order linear partial differential equation in several variables , physical application using separation of variables , classifications of partial differential equation , some boundary value problems and Green's function.

**Math.472 Introduction to differential geometry:**

This course discusses theory of curves in $R^3$, regular curves , arc length and reparameterization , natural parameterization, Serret-Frenet apparatus, existence and uniqueness theorem for space curves, Bertrand curves. Involutes and evolutes, local theory of surfaces, simple surfaces, coordinate transformations, tangent vectors & tangent spaces . First and second fundamental forms, normal and geodesic curvature , Weingarten map, principal Gaussian and mean curvatures, geodesics, equations of Gauss and Godazzi-Mainardi.

**Math.484 Complex Analysis:**

This course discusses complex numbers, Cartesian and polar representation of complex numbers, powers and roots of complex numbers, limits and continuity of complex functions, analytic functions , Cauchy-Riemann

equations. Harmonic functions, exponential, trigonometric , hyperbolic functions and logarithmic functions. Complex integration, contour integral , Cauchy's theorem, Cauchy's integral
Formula, bounds on analytic functions ,Taylor and Laurent series, power series, zeros and singularities. Residue theory and applications to real and improper integrals.

## BA Degree Program : Physics

The first year for these program is the preparatory year of natural Science

**Level 1**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 101** | Language Skills | 2 | - |
| **CHEM101** | General Chemistry (1) | 4 | - |
| **ENG101** | English Language | 3 | - |
| **IC101** | Introduction to Islamic Culture | 2 | - |
| **MATH101** | Calculus (1) | 4 | - |
| **PSY101** | Thinking Skills | 2 | - |
| **Total** | 17 | | |

**Level 2**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 103** | Arabic Editing | 2 | - |
| **CSC101** | Introduction to Computers and Programming | 3 | - |
| **ENG103** | English Language (2) | 3 | ENG101 |
| **IC102** | Islamic and Society Building | 2 | IC101 |
| **PHYS101** | General Physics (1) | 4 | - |
| **STAT101** | Statistical Probability | 3 | - |
| **Total** | 17 | | |

**Level 3**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC103** | Economic System in Islam | 2 | IC101 |
| **MATH201** | Calculus for Science (2) | 3 | MATH101 |
| **PHYS243** | General Physics (2) | 4 | PHYS101 |
| **PHYS211** | Classical Mechanics (1) | 3 | MATH101 PHYS101 |
| **PHYS231** | Vibrations and Waves | 2 | MATH101 PHYS101 |
| **PHYS243** | Thermodynamics | 3 | PHYS101 |
| **Total** | 17 | | |

**Level 4**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **MATH20** | Calculus for | 3 | MATH20 |

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| | | | |
|---|---|---|---|
| 5 | Physics (3) | | 1 |
| **PHYS232** | Physical Optics | 3 | Phys231 |
| **PHYS234** | Health Physics | 2 | - |
| **PHYS203** | Mathematical Physics (1) | 3 | MATH20 1 |
| **PHYS212** | Classical Mechanics (2) | 3 | PHYS211 |
| **PHYS221** | Electromagnetis m (1) | 3 | PHYS202 |
| **Total** | 17 | | |

**Level 5**

| Course Code | Course Title | Credi t | Pre-Course |
|---|---|---|---|
| **BUS103** | Communication Skills | 2 | - |
| **MATH21 0** | Differential Equations | 3 | MATH20 5 |
| **PHYS302** | Mathematical Physics (2) | 3 | PHYS203 |
| **PHYS321** | Electromagnetis m (2) | 3 | PHYS212 |
| **PHYS351** | Modern Physics | 3 | PHYS232 |
| **PHYS393** | Optics Physics | 3 | PHYS232 |
| **BIO314** | Healthy Culture | 2 | - |
| **Total** | 18 | | |

**Level 6**

| Course Code | Course Title | Credi t | Pre-Course |
|---|---|---|---|
| **IC104** | Political System in Islam | 2 | IC101 |
| **PHYS303** | Mathematical Physics (3) | 3 | PHYS30 |
| **PHYS350** | Quantum Mechanics (1) | 3 | PHYS21 2<br>PHYS35 1 |
| **PHYS391** | Electromagnetis m Lab | 2 | PHYS22 1 |
| **PHYS393** | Modern Physics Lab | 2 | PHYS35 1 |
| **PHYS342** | Statistical Physics | 3 | PHYS24 3 |
| **PQUR12 6** | Islamic Morals | 2 | |
| **Total** | 17 | | |

**Level 7**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS422** | Electronics | 4 | PHYS243 |
| **PHYS452** | Quantum Mechanics (2) | 3 | PHYS350 |
| **PHYS471** | Solid State Physics (1) | 3 | PHYS350 |
| **PHYS481** | Nuclear Physics (1) | 3 | PHYS351 |
| | Selective Course (Faculty) | 2 | - |
| **Total** | 16 | | |

**Level 8**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS455** | Molecular and Atomic Spectra | 3 | PHYS452 |

| | | | |
|---|---|---|---|
| **PHYS495** | Solid State Lab | 2 | PHYS471 |
| **PHYS497** | Nuclear Physics Lab | 2 | PHYS481 |
| **PHYS498** | Project | 2 | PHYS497 PHYS495 |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course | 2 | - |
| **Total** | 17 | | |

## Course Description:

**CHEM 10 : General Chemistry**

Theoretical part : Chemical calculations, gasea, liquid state, thermochemistry, solutions, chemical kinetics, chemical and ionic equilibria Bohr Theory and electronic configuration of atoms and periodic table . An Introduction to types of chemical bonds .

Practical part : some experiments on properties of matter : density , viscosity, qualitative analysis : identification of acidic and basic radicals for inorganic salts .

**Course Number : CSC 101 Introductions to Computer and Programming**

Credit Hours ( lecture and Lab ) : 3 (2+ 1) Level : Second

Theoretical parts : Introduction to programming , structured program development, program control, functions, array. Assignments in algorithm design and translation of algorithms in high level language like C language

Practical part: Excercices on the theoretical part.

**Course Number :** ENG **101 - English Language**

The course aims to introduce students to :

An awareness of the basics of the English language in general .

An understanding of the basics of English grammar .

The basics of English pronunciation.

Specialized academic topics in the students, respective disciplines.

Proposed Teaching Methods

The course will be conducted via lectures in the main seminar, workshops and group discussions will also be used .

**Course Number : Math 101 - Calculus -1**

Real number and real line – Inequality. Function – The graph of a function- even and odd functions- composite of functions- Review of Trigonometric functions – inverse functions- Limits – The definition of a limit – Properties of Limits- Techniques for Evaluaring Limits – Infinites Limits. Continuity at a point on an open interval - one sided limits and continuity on a closed interval – Properties of continuity . The Derivative of a function – Differentiability and continuity – chain Rule – Derivatives of Trigonometric function – Logarithmic and Exponential functios ( Differentiation ) - Hyperbolic functions – inverse Trigonometric functions Differentiation . Externa on an interval- Rolle,s Theorem and mean value theorem – Increasing and Decreasing functions and the first derivative test – concavity and second derivative test- related rates .

**PHYS 101 General Physics (1) (3 + 1) h.**

<u>Theoretical part:</u> Physics and measurements, Units and dimensions, Dynamics of particle in one dimension (displacement, average velocity, instantaneous velocity, acceleration, free fall), vector algebra and geometry, Motion in two dimensions, Projectile motion, Uniform circular motion, Tangential and radial accelerations,

Newton's first law and inertial frames, Mass and weight, Newton's second law, Newton's third law, Friction, Work and energy, Vector scalar products, Work of variable forces, Kinetic energy and work-energy theorem, Conservative and non-conservative forces and potential energy, Power, Conservation of mechanical energy, The conservation law of linear momentum, Impulse, Collisions, Collision in one and two dimensions, Rotational motion with constant angular acceleration, Angular quantities, Moment of inertia, Torque and angular momentum, Work of rotational motion, Properties of matter: Elasticity, Stress, Strain, Modulus's, Strain energy, Fluid mechanics: Density and relative density, the concept of pressure, Pascal law, Archimedes principle, Fluid flow, Bernoulli's equation and its applications. State of matters, heat and Temperature and zero law of thermodynamics, Phase transitions, Latent heats, Ideal gases.

Practical part: Error and measurements, Force table, Hook's Law, Free fall, Projectile motion, Boyle's Law, Young's Modulus, Specific Heat of a Solid, Coefficient of Thermal expansion, Surface tension in capillary tube, viscosity, Newton's law of cooling, Determination of the Paraffin wax fusion temperature.

**PHYS 202 General Physics (2) (3 + 1) h.**

Theoretical part: Electric Charge, Insulators and conductors, Coulomb's law, Point charge, The electric field, Electric field of multiple point charges, The electric field of continuous charge distribution, examples of various shapes (disks, rings, spheres, planes), The parallel plate capacitor, Electric dipole, motion of point charge and electric dipole in electric field, Electric flux, Gauss's law, Applications of Gauss's law, Conductor in electrostatic equilibrium, Electric potential, The potential of point charges, The potential of dipole, The electric potential of many charges, Capacitance and capacitors, Energy stored in a capacitor, Fundamental circuits, The electric current, Batteries, current density, Conductivity and resistivity, Ohm's law, Series resistors, Parallel resistors, Kirchhoff's laws, RC circuits, Magnetism and magnetic force, source of magnetic fields, Magnetic field of a current, Magnetic dipoles, Ampere's law and solenoids, The magnetic force on a moving charge, The magnetic force on a current-carrying wire, Forces and torques on current loops, Induced current, Motional emf, Magnetic flux, Lenz's law, Faraday's law, Induced fields and EM waves, Inductors, LC circuits, LR circuits, AC circuits and phase, Capacitors in AC circuits, RC filter circuits, Inductor circuits, The RLC circuits, Power in AC circuits, Wave phenomena, geometrical optics, speed of light, Longitudinal and transverse waves, Sound, The nature of light and the laws of geometric optics, reflection and refraction, Fermat's principle, Snell's law, Image formation.

Practical part: Verification of Ohm's Law, Metric bridge, Charge and discharge of capacitors, Inductive Reactance, Capacitive Reactance, RCL circuits, Transformers, Speed of sound in air , Refractive Index of a Prism, Focal length of Lenses, Focal Length of Mirrors.

**PHYS 211 Classical Mechanics (1) (3 + 0) h.**

Space time, Review of Newton's law and conservation of linear momentum in Cartesian and polar coordinate system, applications on projectile motion in a linear air resistance medium, Quadratic air resistance. Motion of charges in a uniform magnetic field, The center of mass, angular momentum of several particles, Kinetic energy and work, Potential energy and conservative forces, Gradient relation, Time dependent potential energy, Energy for one dimensional linear system, Curvilinear one-dimensional systems, Central forces, The energy of interaction of two particles, The energy of multi-particle systems, CM and relative coordinates, The equation of the orbit, Kepler orbits, The unbound Kepler orbits, Change of orbits, Mechanics in non inertial frames, The tides, Rotating frames and angular velocity vector. Newton's second law in rotating frame,

The centrifugal force, Coriolis force, Coriolis force and
free fall, The Foucault pendulum, Coriolis acceleration.

**PHYS 231 Vibration and Waves (2 +0) h.**

Periodic motion, Simple harmonic oscillation, Damped oscillation, Forced oscillation, Application of damped and forced oscillations, Superposition of simple harmonic oscillations, traveling waves, standing, Beats, Transverse wave in wires, Longitudinal wave in rods, Application of longitudinal wave in open and closed air columns, Fourier analysis, Doppler effect.

**PHYS 243 Thermodynamics (3 + 0) h.**

Fundamental concept in heat and thermodynamics, Thermal Equilibrium and zeroth law of thermodynamics, Ideal gases, Kinetic theory of gases, First law of thermodynamic, Application of first law of thermodynamic, isothermal and adiabatic processes. Irreversible process and reversible processes, Carrnot cycle, Otto cycle-cleapeyron latent heat equation, Second law of thermodynamic, Heat Engines, Refrigerators, Entropy, Thermodynamic functions, Maxwell relations, Third law of thermodynamic, Phase change, Applications on thermodynamic laws.

**PHYS 203 Mathematical Physics I (3 + 0) h.**

Determinants, Matrices, Solving linear equations and differential equations by matrices, Application on the motion of the rotation of the rigid body, Vector Algebra: Vector products, Position, Displacement, Vector transformation, Gradient, The Divergence, The Curl, Laplace operator, Line, Surface, and Volume Integrals, Gauss theorem, Stock's theorem, Green's theorem, Spherical polar coordinates, Cylindrical coordinates.

**PHYS 212 Classical Mechanics II (3 + 0) h.**

Calculus of variations, The Euler-Lagrange equation and applications, Lagrange's equations for Unconstrained motion, Constrained systems, Generalized momenta and Ignorable coordinates, Lagrange multipliers and constraint forces, Rotational motion of rigid body, The inertial tensor, Principal axes of Inertia, Precession of a top by weak torque, Euler's equations, Euler's angles, Coupled oscillations and normal modes, The double pendulum, Three coupled pendulum, Hamiltonian mechanics for one dimensional systems, Hamiltonian mechanics in several dimensions, Ignorable
coordinates, Phase space orbits, Liouville's Theorem.

**PHYS 221 Electromagnetism I (3 + 0) h.**

Review of vector Operations and algebra, Linear and rotational transformation of vectors, Vector field, Review of vector differential calculus: (gradient, the divergence, the curl, product rules of algebra , Second Derivatives,), Review of integral Calculus: (linear, surface, and volume integrals of vector functions), The fundamental theorem for: (calculus, gradient, divergence, curl), Curvilinear Coordinates: (spherical polar and cylindrical coordinates), The Dirac delta function in one and three dimension, The divergence of reciprocal square of radial distance, The Helmholtz theorem, Coulomb's law, The electric field, Continuous charge distributions, Divergence and curl of electrostatic field, Field lines and flux, Gauss's law and its applications, Electric potential, The potential of a localized charge distribution, The work done to move a charge, The energy of a point charge distribution, The energy of a continuous charge distribution, Properties of conductors and induced charges, Surface charge and the force on a conductor, Capacitors, Poisson's equation, Laplace's equation in one, two and three dimensions, Boundary conditions and uniqueness theorems, Conductors and the second uniqueness theorem, The Method of images and induced surface charge and calculating force and energy, Multipole expansion and approximate potentials at large distances, The monopole and dipole terms, The electric field of a dipole, Polarization, Field of a polarized object, Induced dipole and dielectrics, Polar molecules, Bound charges, The field inside a dielectric and the electric displacement, Gauss's law in the presence of dielectrics, Boundary conditions, Linear Dielectrics: (susceptibility, permittivity, dielectric constant), Boundary value problems with linear dielectrics, Force and energy in dielectric systems, Magnetostatics and the Lorentz law , Magnetic fields and magnetic forces, The Biot-Savart law, The magnetic field of a steady current, The divergence and curl of the magnetic field, Ampere's law and its applications, Magnetic vector potential, Magnetostatic boundary conditions, Multipole expansion of the vector potential, Magnetic fields in matter and the magnetization, Magnetic materials: (diamagnets, paramagnets, ferromagnets), Torques and forces on magnetic dipoles, Effect of magnetic field on atomic orbits, The field of a magnetized object, Bound currents, The magnetic field inside matter and the auxiliary field, Ampere's law in magnetized materials, Boundary Conditions, Linear and nonlinear media, Magnetic susceptibility and permeability, Ferromagnetism.

**PHYS 232 Physical Optics (3 + 0) h.**

The nature of light , The superposition of waves, Interference of two-beams of light (division of the wave front & division of amplitude) Interferometers( Young , Fresnel's biprism , loyed mirror, Fresnel's double mirrors , wedge interferometer , Newton rings , Michelson interferometer , Jamin & Mach-Zehnder refractometers ), Interference of multiple beams, Fabry-Perot interferometer , Applications of interferometry, Diffraction , Fraunhofer diffraction (single slit, two slits, multiple slits) – diffraction grating - Fresnel diffraction (circular aperture & circular Obstacle ), Polarization - polarization by absorption , reflection , refraction & double refraction, Optical active materials & polarometer .Interference of polarized light , Analysis of polarized light , Electro-optics (Kerr effect & Pockels effect ) , Magneto- optics (Faraday effect).

**PHYS 302 Mathematical Physics II (3 + 0) h.**

Complex numbers, Analytic functions, Limits and Continuity, Analyticity, The Cauchy, Riemann Equations, Elementary Functions, Complex Integration, Contoursm, Independence of path-Cauchy integral theorem- Bounds for analytic Functions, Series representations for analytic functions, Residue Theory, Conformal Mapping, Invariance of Laplace's Equation, Geometric Considerations, Bilinear Transformations, The Schwartz, Christoffel Transformations.

**PHYS 321 Electromagnetism II (3+0) h.**

Electromotive force, Ohm's law, Motional electromotive force, Electromagnetic induction, Faraday's law, The induced electric field, Inductance, Energy stored in magnetic fields, The modified Ampere's law, Maxwell's equations in vacuum, Maxwell's equations in matter, Boundary conditions, Conservation laws and the continuity equation, Poynting's theorem, Newton's third law in electrodynamics and momentum, Maxwell's stress tensor, Conservation of momentum, Angular momentum, Electromagnetic waves in one dimension, The wave equation, Sinusoidal waves, Boundary conditions: reflection and transmission, Polarization, Electromagnetic waves in vacuum, Monochromatic plane waves, Energy and momentum in electromagnetic waves, Electromagnetic waves in matter, Propagation in linear media, Reflection and transmission at normal incidence, Reflection and transmission at oblique incidence, Absorption and dispersion, Electromagnetic waves in conductors, Reflection at a conducting surface, The frequency dependence of permittivity, Guided waves and wave guides, TE waves in a rectangular wave guide, The coaxial transmission lines, Electric dipole radiation, Magnetic dipole radiation, Radiation from an arbitrary source, Power radiated by a point charge, Radiation reaction with matter.

**PHYS 351 Modern Physics (3 + 0) h.**

Special Theory of Relativity: wave propagation, Michelson Morley experiment, Galilean transformation, Lorentz transformations, Relative velocity, Lorentz contraction, Time Dilation, relativity of mass, Mass and energy, Applications, The particle like properties of Electromagnetic radiation: Electromagnetic waves, The photoelectric effect, black body radition, The Compton Effect, X-rays Waves like properties of particles: De-Broglie hypothesis, Electron diffraction experiment of Davison and Germer, Electron microscope, Uncertainity principle, quantum theory, Atomic Structure: atomic properties, The Thomson model, Rutherford Model for atomic nuclei, alpha particle scattering, Atomic Spectra, Bohr theory of the hydrogen atom, Sommerfeld's Model, Failure of the Bohr theory Frank-Hertz experiment, The basic ideas of the Quantum Mechanics.

**PHYS 393 Optics Lab (0 + 2) h.**

Prism spectrometer (refractive index and dispersion), Grating spectrometer, Fresnel's biprism with He-Ne laser, Fresnel's double mirrors with He-Ne laser, Newton's rings, Michelson interferometer, Mach-Zehnder-interferometer, Diffraction at a single slit, Diffraction at double slits, Diffraction at one-and two dimensional gratings, Diffraction at a single slit measuring and evaluating with Video Com, Polarimter and optical activity, Abbe's refractometer, Inverse square law of light radiation and absorption coefficient of glass or plastic materials, Polarization of light.

**PHYS 303 Mathematical Physics III (3+0) h.**

Series Method for solving linear differential equations, Fuch's theorem, Second solution, Legendre polynomials, Hermite polynomials, Lagurre polynomials, Bessel Functions, Fourier transformation and its application, Laplace transformation and its application, Eigenvalue problem, Differentional equations of Boundary value problem.

**PHYS 342 Statistical Physics (3 + 0) h.**

Probability, One random variable, Some important probability distributions, Many random variables, Sums of random variables and the central limit theorem, Rules for large numbers, entropy, Kinetic theory of gases, Maxwell's distribution of the velocities of gas molecules and its applications, Distribution function of the energy of molecules, Liouville's theorem, Equilibrium properties, The microcanonical ensemble, Two-level systems, The ideal gas, Mixing entropy and the Gibbs paradox, The canonical ensemble, Canonical examples, The Gibbs canonical ensemblem, The grand canonical ensemble, Quantum statistical mechanics, Maxwell-Boltzmann distribution, Bose Einstein distribution, Fermi-Dirac distribution, Vibrations of a solid, Black-body radiation, Quantum microstates, Quantum macrostates, Ideal quantum gases, Hilbert space of identical particles, Canonical formulation, Grand canonical formulation, The degenerate fermi gas, The degenerate bose gas.

**PHYS 352 Quantum Mechanics (3 + 0) h.**

Reviews of the fundamental experiments in modern physics, the need for quantum mechanics. Wave packet and uncertainty principle, Schrödinger equation for free particle, Continuity relation, The dynamical variables and calculating the expectation values, Schrödinger equation with a potential in one dimension, Dynamical variables and calculating the expectation values in momentum space, Commutation relations, Hermitian operators, Linear operators, Completeness relation and orthonormality, Schrödinger equation in three dimensions, The fundamental postulates of quantum mechanics, Particle in an infinite well, Spectral expansion theory, The parity, Constants of motion and conservation laws, Momentum eigen functions and free body, One-dimensional potentials:(The potential step, The finite potential well at scattering and bound states, The potential barrier, The delta function potential at Scattering and Bound states, Simple harmonic oscillator, Oscillator eigen functions and eigen values, Ladder operators and dynamical variables, Schrödinger equation in three dimensions in Cartesian coordinates, Schrödinger equation in three dimension curvilinear coordinate system, Angular momentum and its eigen functions and eigen values, The addition of angular momentum, The central potentials.

**PHYS 392 Electromagnetism Lab (0 + 2) h.**

Measurement of e/m of the electron, Verification of Biot - Savart law , Verification of Faraday's law, Transformers , Measuring the force on current carrying conductors in a homogenous magnetic fields, RLC circuits, Generators, Motors, Transformers, Magnetic moment of magnetized rod, Helmholtz coils, Magnetic induction.

**PHYS 395 Modern Physics lab (0 + 2) h.**

Characteristics of microwaves, Franck- Hertz experiment, Stefan-Boltzmann law for heat radiation, Determination of Planck's constant by means of the photoelectric effect using the compact arrangement, Faraday effect, Fabry – Perot interferometer, Kerr effect, The Balmer series of hydrogen and determination of Rydbergs constant, Pockels effect, Zeeman effect.

**PHYS 422 Electronics (3 + 1) h.**

Theoretical part: Analog Electronics: The P-N junction diode and Zener diode with their applications Junction Field effect transistor - Bipolar junction transistor (Bias and amplifiers: JFET & BJT) – Differential and Operational Amplifiers, Introduction to Feedback Circuits, Multivibrators and Oscillators, Digital Electronics: Binary and Hexadecimal System, Logic Gates, Karnaugh Maps, Flip Flops, Shift Registers, Counters, Memories. Practical part: P-N junction application (half-wave rectifier, full-wave rectifier, clampers and limiters, Zener regulation) - Transistors JFET & BJT amplifiers. Amplifiers with 741(Inverting & Non inverting Amplifiers, Active Filters, Wien Oscillator, Astable Multivibrator). Half and Full Adder (7483), Flip Flop (7474-7476), Shift Register (7495-74194), Counters (7493-74193).

**PHYS 452 Quantum Mechanics II (3 + 0) h.**

Dirac notation, Vector space algebra and Hilbert space, Rephrasing wave mechanics and operator methods in abstract view, Angular momentum commutation relations, Raising and lowering operators for angular momentum, Expansion theory in abstract view, Matrix representation of angular momentum operators, General relations in matrix mechanics, Eigen states of spin ½, The intrinsic magnetic moment of spin ½ particles, Addition of two spins, Addition of Spin ½ and orbital angular momentum, Time independent perturbation theory and energy shifts, Degenerate perturbation theory, The Stark effect, Hyperfined splitting, Variational principle and its applications, The WKB approximation, Time-dependent perturbation theory, The interaction of charged particle with electromagnetic field, Two level-system, emission and absorption of radiations, spontaneous emission, Transition rate, selection rule, scattering theory, Partial wave analysis, The Born approximation.

**PHYS 471 Solid State Physics I (3 + 0) h.**

Different states of matter, classification of solids, crystal structure (Bravais lattices & Miller indices), methods of determination of crystal structure (X-ray diffraction, electron and neutron diffraction), crystal defects, crystal binding (interatomic forces, types crystal bonds), Methods of crystal growth, lattice dynamics (crystal vibration modes and phonons), thermal properties of insulators (specific heat of insulators: classical model, Einstein's model, Debye model,-thermal conductivity of insulators), Dependence of thermal conductivity on temperature, Free electron theory (classical model of free electron, Fermi gas of free electrons, Maxwell-Boltzmann distribution, Fermi-Dirac distribution function), band theory (zone theory and tight binding theory).

**PHYS 481 Nuclear Physics I (3 + 0) h.**

Properties of the nucleus: determination of nuclear charge, radius and mass, Nuclear binding energy, Natural Radioactivity: Decay law, Nuclear stability, Radioactivity and theory of transformation .Artificial Radioactivity: Discovery of artificial radionuclides, Transuranium elements, Interaction of radiation with matter: Interaction of heavy elements, interaction of light electrons, interaction of gamma rays with matter, interaction of neutrons with matter, Radiation Detectors: Gas detectors, Scintillation detectors, solid state detectors, Nuclear Reactions: Reactions of matter by gamma rays, reactions by alpha particles, reactions by protons, reactions by neutrons, Nuclear fission: Discovery of Nuclear fission, theory of Nuclear fission, Nuclear fusion: Energy production in stars, control of thermonuclear reactions.

**PHYS 455 Molecular and Atomic Spectra (3 + 0) h.**

Introduction: Comparing between atomic emission spectroscopy and atomic absorption spectroscopy; Optical spectroscopy, Atomic spectrum, Quantization of hydrogen atom, Atomic emission / absorption spectrophotometry Molecular spectroscopy , Spectroscopy of inner electrons. Zeemen's effect, Sodium spectrum, Effect of magnetic field on the energy levels of atom. Theory of magnetic energy, Anomalous Zeeman's effect and Lande splitting factor. Molecular Spectra of diatomic molecules, Vibrational energy levels in both classical mechanics and quantum mechanics. Rotational spectra of diatomic molecule in gaseous state and rotational energy levels, Molecular spectra; harmonic Oscillator, Non Rigid Rotator, Infrared Vibration, Rotation spectra, spectrum, IR spectrum, RBS spectra, XRD spectrum, measurements of Absorbance, Transmitting and Reflecting using double beam Spectrophotometers in all ranges of wavelengths (UV-VIS-NIR-IR), Normal modes of vibrations; Natural of infrared absorption, Basic Laser principles, Laser behavior, Properties of laser radiations, Different types of lasers, Laser spectroscopy, The total losses of the laser system, Transmission at the mirrors, Absorption and scattering by the mirrors, Absorption in the laser medium, Diffraction losses at the mirrors, The Ruby Laser, Three Level Laser (Helium-Neon Laser)-Four Level Laser ( Carbon dioxide Laser), Laser applications.

**PHYS 497 Solid State Physics lab (0 + 2) h.**

Studying the characteristics of the solar cell, electron diffraction experiments characteristics curves of an optical (photo) resistor, studying the electron spin resonance (ESR), calculation of the energy gap of germanium by an electrical method determination of the thermal coefficient of resistance of a noble metal (platinum) by computer, the magnetic susceptibility of some materials and its classification, X-ray spectroscopy and calculation of Planck's constant and Miller indices of crystal planes in NaCl single crystal, thermoelectric effect in semiconductors (calculation of Seebeck, Peltier and Thomson coefficients), superconductivity and determination of the transformation temperature TC of YBCO specimen by computer, determination of the absorption coefficient of aluminum for X-ray, Hall effect, studying the crystalline structure by using the field effect microscope.

**PHYS 498 Nuclear Physics Lab (0 + 2) h.**

Statistical nature of Radioactive decay law, Rutherford Scattering, Attenuation of gamma radiation, Absorption of beta radiation passing through different materials, Inverse square law in case of gamma-rays, Determination of the range of beta particles in absorbers by beta gamma source, Backscattering of beta particles, determination of the dead time of GM tube, Effect of a magnetic field on beta particles motion, Assessment of natural radionuclide in NaCl, Compton scattering.

**PHYS 499 Project (2 + 0) h.**

The student carries out a research under the supervision of one of the Staff members in one of the following branches: Theoretical Physics, Nuclear Physics, Solid State Physics, Fiber Optics, Laser, Plasma, Electronics. The student submit a a report about his work, and is evaluated by a committee selected by the department.

# College of Sciences and Arts in Unaizah

## Vision:

The College of Sciences and Arts in Unaizah hopes to be one of the prominent institutions of higher Education in Saudi Arabia . It strives hard to provide knowledge and develop it at all levels , including pre-university and higher education, for the benefit of the Saudi society .

Furthermore , the college looks forward to supply the market-place with qualified graduates who are competent and skillful , able to take the responsibilities of serving the country , and keeping its resources in the fields of economics administration and education .

## Mission:

The College of Sciences and Arts in Onizah is a government institution with great heritage , firmly committed to the educational , cultural and community service policies of the kingdom of Saudi Arabia . The stated mission of the college is fostering efficient , creative , professional development and personal growth among Saudi female nationals . These are established through taking measures and careful planning for life-long learning that integrates sound scientific knowledge together with human values . Healthy learning environment in the college promotes continuous development of educational and research programs . Positive interpersonal relationships help members to communicate and interact with scientific and cultural developments in the outside world , at the same time it helps them to meet the growing needs of the local society. This is expected to facilitate a comprehensive human resource development to compete in accordance with national, regional and world labor market requirements.

## Aims:

The vision for the learning and teaching programs offered in the college rests on the following principles :

1- that the teaching profession is developing amazingly fast .

2- understanding the changes in the new role of the teacher from just transmitting information to students into a facilitator for learning , group work and self-teaching , allowing students to be active learners not passive receptors .

3- that the competent and excellent teacher is an important element in order to achieve and secure students success , and meet college objectives .

4- that the college has a social and cultural role to play, over and above training and graduating student teachers .

5- that education is essential to achieve national security , and that the college has a central role to play in this respect .

## About:

The College of Sciences and Arts in Unaizah has undergone several stages of developments since it was first established as an Intermediate College in 1399 offering diploma in 3 specializations namely: Islamic studies , Arabic Language and Mathematics .

In 1405 H, the college witnessed major developments; some new courses and specializations were introduced and others were reorganized into : Islamic Studies, Arabic language and Social Studies, Science and Mathematics, Kindergarten and Home Economics .

In 1415 H the Intermediate College expanded in terms of capacity and range of courses being offered .Then it became a College of Education with eight areas of specializations, namely : Islamic Studies, Geography , English language , Home Economics , Biology , Physics and Math's . Successful graduates were awarded the Bachelor of education in their specialization.

In 1427 H the College of education Affiliated to Qassim University .

Since 1429 H its name has changed into The College of Sciences and Arts in Onizah in accordance with the recommendation of the Council of Higher education NO. 10 / 50 / 1429 dated 10 / 7 /1429 concerning the reorganization of girls colleges under Qassim university .

## Degrees:

Bachelor

## Programs:

1- Physics .

2- Mathematics .

3- Computer Science.

## Study Plans:

BA Degree Program: **Computer sciences**

**Level 3**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC101** | Introduction to Islamic Culture | 2 |
| **Arab101** | Language Skills | 2 |
| **Phys104** | General Physics (2) | 4 |
| **Math105** | Differential Calculus | 3 |
| **CEN111** | Logic Design | 4 |
| **CSC152** | Concepts of Algorithms & Computer Programming | 4 |
| | Total | 19 |

**Level-4**

| Course Code | Course Title | Credit |
|---|---|---|
| **Arab103** | Expository Writing | 2 |
| **Math106** | Integral Calculus | 3 |
| **Math109** | Linear Algebra and Analytical Geometry | 3 |
| **IT125** | Database | 4 |
| **CEN126** | Computer Architecture | 3 |
| **CSC153** | Object Oriented Programming | 4 |
| | Total | 19 |

**Level-5**

| Course Code | Course Title | Credit |
|---|---|---|
| **Math203** | Differential and Integral Calculus | 3 |

| | | |
|---|---|---|
| **Stat224** | Introduction to Statistics & Probability | 3 |
| **CSC225** | Assembly Language | 3 |
| **CSC244** | Concepts of Algorithms | 3 |
| **CSC276** | Computer Graphics | 4 |
| **CSC283** | Discrete Structures | 4 |
| | Total | 20 |

**Level-6**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC102** | Islam and Construction of Society | 2 |
| **Math207** | Differential Equations | 3 |
| **CSC214** | Data Structures | 4 |
| **IT224** | Visual Programming | 4 |
| **CSC237** | Programming Languages Concepts | 3 |
| **CSC229** | Operating Systems | 4 |
| | Total | 20 |

**Level-7**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN301** | Signals and Systems Analysis | 4 |
| **CEN333** | Microprocessors Systems | 4 |
| **CSC338** | Compiler Design | 3 |
| **CEN345** | Computer Networks | 4 |
| **CSC346** | Software Engineering | 3 |
| | Total | 18 |

**Level-8**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC103** | The Islamic Economical System | 2 |
| **CSC313** | Algorithms Analysis & Design | 3 |
| **CSC327** | Operations Research and Programming Applications | 3 |
| **CSC357** | Internet Techniques & Web Programming | 3 |
| **CSC392** | Selected Topics in Computer Sciences | 3 |
| **CSC393** | Systems Programming | 3 |
| | Total | 17 |

**Level-9**

| Course Code | Course Title | Credit |
|---|---|---|
| **IC104** | Fundamentals of the Islamic Political Systems | 2 |
| **CSC414** | Introduction to Unix/Lunix Systems | 3 |

| | | |
|---|---|---|
| **IT463** | Knowledge Base Systems Applications | 3 |
| **CSC448** | Optimization Techniques | 3 |
| **IT481** | Communication Skills | 2 |
| **CSC498** | Graduation Project (1) | 2 |
| | Total | 15 |

**Level-10**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC445** | Introduction to Cryptography & Information Security | 3 |
| **IT450** | Multimedia Data Management | 3 |
| **CSC458** | Distributed Systems & Parallel Processing | 3 |
| **CSC463** | Artificial Intelligence | 4 |
| **CSC499** | Graduation Project (2) | 4 |
| | Total | 17 |

## Course Description:

**Course Code :** **CSC 152**
**Course Title :** Concepts of Algorithms and Computer Programming
**Prerequisites :** non
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level : 3
**Course description:**
Problem-solving, algorithmic design, Introduction to Programming, Structured Program Development, Program Control, Functions, Arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.
**Textbook :**
C How to program , Deitel & Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004

**Course Code:** **CEN 111**
**Course Title:** Logic Design
**Prerequisites:** non
**Credit Hours**: 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: Level:3
**Course description:**
Digital computer and information (numbering systems, Arithmetic operations, Decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, Combinational circuits simplification, CMOS circuits), Combinational logic design (design procedure, decoders, multiplexes, Binary adder and subtracter), Sequential circuits (latches, flip flops, synchronous sequential circuits analysis and design), Analysis and design of synchronous sequential machines, Representation, state reduction and realization; Finite state machines.
**Textbook:**
M. Mano, Digital Design, 3rd Ed., 2002.

**Course Code :** **IS 125**
**Course Title:** Database
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4
**Prerequisites** : CSC 152
**Course discretion**
Database definition, Database system, Overview of database management, database system architecture, Introduction to Relational databases, An Introduction to Structured Query Language(SQL), Database Integrity, Views, Normalization, Database design, Practical Applications.

**Textbook:**

"An Introduction to Database Systems", Date, 2004, Addison-Wesley.

**Course Code: CEN 126**

**Course Title:** Computer Architecture

**Prerequisites:** CEN 111

**Credit Hours**: 3 Lecture Hrs: 3

Lab Hrs:0 Tut. Hrs: 0 Level:4

**Course description:**

Review of logic design principles. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design. System software. Micro-programmed CPU. Comparison between CISC, RISC and VLIW processors. Introduction to memory organization; I/O operations; Introduction to parallel processing techniques.

**Textbook:**

M. Mano, "Computer System Architecture," Prentice Hall, 2004.

**Course Code : CSC 153**

**Course Title :** Object Programming

**Prerequisites** : CSC152

**Credit Hours : 4** Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:4

**Course description:**

Introduction to Object-Oriented Programming, Program Control Structures, Functions, Arrays, Pointers and Strings, Classes Part I Classes and data abstraction, Classes Part II: Operator Overloading, Inheritance Virtual Functions and Polymorphism.

**Textbook**:

C How to program ,Deitel & Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004.

**Course Code : CSC 244**

**Course Title :** Concepts of Algorithms

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:5

**Prerequisites**: CSC 152

**Course description:**

Growth function and Recurrence, Divide-and-Conquer: (Strassen, Fibonacci, Polynomial Multiplication), Heap Sort, Quick Sort, Bubble Sort, Insertion Sort, Merge Sort, Hash Table, Binary Search Tree, Dynamic Programming, Greedy Algorithms,

**Textbook**

Introduction to Algorithms, (Second Edition) Thomas Cormen, Charles Leiserson, Ronald Rivest, and Clifford Stein. MIT Press. ISBN: 0262032937

**Course Code : CSC 276**

**Course Title :** Computer Graphics

**Credit Hours** : 4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:5

**Prerequisites:** CSC 153

**Course Description:**

Computer Graphics Applications Survey. **Color models** (chromaticity diagram, RGB, CMY, YIQ, HSV, and HLS color models). **Graphics Output Primitives** (coordinate frames, DDA, Bresenham's algorithm, circle-drawing, fill-area primitives algorithms). **2D Graphics**(2D cartesian coordinates, curves and parametric equations, functions and transformations, inverse functions. **3D Graphics** (vectors in 3D, dot and cross product, homogeneous coordinates, correlation between Cartesian and homogeneous coordinates). **Geometric transformations**(2D geometric transformations, matrix representation and homogeneous coordinates, inverse transformations, 2D composite transformations).**Geometric representation** Lagrange polynomials of degree n, Hermit cubic polynomial, Bernstein polynomial, interpolation problem, Spline interpolation problem of approximation, Bezier-Bersnstein approximation, Bezier-B-Splineapproximation, quadric surfaces

**Graphics Lab**: modeling, rendering, animation using 3D Studio Max? from Autodesk?. Use of OpenGL?.

**Textbook:**

College of Sciences and Arts in Unaizah

Hearn, D. and P. Baker "*Computer Graphics with OpenGL*". Pearson Prentice Hall, Pearson Education Inc., Upper Saddle River NJ07458, USA, 2004. PIE ISBN 0-13-120238-3

**Course Code :** **CSC 283**
**Course Title :** Discrete Structures
**Credit Hours** : 4 Lecture Hrs:
Lab Hrs: 0 Tut. Hrs: Level:5
**Prerequisites:** CSC 153
**Course description:**
**Introduction to Discrete Structures**: algorithmic language. **Logic**: propositions, predicate logic, proofs, mathematical induction. **Sets**: special sets, operations, properties and identities, application of logic to knowledge-based systems. **Relations**: graphical and matrix representations, equivalence and order relations, application to databases **Functions** types, cardinality, application to functional languages **Undirected Graphs** Simple graphs, Eulerian paths, Hamiltonian circuits, trees, application to syntax diagrams **Directed Graphs** digraphs, consistent labeling, paths problems, Wars hall's algorithm, shortest paths and Dijkstra's algorithm, application to routing in computer networks. **Machines and Computations**: automata as models, finite state automata (FSA) without outputs, FSA as language recognizers and their limits, introduction to Turing Machines, application of FSA to problem-solving.
**Textbook:**
Skvarcius, R. and W.B. Robinson "Discrete Mathematics with Computer Science Applications" The Benjamin / Cummings Publishing Co., 1986.

**Course Code :** **CSC 225**
**Course Title :** Assembly Language
**Prerequisites :** CEN 126
**Credit Hours :** 3 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:5
**Course description**
Introduction to PC hardware, PC software requirements, assembly language programmers requirements, program logical and control, string operations, arithmetic operations for processing binary data , assembling linking and executing a program.
**Textbook**
Peter Abel. IBM PC Assembly Language and Programming ". 1998

**Course Code : CSC 237**
**Course Title : Programming Languages Concepts**
**Prerequisites**: CSC 283
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0
**Course description:**
Preliminaries. Evolution of the Major Programming Languages. Describing Syntax and Semantics. Lexical and Syntax Analysis. Names, Binding, Type Checking, and Scopes. Data Types. Expressions and Assignment Statements. Statement-Level Control Structure. Subprograms. Implementing Subprograms. Abstract Data Types. Support for Object-Oriented Programming. Concurrency. Exception Handling and Event Handling. Functional Programming Languages. Logic Programming Languages. Project.
**Textbook**
Robert W. Sebesta. Concepts of programming languages, 2008 Addison-Wesley.

**Course Code :** **CSC 229**
**Course Title :** Operating Systems
**Prerequisites**: CEN 126
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:6
**Course description:**
Computer System Structure, Operating System Concepts, Operating System Structure, Procedures, CPU Scheduling, ProcessSynchronization,BatchFiles,RecoveryConsole,MemoryManagement,VirtualMemory,File-System Interface, Storage Structure, Data Storage on Disks, File-Systems : Fat,Fat32, NTFS,

Distributed Systems ,Hardware Protection, The Linux system

**Textbook**

Abraham Silberschatz, Peter Baer, Galvin, Greg Gagne. Operating Systems concepts , Pearson Educaion, Sixth Edition.

**Course Code :** **IS 224**
**Course Title :** Visual Programming
**Prerequisites** : CSC 153
**Credit Hours** : 3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0

**Course Description:**

Selecting a Visual Language, Knowing the concepts and procedures used in Visual Languages, Syntax and semantics of the language used. Types of Data, conditional statements, recursion, data structures, modular programming, review of Object-Oriented Programming concepts and techniques, User Interface Design rules, Materializing an interface into a set of visual objects, File types, File organizing techniques, File usages, Publishing an interface on the web, Basic concepts of Human Computer Interaction, Comparison between the selected language and other visual languages.

**Textbook:**

Diane Zak, Programming with Microsoft Visual Basic .NET 2005, Publisher Course Technology, ISBN 0-619-21718-9

**COURSE CODE :** **CSC 214**
**Course Title :** Data Structures
**Prerequisites :** CSC 283
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:6

**Course description:**

Functions in C - Structures and pointers - Memory Management functions , Concepts and Definition of abstract data type, Array as ADT, Stack and operations, Queue and operations Linked List and stack as list, Queue as list and applications, Sorting, recursion, Tree Introduction to Graphs, Projects and Exercises.

**Textbook :**

Data structures using C and C++. Second edition, YEDIDYAH LANGSAM and others Prentice Hall and others. 1996.

**Course Code:** **CSC346**
**Course Title:** Software Engineering**.**
**Prerequisites:** CSC 214
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:7

**Course description:**

Software Engineering Concepts, System Engineering Concepts, Software Process, Analysis Concepts and Principles, Analysis Modeling Design, Real-Time System Design, Software Testing Techniques, Technical Metrics for Software, Project

**Textbook:**

Ian Somerville, Software Engineering , Pearson Education, 7-th edition.

**Course Code :** **CSC 338**
**Course Title :** Compiler Design
**Prerequisites:** CSC237
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level: 7

**Course description**

The design and implementation of compilers. Compiler organization, algorithms for lexical, syntactic and semantic analysis, top-down and bottom-up parsing (e.g., recursive descent, LL, LR, LALR parsing). Symbol table organization, error detection and recovery, intermediate and object code generation, and code optimization. Student has to implement a compiler for a simple high level language as project.

**Textbook:**

A. V. Aho, R. Sethi, J. D. Ullman; *"Compilers: Principles, Techniques, and Tools";* 1986; Addison-Wesley; ISBN: 0-201-10088-6; (The dragon book).

**Course Code:** **CEN 333**
**Course Title:** Microprocessor Systems
**Prerequisites:** CEN 126
**Credit Hours**: 3 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level: 7

**Course description:**

Architecture and Instruction set of different 16 bit microprocessors; Microprocessor chips. **Supporting chips**: Buffers, decoders, system clock generator, reset system. Memory chips and subsystems Interfacing 16-bit Microcomputers. Architecture of Microprocessor based systems, design technique, memory and I/O devices interfacing to the microprocessor, interfacing technique. **I/O techniques**: Interrupts, Direct memory access; **System development and design tools techniques**: hardware and software.

**Textbook:**

B. Brey, " The Intel Microprocessors..", Prentice Hall, 5th Edition, 2000

**Course Code :** **CEN 301**

**Course Title:** Signals and Systems

**Prerequisites :** Math 207

**Credit Hours : 4** Lecture Hrs: 4

Lab Hrs: 0 Tut. : 0 Level:7

**Course description:**

Time-domain analysis of signals: Mathematical and graphical representation. Classifications. Basic operations. Basic signals. Sampling and aliasing. Time-domain analysis of systems: Block diagram representation. Differential and difference equation representation. Impulse and step responses. Frequency-domain analysis of signals: Spectra of continuous-time and discrete-time signals. Frequency-domain analysis of systems: Frequency response of continuous-time systems: Bode plot, SyQuest plot, feedback and its effects on system stability. Frequency response of discrete-time systems. Laplace transform and its applications. Z-transform and its applications: Relationship with Laplace. Exercises should be solved using MATLAB

**Textbook:**

A. V. Oppenheim, *Signals and Systems,* Prentice Hall, 2nd edition, 1997

**Course Code:** **CEN 345**

**Course Title :** Computer Networks

Prerequisites: CEN 126

Credit Hours :4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:7

**Course description:**

**Introduction to computer networks**: Network Types, Overview of data transmission, Introduction to network protocols, The Internet protocol. **Network topologies**; Network architecture and the OSI reference model; The physical and Data Link Layer , flow and errors control, ARQ Stop/wait, Sliding window protocols, **DLC standards**: HDLC , PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, Hubs, routers, Ethernet Switches; **Network Layer Services**: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.

**Textbook:**

A. Tanenbaum Computer Networks. 4rd Ed., Prentice-Hall, 2003.

**Course Code :** **CSC 392**

**Course Title:** Selected Topics for Computer science

**Credit Hours** :3 Lecture Hrs:

Lab Hrs: Tut. Hrs: 0 Level:8

**Prerequisites :**

**Course description:**

In this course, advanced topics in computer sciences are proposed, like: Java Object-Oriented programming, **Object-Oriented Software Engineering,** Application Programs, Operating Systems Design and implementation, Distributed Operating Systems, Distributed Computing, Introduction to Parallel Computing.

**Textbooks:**

The text book depends on the topic of the course.

**Course Code:** **CSC 393**

**Course Title:** Systems Programming

**Credit Hours** :3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level : 8

**Prerequisites:** CSC338

**Course description**

Study of one particular processor, assembly for this processor. Introduction to the assembly laguage of this processor. Design and implementation of an assembler (translation to machine code).

Linkers and loaders: Absolute loaders; Program relocation; Program linking; Data structures; Dynamic loading; Bootstrap loaders.

Macro processors: Data structures and logic flow for a simple one-pass macro processor; Concatenation of macro parameters; Generation of labels in macro expansions; Conditional macro expansion; Macro processing within an assembler; General-purpose macro processors. Project.

**Textbook :**

Leland Beck "An introduction to Systems programming", Addison Wesley, 1990.

**Course Code:** **CSC357**

**Course Title:** Internet Techniques web programming**.**

**Credit Hours** : 3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0 Level: 8.

**Prerequisites**: CEN 345

**Course description:**

An overview of connecting to and navigating within the Internet system and the World Wide Web: Navigation. Search Engines. Advanced search techniques. Design of web pages using HTML, XML and Java. TCP/IP. Client/Server architectures. Mastering Connectivity. Security.

**Textbook :**

Gary P. Schneider and Jessica Evans *The Internet -- 3rd Edition*, Course Technology, 2002.

**Course Code:** **CSC 327**

**Course Title:** Operations Research &Applications programming

**Credit Hours** :3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0 Level:8

**Prerequisites**: CSC 283

**Course description:**

OR Approach, Methodology And Applications : modeling, constraints, objective and criteia. Problems of multiple criteria optimization, model validation and systems design. Mathematical programming; simulation, gaming; heuristic programming. Examples,: theory of inventory. Production; linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. Theory of games for two-person competitive situations. Project management through PERT-CPM

**Textbook:**

Hamdi Taha , Operations Research: An Introduction (7th Edition), ISBN: 0130323748, 2002.

**Course Code :** **CSC 313**

**Course Title :** Algorithms Analysis and Design

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level : 8

**Prerequisites** : CSC 214

**Course description:**

Introduction to Algorithms Analysis and Design, General Algorithms: (1- Greater Common Divisor Algorithm, 2- Smaller Common Multiple Algorithm, 3- Pascal-Triangle Algorithm, 4- Inverse Number Algorithm, 5- Recursive Algorithm), Algorithms And Procedures, Algorithm Analysis: (Algorithm Efficiency, Algorithm Run-time, Algorithm Complexity, Computation Horner Algorithm Complexity Degree, Multiplication Two Polynomials Complexity Degree, Computation Using While Loop Algorithm Complexity Degree), Sorting Algorithms: (Insert Sort Algorithm, Selection Sort Algorithm, Bubble Sort Algorithm, Heap Sort Algorithm, Merge Sort Algorithm, Sort Algorithm, Files Sorting Algorithms), Searching Algorithms, Backtracking Algorithms: (8-th Queen Problem, Optimal Option Problem).

**Textbook**

Michael T.Goodrich, Roberto Tamassia , Algorithm Design: Foundations ,Analysis and Internet Examples, John Wiley & Sons Inc 0-471-38365-1, 2002.

**Course Code :** **IS 463**

**Course Title :** Knowledge base systems Application
**Prerequisites** : CS 214
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:9
**Course Description:**
Review of first-order logic, relational algebra, and relational calculus. Fundamentals of logic programming. Logic for knowledge representation. Architecture of a knowledge-base system. Fundamentals of deductive databases. Top-down and bottom-up query processing. Some important query processing strategies and their comparison. Project or term paper on current research topics.
**Textbook**
Richard A. Frost, Introduction to Knowledge Based Systems.

**Course Code :** **CSC 498**
**Course Title:** Project I
**Credit Hours : 2** Lecture Hrs:
Lab Hrs: Tut. Hrs: Level:9
**Prerequisites : 100 CH**
**Course description:**
Student will study, design and develop an integrated system, and he will be examined at the end of the semester.
**Textbooks**
Selected papers and researches related to the project topic.

**Course Code:** **IS 481**
**Course Title:** Communication skills
**Credit Hours** : Lecture Hrs: 2
Lab Hrs: 0 Tut. Hrs: 0 Level:
**Prerequisites: non**
**Course description**
This course covers written, oral, and interpersonal communication. Students will hand in short pieces of writing each week, will make oral presentations several times in the semester, and will work together in simulated project meetings and other realistic scenarios of pair and small group interaction.

**Course Code:** **CSC 448**
**Course title :** Optimization Techniques
**Perquisites:** CSC 327
**Credit Hours**: 3 Lecture Hrs 2: Lab Hours: 1
Tut. Hrs: 0
**Course description:**
Unconstrained optimization theory. Convex functions and convex sets. Algorithms for unconstrained optimization (Steepest descent Newton methods Conjugate gradient methods). Constrained optimization theory (Kuhn-Tucker conditions). Special problems: (Linear programming Quadratic Programming). Algorithms for constrained optimization.
Since this is a course on optimization *techniques* you will need to be able to program with high level programming languages (e.g C/C++, Java, C#)
**Textbook :**
Wright, S. and J. Necedah *Numerical Optimization* Springer.

**Course Code:** **CSC 414**
**Course title:** introduction to Unix and Linux
**Prerequisites: CSC 229**
**Credit Hours : 3.** Lecture Hrs:2. Lab Hrs:2. Level:9
**Course description:**
User/kernel interface, fundamental concepts of Unix, user authentication, basic and advanced I/O, file system, signals, process relationships, and inter-process communication. Fundamental development and debugging tools such as "make" and "gdb" will also be covered.
**Textbook:**
W. Richard Stevens, Advanced Programming in the UNIX Environment, Addison Wesley Professional, 1992.

**Course Code :** **IS 491**
**Course Title : Multimedia Data Management**
**Prerequisites** : IS 224
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 1 Level : 10
**Course Description:**

Significance and value of multimedia for a variety of end uses .Multimedia data storage. Use of multimedia hardware for capture and management of sound, graphics and video. Multimedia development tools, programming, scripting and design skills. Use of multimedia authoring tools for producing multimedia applications

**Textbook:**

Boyle, T. .*Design for Multimedia Learning.* London: Prentice Hall, 1997

**Course Code :** **CSC 463**
**Course Title:** Artificial Intelligence
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level : 10
**Prerequisites**: CSC 214

**Course description**

Introduction & Definitions. Agent and examples. Uninformed Search. Heuristic Search. Constrained Search Problems CSP). Logical agents. First Order Logic and examples Machine Learning. Project.

**Textbook**

Russell, S. J. and P. Norvig. Artificial Intelligence, A Modern Approach, Prentice Hall,2003,USA.

**Course Code :** **CSC 458**
**Course Title :** Distributed Systems and Parallel Processing
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0
**Prerequisites** : CSC 229

**Course description:**

Introduction to distributed systems, processes and processors, parallel architecture (multi-computers, multi-processors), communication in parallel systems, performance of parallel systems, examples of parallel programming, introduction to distributed systems, distributed algorithms, types of distributed systems, compatibility of distributed systems and discovery of the end of processes.

**Textbook:**

Coulouris, G., Jean Doll more, and Tim Kind berg Distributed Systems: Concepts and Design, Addison-Wesley, 3rd Edition, 2001-ISBN: 0-201-619180

**Course Code :** **CSC 499**
**Course Title:** Project II
**Credit Hours** :4 Lecture Hrs:
Lab Hrs: Tut. Hrs: Level: 10
**Prerequisites : CSC498**

**Course description:**

Student will study, design and develop an integrated system. Examination to be held at the end of the semester.

**Textbooks:**

Selected papers and researches related to the project topic.

## Second Program:

BA Degree Program: **Information technology**

**Study Plan:**

**Level 3**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC244** | Concepts of Algorithms | 3 |
| **CSC276** | Computer Graphics | 4 |
| **CSC283** | Discrete Structures | 4 |
| **IS226** | Information Systems Fundamentals | 3 |
| **MATH203** | Differential and Integral Calculus | 3 |
| **STAT224** | Introduction to Statistics & Probability | 3 |
| | Total | 20 |

**Level-4**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC214** | Data Structures | 4 |
| **CSC229** | Operating Systems | 4 |
| **CSC237** | Programming Languages Concepts | 3 |
| **IC102** | Islam and Construction of Society | 2 |
| **IS224** | Visual Programming | 4 |
| **MATH207** | Differential Equations | 3 |
| | Total | 20 |

**Level-5**

| Course Code | Course Title | Credit |
|---|---|---|
| **CEN345** | Computer Networks | 4 |
| **CSC346** | Software Engineering | 3 |
| **IS326** | Database (2) | 4 |
| **IS340** | Information Systems Analysis and Design | 3 |
| **IS344** | Design and Programming of GUI | 4 |
| | Total | 18 |

**Level-7**

| Course Code | Course Title | Credit |
|---|---|---|
| **CSC414** | Introduction to Unix and Linux Systems | 3 |
| **IC104** | Fundamentals of the Islamic Political System | 2 |
| **IS449** | Data Mining | 3 |
| **IS463** | Knowledge base Systems Application | 3 |
| **IS481** | Communication Skills | 2 |
| **IS498** | Graduation Project-1 | 2 |
| | Total | 15 |

**Level-8**

| Course Code | Course Title | Credit |
|---|---|---|
| **IS450** | Multimedia Data Management | 3 |
| **IS452** | Planning & Management of Information Resources | 3 |
| **IS465** | Decision Support Systems | 3 |
| **IS480** | Electronic Commerce Systems | 3 |
| **IS499** | Graduation Project-II | 4 |
| | Total | 16 |

## Course Description:

**Course Code :** **CSC 152**
**Course Title :** Concepts of Algorithms and Computer Programming
**Prerequisites :** non
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level : 3
**Course description:**
Problem-solving, algorithmic design, Introduction to Programming, Structured Program Development, Program Control, Functions, Arrays. Assignments in algorithm design and translation of algorithms in high level language like C language.
**Textbook :**
C How to program ,Deitel&Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004

**Course Code:** **CEN 111**
**Course Title:** Logic Design
**Prerequisites:** non
**Credit Hours**: 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: Level:3
**Course description:**
Digital computer and information (numbering systems, Arithmetic operations, Decimal codes, etc), Combinational logic circuits (binary logic and gates, Boolean algebra, Combinational circuits simplification, CMOS circuits), Combinational logic design (design procedure, decoders, multiplexes, Binary adder and subtracted), Sequential circuits (latches, flip flops, synchronous sequential circuits analysis and design), Analysis and design of synchronous sequential machines, Representation, state reduction and realization; Finite state machines.
**Textbook:**
M. Mano, Digital Design, 3rd Ed., 2007.

**Course Code :** **IT 125**
**Course Title :** Database
**Credit Hours :** 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4
**Prerequisites** : CSC 152
**Course discretion:**
Database definition, Database system, Overview of database management, database system architecture, Introduction to Relational databases, An Introduction to Structured Query Language(SQL), Database Integrity, Views, Normalization, Database design, Practical Applications.
**Textbook:**
"An Introduction to Database Systems", Date, 2004, Addison-Wesley.

**Course Code:** **CEN 126**
**Course Title:** Computer Architecture
**Prerequisites:** CEN 111
**Credit Hours**: 3 Lecture Hrs: 3
Lab Hrs:0 Tut. Hrs: 0 Level:4
**Course description:**
Review of logic design principles. Basic computer organization. Data representation; Design of a hardwired-controlled basic computer; Processor organization; ALUs, bus and stack organizations; Instruction sets and instruction formats; Machine and Assembly language programming. Assembler function and design .System software .Micro-programmed CPU .Comparison between CISC, RISC and VLIW processors. Introduction to memory organization; I/O operations; Introduction to parallel processing techniques.
**Textbook:**
M. Mano, "Computer System Architecture," Prentice Hall, 2004.

**Course Code :** **CSC 153**
**Course Title :** Object Programming
**Prerequisites** : CSC152
**Credit Hours : 4** Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:4
**Course description:**
Introduction to Object-Oriented Programming, Program Control Structures, Functions, Arrays, Pointers and Strings, Classes Part I Classes and data abstraction, Classes Part II :Operator Overloading, Inheritance Virtual Functions and Polymorphism.
**Textbook**:
C How to program ,Deitel&Deitel, ISBN: 0-13-142644-3, Prentice Hall 4th Edition 2004.

**Course Code :** **CSC 244**
**Course Title :** Concepts of Algorithms
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:5
**Prerequisites**: CSC 152
**Course description:**
Growth function and Recurrence, Divide-and-Conquer: (Strassen, Fibonacci, Polynomial Multiplication), Heap Sort, Quick Sort, Bubble Sort, Insertion Sort, Merge Sort, Hash Table, Binary Search Tree, Dynamic Programming, Greedy Algorithms,
**Textbook**
Introduction to Algorithms, (Second Edition) Thomas Cormen, Charles Leiserson, Ronald Rivest, and Clifford Stein. MIT Press. ISBN: 0262032937

**Course Code :** **CSC 276**
**Course Title :** Computer Graphics
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:5
**Prerequisites:** CSC 153
**Course description:**
Computer Graphics Applications Survey.**Color models** (chromaticity diagram, RGB, CMY, YIQ, HSV, and HLS color models).**Graphics Output Primitives** (coordinate frames, DDA, Bresenham's algorithm, circle-drawing, fill-area primitives algorithms). **2D Graphics** (2D Cartesian coordinates, curves and parametric equations, functions and transformations, inverse functions. **3D Graphics** (vectors in 3D, dot and cross product, homogeneous coordinates, correlation between cartesian and homogeneous coordinates). **Geometric transformations** (2D geometric transformations, matrix representation and homogeneous coordinates, inverse transformations, 2D composite transformations).**Geometric representation** (Lagrange polynomials of degree n, Hermite cubic polynomial, Bernstein polynomial, interpolation problem, Spline interpolation, problem of approximation, Bezier-Bersnstein approximation, Bezier-B-Spline approximation, quadric surfaces).
**Graphics Lab:** modeling, rendering, animation using 3D Studio Max from Autodesk. Use of OpenGL.
**Textbook:**
Hearn, D. and P. Baker "*Computer Graphics with OpenGL*".Pearson Prentice Hall, PearsonEducation Inc., Upper Saddle River, NJ07458, USA, 2004.PIE ISBN 0-13-120238-3.

**Course Code :** **CSC 283**
**Course Title :** Discrete Structures
**Credit Hours** : 4 Lecture Hrs:
Lab Hrs: 0 Tut. Hrs: Level:5
**Prerequisites:** CSC 153
**Course description:**
**Introduction to Discrete Structures**: algorithmic language. **Logic**: propositions, predicate logic, proofs, mathematical induction. **Sets**: special sets, operations, properties and identities, application of logic to knowledge-based systems. **Relations**: graphical and matrix representations, equivalence and order relations, application to databases. **Functions**: types, cardinality, application to functional languages. **Undirected Graphs**: Simple graphs, Eulerian paths, Hamiltonian circuits, trees, application to syntax diagrams. **Directed Graphs**: digraphs, consistent labeling, paths problems, Warshall's algorithm, shortest paths and Dijkstra's algorithm, application to routing in computer networks .**Machines and Computations**: automata as models, finite state automata (FSA) without outputs, FSA as language recognizers and their limits, introduction to Turing Machines, application of FSA to problem-solving.
**Textbook:**
Skvarcius, R. and W.B. Robinson "Discrete Mathematics with Computer Science Applications" The Benjamin / Cummings Publishing Co., 1986.
**Course Code :** **IT 226**
**Course Title :** Information Systems Fundamentals

**Prerequisites** : IT 125
**Credit Hours** :3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level: 5
**Course description:**
Definition of Information Systems ,Philosophy of IT Department, IT Courses Interrelations, Survey of information systems technology, Strategies for IT design, Strategic Role for Information and Information Systems, Organizational Structure and Information Systems, Organizational Modeling, Enterprise-wide computing and networking, Conceptual foundations, The Decision-making process, Information Systems Strategic Planning, Information system requirements, designing the information architecture of an organization, Information systems products and services, Managing of Information Systems.
**Textbook:**
O'Brien, J. A. (2003). Introduction to Information Systems (11th ed.). New York: McGraw Hill

**Course Code :** **CSC 237**
**Course Title :** Programming Languages Concepts
**Prerequisites**: CSC 283
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0
**Course description:**
To present an overview of several different paradigms of programming, To give some experience in writing programs in different languages, To introduce the concepts of syntax-directed translation, programming language semantics, parsing, and others.
**Textbook**
Robert W. Sebesta. Concepts of programming languages, 2008 Addison-Wesley.

**Course Code :** **CSC 229**
**Course Title :** Operating Systems
**Prerequisites**: CEN 126
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:6
**Course description:**
Computer System Structure ,Operating System Concepts ,Operating System Structure ,Procedures, CPU Scheduling, Process Synchronization,BatchFiles,RecoveryConsole,MemoryManagement,VirtualMemory,File-System Interface, Storage Structure, Data Storage on Disks ,File-Systems : Fat,Fat32, NTFS, Distributed Systems ,Hardware Protection ,The Linux system.
**Textbook**
Abraham Silberschatz, Peter Baer, Galvin, Greg Gagne. Operating Systems concepts , Pearson Educaion, Sixth Editio

**Course Code :** **ITS 224**
**Course Title :** Visual Programming
**Prerequisites** : CSC 153
**Credit Hours** : 3 Lecture Hrs: 2
Lab Hrs: 2 Tut. Hrs: 0
**Course Description:**
Selecting a Visual Language, Knowing the concepts and procedures used in Visual Languages, Syntax and semantics of the language used. Types of Data, conditional statements, recursion, data structures, modular programming, review of Object-Oriented Programming concepts and techniques, User Interface Design rules, Materializing an interface into a set of visual objects, File types, File organizing techniques, File usages, Publishing an interface on the web, Basic concepts of Human Computer Interaction, Comparison between the selected language and other visual languages.
**Textbook:**
Diane Zak, Programming with Microsoft Visual Basic .NET 2005, Publisher Course Technology, ISBN 0-619-21718-9

**Course Code :** **CSC 214**
**Course Title :** Data Structures
**Prerequisites :** CSC 283
**Credit Hours** : 4 Lecture Hrs: 3
Lab Hrs: 2 Tut. Hrs: 0 Level:6
**Course description:**
Functions in C - Structures and pointers - Memory Management functions , Concepts and

Definition of abstract data type, Array as ADT, Stack and operations, Queue and operations Linked List and stack as list, Queue as list and applications, Sorting, recursion, Tree Introduction to Graphs, Projects and Exercises.

**Textbook :**

Data structures using C and C++. Second edition, YEDIDYAH LANGSAM and others Prentice Hall and others. 1996.

**Course Code :** **IT 326**

**Course Title :** Database (2)

**Prerequisites** : IT 125

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 1 Level : 7

**Course Description:**

DBMS architecture and administration; Centralized and Client-Server approaches, System Catalog, Data Dictionary. Transaction management; Transactions: concepts, characteristics. Recovery techniques, Concurrency control techniques: Serializability, Deadlock, Locking schemes, Time-stamp ordering, Multi-version, Optimistic techniques; DB security; Distributed databases; Distributed DBMS, Data fragmentation and replication, Distributed transactions management. Object-Oriented databases. Introducing to new emerging DB technologies and applications; Web DBs, Multimedia DBs, Data Warehousing and Data Mining

**Textbook:**

Principles of Distributed Database Systems, Ozsu, M. Tamer And Valduriez, Patrick

**Course Code:** **CSC346**

**Course Title:** Software Engineering.

**Prerequisites:** CSC 214

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:7

**Course description:**

Software Engineering Concepts, System Engineering Concepts, Software Process, Analysis Concepts and Principles, Analysis Modeling Design, Real-Time System Design, Software Testing Techniques,Technical Metrics for Software, Project.

**Textbook:**

Ian Somerville, Software Engineering , Pearson Education, 7-th edition.

**Course Code :** **IT 340**

**Course Title :** Information Systems Analysis and Design

**Prerequisites** : IT 226.

**Credit Hours** : 3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0 Level:7

**Course Description:**

fundamental knowledge, methods and skills needed to analyze, design and implement computer-based systems. The role of the systems analyst and the techniques employed. Utilizing the structured software development life cycle approach, the development phases are comprehensively discussed and reviewed.The Modeling Techniques: Process Modeling (DFDs), Data Modeling (ERDs), Architectural System Design Modeling, Unified Modeling language forms and Object-Oriented Modeling. The Course includes an integrated project that covers the whole system analysis and design phases, which the students will fulfill on a groub base manner. The Course also emphasizes on developing and improving the skills of interrelating, documenting, and modeling for the students.

**Textbook:**

Modern System Analysis & Design, 3rd Edition, 2002, J. A. Hoffer, J. F. George, J. S. Valacich, ISBN 0130339903

**Course Code :** **IT 344**

**Course Title :** Design and programming of GUI

**Prerequisites** : IT 224

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:7

**Course Description:**

Fundamentals of programming and designing of business applications using Visual programming, Common controls and construction of menus in

Visual programming, Concepts and applications of data structures and design of graphical user interfaces, adding Database access and Internet access to Visual programming programs.

**Textbook:**

Philip A. Koneman, Visual Basic.NET Programming for Business, Pearson Education, Prentice-Hall

**Course Code:** **CEN 345**

**Course Title :** Computer Networks

**Prerequisites:** CEN 126

**Credit Hours :**4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:7

**Course description:**

**Introduction to computer networks**: Network Types, Overview of data transmission, Introduction to network protocols, The Internet protocol. **Network topologies**; Network architecture and the OSI reference model; The physical and Data Link Layer , flow and errors control, ARQ Stop/wait, Sliding window protocols, **DLC standards**: HDLC , PPP and SLIP; Medium Access control Protocols and standards; ALOHA, CSMA, CSMA/CD, Token Ring , Wireless; LAN standards & Devices: Ethernet and IEEE standards for LANs; LAN devices: Bridges, Hubs, routers, Ethernet Switches; **Network Layer Services**: Datagram and Virtual Circuits; WAN Standards and techniques: X.25, Frame relay, ATM.

**Textbook:**

A. Tanenbaum Computer Networks.4rd Ed., Prentice-Hall, 2003.

**Course Code :** **IT 324**

**Course Title :** Modern Concepts of Application Programming

**Prerequisites** : IT 224

**Credit Hours** : 4 Lecture Hrs: 3

Lab Hrs: 2 Tut. Hrs: 0 Level:8

**Course description:**

Modern programming Concepts and how to be used to build real world applications needed by Society Organizations. Understanding a problem and analyzing it, sketching a solution, implementing the solution, documenting it and finally presenting the work in a professional manner. Projects tobe selected in the domain of modern applications, e.g: Health Information Systems, E-Commerce applications, Academic field, … .

This course, however, is intended to develop the talents of students and to encourage the spirit of competition, creation, goodness of work, and prettiness of exposition This course includes 2 or 3 large programming projects per semester.

**Textbook**

To be determined according to the chosen projects.

**Course Code :** **IT 342**

**Course Title :** Information Systems Engineering

**Prerequisites** : IT 340

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:8

**Course description:**

Application systems implementation, functional testing, user acceptance testing, and installation strategies .The processes of maintaining information systems, types of maintenance, measuring and controlling of maintenance effectiveness.

Software quality assurance, quality concepts, the ISO quality factors, technical metrics for software and examples of function-based, specification quality, testing metrics. Technical metrics for object-oriented systems. Information Systems Development Methodologies. Requirements Gathering Engineering. Software Copying Management.

**Textbook:**

Kees M. van Hee, Information Systems Engineering, A Formal Approach, (ISBN-13: 9780521455145 | ISBN-10: 0521455146)

**Course Code :** **IT 392**

**Course Title :** Selected Topics in Information Systems

**Prerequisites** :80CH.

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:8

**Course Description:**

Special topics of current trends in information systems. Engineering Tools and Methods, Simulation, Virtual Reality, Internet Security, Data Warehousing and Mining, Geographic Information Systems, Telemedicine and Medical Informatics, Workflow Management, Quantitative and Qualitative Methods in Information Systems, Global Information Systems Management, Intelligent Agent Technology and Applications, Human Computer Interaction, Computer-Based Learning and Training, Philosophical Foundations of Information Systems, Absorbing Continuous IT Developments in Organizations, IT Professional and Organizational Needs, Organizational Learning and Collaborative Technologies, Understanding and Managing Information Users Behavior, Policy, Legal and Security Issues in IT , and Virtual Organizations.

**Course Code:** **CSC 357**

**Course Title:** Internet Techniques web programming**.**

**Credit Hours** : 3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0 Level: 8.

**Prerequisites**: CEN 345

**Course description:**

An overview of connecting to and navigating within the Internet system and the World Wide Web: Navigation. Search Engines. Advanced search techniques. Design of web pages using HTML, XML and Java.TCP/IP.Client/Server architectures. Mastering Connectivity. Security.

**Textbook :**

Gary P. Schneider and Jessica Evans*The Internet -- 3rd Edition*, Course Technology, 2002.

**Course Code:** **CSC 327**

**Course Title:** Operations Research &Applications programming

**Credit Hours** :3 Lecture Hrs: 2

Lab Hrs: 2 Tut. Hrs: 0 Level:8

**Prerequisites**: CSC 283

**Course description:**

OR Approach, Methodology And Applications : modeling, constraints, objective and criteia. Problems of multiple criteria optimization, model validation and systems design.Mathematical programming; simulation, gaming; heuristic programming. Examples,: theory of inventory. Production; linear and quadratic cost functions. Waiting line problems: single and multiple servers with Poisson input and output. Theory of games for two-person competitive situations. Project management through PERT-CPM

**Textbook:**

HamdiTaha, Operations Research: An Introduction (7th Edition), ISBN: 0130323748, 2002.

**Course Code :** **IT 449**

**Course Title :** Data Mining

**Prerequisites** : IT 326.

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:9

**Course description:**

Principles, algorithms and applications of data mining, including algorithms, methods, implementations and applications of mining sequential and structured data, text data, Web data, spatiotemporal data, biomedical data and other forms of complex data.

**Textbook:**

Jiawei Han and MichelineKamber*"* *Data Mining: Concepts and Techniques*" 2nd ed., Morgan Kaufmann, 2006

**Course Code:** **IT 481**

**Course Title:** Communication skills

**Credit Hours** :2 Lecture Hrs: 2

Lab Hrs: 0 Tut. Hrs: 0 Level: 9

**Prerequisites: non**

**Course description**

This course covers written, oral, and interpersonal communication. Students will hand in short pieces of writing each week, will make oral presentations several times in the semester, and will work together in simulated project meetings and other realistic scenarios of pair and small group interaction.

**Course Code : IT 463**
**Course Title :** Knowledge base systems Application
**Prerequisites** : CSC 214
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 0 Level:9
**Course Description:**
Review of first-order logic, relational algebra, and relational calculus. Fundamentals of logic programming .Logic for knowledge representation .Architecture of a knowledge-base system .Fundamentals of deductive databases. Top-down and bottom-up query processing. Some important query processing strategies and their comparison .Project or term paper on current research topics.
**Textbook**
Richard A. Frost, Introduction to Knowledge Based Systems.

**Course Code : CSC 414**
**Course title:** introduction to Unix and Linux
**Prerequisites: CSC 229**
**Credit Hours** : 3. Lecture Hrs:2.
Lab Hrs:2. Level:9
**Course description:**
User/kernel interface, fundamental concepts of Unix, user authentication, basic and advanced I/O, file system, signals, process relationships, and inter-process communication. Fundamental development and debugging tools such as "make" and "gdb" will also be covered.
**Textbook:**
W. Richard Stevens, Advanced Programming in the UNIX Environment, Addison Wesley Professional, 1992.

**Course Code : IT 498**
**Course Title :** Graduation Project-1
**Prerequisites** : 100 CH.
**Credit Hours** : 2.
Level:9
**Course Description:**
The previous courses have provided the IT students with strong and sufficient knowledge to develop information systems. The next logical stage is that the IT student must acquire hands-on experiences on developing real world information systems. In addition, the students should be familiarized with real world problems encounter during the development of real world information systems. Furthermore, the students should be trained to work in teams. In this course, the students will be organized into groups. The number of students in each group should not exceed three students. For each group, a supervisor will be allocated to guide the group in developing a particular information system. In developing an information system, a particular information system development methodology should be used. Each group will develop a real world information system in two stages: The first stage will be carried out in IT 498 and the second stage will be carried out in IT 499. In IT 498, the students of each group must identify a problem domain, define a problem, identify the requirements in details, specify requirements in details, analyze and document the current system, proposed alternative systems, and design a particular system in details which includes the definitions of all the required system models such as the data model and the functional model. At the end of the course, each group must submit a formal report documenting the problem domain, the requirements, specifications, and the system models.

**Course Code : IT 450**
**Course Title :** Multimedia Data Management
**Prerequisites** : IT 224
**Credit Hours** : 3 Lecture Hrs: 3
Lab Hrs: 0 Tut. Hrs: 1 Level : 10
**Course Description:**
Significance and value of multimedia for a variety of end uses .Multimedia data storage. Use of multimedia hardware for capture and management of sound, graphics and video.

Multimedia development tools, programming, scripting and design skills. Use of multimedia authoring tools for producing multimedia applications.

**Textbook:**

Boyle, T. .*Design for Multimedia Learning.* London: Prentice Hall, 1997.

**Course Code :** **IT 452**

**Course Title :** Planning & Management of Information Resources

**Prerequisites** : IT 342

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level: 10

**Course Description:**

Definition of Information Resources and IT Infrastructure, Information Strategy Planning Components (Business Planning, Systems Planning, technical Planning). Strategic Planning Steps, used tools, managing the Feedback, Developing strategic Objectives and Rules. Organizing, Managing, and Developing of Information Resources for the Information Systems Departments, Cost Analysis, Outsourcing Management, IT Contingency Planning and Resources Safety. Human Factors and Performance Measurements. Security issues, Internal auditing, Standards and procedures of the Information Center, Continuous Improvement of IT Resources. Standards of Computer Networks, Planning of Networks, Business Requirements to Construct Networks, Requirements Analysis, Design of Networks, Choosing Network Technologies, Managing Networks, Measuring and continuous Evaluation of Network Performance, Network Maintenance and Development, Economical and Legal Issues of Managing Networks, Network effects on the performance and Productivity of the Organization, Computer Networks and the Organization, Network Management Tools.

**Textbook:**

**Course Code :** **IT 465**

**Course Title :** Decision Support Systems

**Prerequisites** : IT 326

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 level:10

**Course description:**

Decision-making process, systems modeling and support .Categorization of problem-solving techniques .Data management and concepts of the data warehousing .**Modeling of managerial problems**; linear programming models, simulation models, heuristics and forecasting models. Model-base management systems. DSS user interface design and management. Decision support system construction methods.DSS Hardware, software, and technology Levels. Knowledge-based and expert systems, expert system architecture; representation of knowledge; forward and backward chaining; inferences making process; Applications of expert systems in decision making Group, distributed, and executive decision support systems.

**Textbook:**

Turban, E. & Aronson J. E., Decision Support Systems & Intelligent Systems, Seventh Edition. Upper Saddle River, NJ: Prentice Hall. ISBN: 0-13-046106-7

**Course Code :** **IT 480**

**Course Title :** Electronic Commerce Systems

**Prerequisites** : IT 340

**Credit Hours** : 3 Lecture Hrs: 3

Lab Hrs: 0 Tut. Hrs: 0 Level:10

**Course description:**

Strategic planning for EC adoption; Business design and architecture for EC applications; Web-based marketing strategies and models; E-Commerce Project Management; Public Policy and Legal Issues of Privacy; Socio-Technical Infrastructure for E-Commerce; Risk Management in E-Commerce Initiatives; E-Transformation; Measuring Effectiveness of E-Commerce Projects; EC and organizational change management; EC and competitiveness; Success and failure in EC implementation; Retailing in E-Commerce; E-Commerce in Banking; Advertisement in E-Commerce; E-Commerce and Online Publishing; E-Commerce in Manufacturing; E-Commerce and Supply Chain Management; E-Commerce and Customer Asset Management; Electronic Payment Systems; Mobile E-Commerce; Modern trends in developing E-commerce systems.

**Textbook:**

Daniel Amor. (1999). *The E-business (R)evoltion: Living and Working in an Interconnected World*. Upper Saddle River, NJ: Prentice Hall.

**Course Code :** **IT 499**
**Course Title :** Graduation Project-II
**Prerequisites** : IT 498
**Credit Hours** : 4
**Course description:**

In this course, each group will continue developing the information systems that started in IT 498. Each group must use a particular tool to implement its information system in a good programming practice. This implementation tool must be new and the students have not been experienced in the previous courses. Furthermore, the students must generate a user manual for their information system in an appropriate format. At the end of the term, each group must submit a final report, which documents completely the information system from the problem definition phase to the test and implementation phase and contains a user manual for the information system.

## Program: Mathematic

**Study plan:**

**The first and second level is the nature science preparation**

**Level 3**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration(2)** | Math.202 | 4 |
| **Principal of Probability Distribution Theorem** | Stat212 | 4 |
| **Basics of Mathematics** | Math.231 | 3 |
| **Introduction to Geometry** | Math.273 | 3 |

**Level 4**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Differentiation & Integration in many variables** | Math.203 | 4 |
| **Mathematical applications on computers** | Math.251 | 2 |
| **Vectors** | Math.204 | 3 |
| **Linear algebra** | Math.242 | 4 |
| **Theory of numbers** | Math.243 | 3 |

**Level 5**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Linear Programming** | Math.213 | 4 |
| **History of Mathematics** | Math.232 | 3 |

| | | |
|---|---|---|
| **Introduction to Differential Equations** | Math.321 | 4 |
| **Numerical analysis** | Math.351 | 4 |

**Level 6**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Mathematical Methods** | Math.326 | 4 |
| **Group Theory** | Math.343 | 4 |
| **Real Analysis (1)** | Math.382 | 4 |

**Level 7**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Rings and Fields** | Math.444 | 4 |
| **Introduction to Topology** | Math.471 | 4 |
| **Real Analysis (2)** | Math.483 | 4 |
| **Project** | Math.499 | 4 |

**Level 8**

| Course name | Course code & number | Studying Hours |
|---|---|---|
| **Introduction to Partial Differential Equations** | Math.422 | 4 |
| **Introduction to Differential Geometry** | Math.472 | 4 |
| **Complex Analysis** | Math.484 | 4 |

## COURSE DESCRIPTION:

**Level 3**

**Math .202 Differentiation & Integration(2) :** This course aims at giving students definite integral and its properties , mean value theorem of integral and the fundamental theorem of calculus. It also discusses indefinite integral , standard integrals, derivatives & integrals of hyperbolic and inverse hyperbolic functions, integration methods such as: integration by substitution , integration by parts , integration by partial fractions and other substitutions. Also L'Hospitals Rule , evaluation of area and volume of revolution, arc length, Numerical integration (Trapezoidal rule), Polar coordinates, Polar curves graphs and areas using polar coordinates.

**Stat212 Principal of probability distribution theorem:**
This course discusses the discrete and continuous probability distributions (The mass and density probability functions and their properties, expectation, variance, standard deviation and the moment generating functions) . The discrete and continuous bi variety random variables and their properties (expectation, covariance, correlation coefficient, variance of sum or difference of two random variables and the moment generating
functions of bi variety random variables) . Bi variety distributions (marginal and conditional

distributions ,independence of random variables , conditional expectation) .Also distribution functions of random vectors and random samples (distribution of sample mean – law of large number – central limit theorem) are discussed.

**Math.231 Basics of mathematics :**

This course aims at introducing mathematical logic, methods of proofs, mathematical induction, set theory, the product of sets, binary operations, equivalence relations , equivalence classes and partitions ,
mappings , the images and inverse images of sets under mappings , equivalence sets, countable and finite sets. Binary operations, morphisms, definition and examples of groups-definition and examples of rings and fields, polynomials and partial fractions.

**Math.273 Introduction to geometry:**

This course provides students with the main concepts of plane Euclidean geometry such as: coordinates, transformation, reflections ,translation, isometrics and similarity. Theorems on triangles, circles, tangents and angles. Polygons, polyhedral, regular polyhedral, their classification, and properties. Spherical geometry such as: sum of angle formula for spherical triangles, projection, conservative functions. Affine geometry : linear and affine transformation, isometrics, finite affine planes.

**Level 4**

**Math.203 Differentiation & integration in many variables:**This course studies the functions in two or more variables, domain of the function, three dimension rectangular coordinates, limits, continuity, partial derivative, higher-order partial derivatives, differentiation of composed function, maxima and minima-method of Lagrange multipliers for maxima and minima. Double integrals in Cartesian and polar coordinates , triple integrals in spherical and cylindrical coordinates, infinite series, convergence tests, representations of functions by power series, Taylor , Maclaurin, and the binomial series.

**Math.251 Mathematical applications on computers**

This course provides an introduction to mathematics software as Mathematica, Mat lap and solving some problems in calculus and linear

algebra by mathematica and Mat lap. Applications: modeling , simulation and visualization , internet research . Writing mathematical reports and projects using scientific work place.

**Math.204 Vectors:**

Students studies vectors in two and three dimensions, scalar and vector products, equations of lines and planes in 3-dimensional space. Surfaces of revolution and their equations in cylindrical and spherical Coordinates. Vector valued functions of a real variable, curves in space, curvature, rates of change in tangent and normal directions, directional derivatives and gradient of a function. Application to equations of normal and tangent space to a surface at a point. Vector fields, divergence, curl of a vector, line and surface integrals, Green's theorem, Gauss' divergence theorem and Stock's theorem.

**Math.242 Linear algebra**

This course studies matrices and their operations, types of matrices, elementary transformations, determinants, elementary properties of determinants, inverse of a matrix, rank of matrix, linear systems of

equations, vector spaces, linear independence , finite dimensional spaces , linear subspaces, inner product spaces, linear mappings, Kernel and image of a linear mapping- Eigen values and Eigen vectors of a matrix and of a linear operator mapping.

**Math.243 Theory of numbers:**

Students study the first and second principle of mathematical induction, well-ordering principle , divisibility, Euclidean algorithm, prime numbers and their properties, linear Diophantine equations, congruencies and their properties, linear congruencies- the Chinese remainder theorem, Fermat's

little theorem, Euler's theorem, Wilson's theorem, arithmetic functions and Pythagorean triples.

**Level 5**

**Math. 213 Linear programming:**

This course gives introduction to operations research, mathematical model for some real problems and mathematical formulation of linear programming problem. Graphical method for solving linear programming problems, convex sets, polygons, extreme point and optimality theorem. Analytical method (Simplex method) , big-M method , Two-phase method, formulation mistakes, dual problem, sensitivity

analysis, application to transportation and network problems.

**Math.232 History of mathematics:**

This course aims at giving students some knowledge about the evolution of some mathematical concepts ,facts and algorithms in arithmetic , algebra, trigonometry ,Euclidean geometry, analytic geometry and calculus through early civilizations such as ancient Egyptian , Babylonians, Greeks, Indians, Chinese, Muslims and Europeans . Evolution of solutions of some conjectures and open problems.

**Math.321 Introduction to differential equations**:

This course gives basic definitions and construction of an ordinary differential equation. Methods of solving ordinary differential equations of first order . Orthogonal trajectories, ordinary differential equations of high orders with constant coefficients and with variable coefficients, types of solutions, linear systems of ordinary differential equations, series solutions of a linear ordinary differential equation of second

order with polynomial coefficient and Laplace transform.

**Math. 351 Numerical analysis:**

Students study numerical methods for solving nonlinear equations (bisection – iteration – Newton – false position … ), errors and rates of convergence. Direct methods for solving linear systems (Gauss

elimination, LU decomposition) and iterative methods (Jacobi –Gauss Seidel – Relaxation). Errors iteration matrices and convergence of iterative methods, polynomial interpolation (Lagrange-
Newton's methods: divided differences- forward and backward differences) and analysis of errors. Numerical differentiation and integration, errors and accuracy. Gaussian integration formulas.

**Level 6**

**Math.326 Mathematical Methods :**

This course discusses series solutions of ordinary differential equations with variable coefficients, inner product space of functions, self- ad joint operator, Sturm-Lowville theory, orthogonal polynomials and special

functions( Legendre, Hermit, gamma, beta, Bessel). Generalized theory of Fourier series and Fourier integrals.

**Math.343 Group Theory:**

This course studies the axioms of group theory and some examples of groups. Subgroups, cyclic groups, Lagrange theorem, normal subgroup, factor group, homomorphism, fundamental theorems of isomorphism, auto morphisms, Caley theorem and its generalization, simple groups, permutation groups, class equation, group action on a set, p-groups, Cauchy theorem- Sylow's theorems, external and internal direct product of group, Burnside theorem, dihedral- quaternion, groups of

auto morphisms on finite and infinite cyclic groups.

**Math.382 Real Analysis (1):**

This course introduces basic properties of the field of real numbers , completeness axiom , series and their convergence ,

monotone sequence , Bolzano-Weirstrass theorem , Cauchy criterion, basic topological properties of the real numbers, limit of a function , continuous functions and their properties . Uniform continuity , compact sets and its properties. The derivative of a function,mean value theorem and Lupital rule and Taylor theorem.

**Level 7**

**Math.444 Ring and Fields:**

Students study rings, group of units, group of auto morphisms of a ring , ideals and factor rings and principal ring. They also study prime and maximal ideals, field of quotient of integral domain, characteristic of a ring, direct sum of rings, modules, Euclidean rings, ring of polynomials, roots of polynomials over a field, fields extensions, finite and simple extensions of fields, algebraic closure of a field, splitting fields and finite fields.

**Math.471 Introduction to Topology:**

This course introduces topological spaces, examples, closure of a set, derived set, topological subspaces, bases ,finite product topology, sub-bases, metric spaces , examples, metrizability, continuous functions , characterization of continuous functions on topological and metric spaces, homeomorphisms and examples. Topological property, compact spaces, examples , limit point and sequentially compact spaces.

**Math.483 Real Analysis (2):**

This course studies definition of Riemann integral, Darboux theorem , Riemann sums , properties and the principle theorem in calculus. Series of functions, point twice convergence , uniform convergence, algebra
and σ – algebra (sigma algebra), finite additivity and countable additivity, main extension theorem and outer measure. Measurable sets , measure , Lebesgue measure and its properties, simple functions, measurable functions, Lebesgue integral, theorems of convergence, the relation between Lebesgue and Riemann integral.

**Math.499 Project:**

A student prepares a research project in one of the Math. topics under the supervision of the staff.
The student should submit a report for an oral exam.

**Level 8**

**Math.422 Introduction to partial differential equations:**

This course discusses classification and formation of partial differential equation , first order linear partial differential equation , solution
using Lagrange's method , Cauchy problem , second order linear partial differential equation in several variables , physical application using separation of variables , classifications of partial

differential equation , some boundary value problems and Green's function.

**Math.472 Introduction to differential geometry:**

This course discusses theory of curves in $R^3$, regular curves , arc length and reparameterization , natural parameterization, Serret-Frenet apparatus, existence and uniqueness theorem for space curves, Bertrand curves. Involutes and evolutes, local theory of surfaces, simple surfaces, coordinate transformations, tangent vectors & tangent spaces . First and second fundamental forms, normal and geodesic curvature , Weingarten map, principal Gaussian and mean curvatures, geodesics, equations of Gauss and Godazzi-Mainardi.

**Math.484 Complex Analysis:**

This course discusses complex numbers, Cartesian and polar representation of complex numbers, powers and roots of complex numbers, limits and continuity of complex functions, analytic functions , Cauchy-Riemann equations. Harmonic functions, exponential, trigonometric , hyperbolic functions and logarithmic functions. Complex integration, contour integral , Cauchy's theorem, Cauchy's integral
Formula, bounds on analytic functions ,Taylor and Laurent series, power series, zeros and singularities. Residue theory and applications to real and improper integrals.

## BA Degree Program : Physics

The first year for these program is the preparatory year of natural Science

**Level 1**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 101** | Language | 2 | - |
| | Skills | | |
| **CHEM101** | General Chemistry (1) | 4 | - |
| **ENG101** | English Language | 3 | - |
| **IC101** | Introduction to Islamic Culture | 2 | - |
| **MATH101** | Calculus (1) | 4 | - |
| **PSY101** | Thinking Skills | 2 | - |
| **Total** | 17 | | |

**Level 2**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **ARAB 103** | Arabic Editing | 2 | - |
| **CSC101** | Introduction to Computers and Programming | 3 | - |
| **ENG103** | English Language (2) | 3 | ENG101 |
| **IC102** | Islamic and Society Building | 2 | IC101 |
| **PHYS101** | General Physics (1) | 4 | - |
| **STAT101** | Statistical Probability | 3 | - |
| **Total** | 17 | | |

**Level 3**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC103** | Economic System in Islam | 2 | IC101 |
| **MATH201** | Calculus for Science (2) | 3 | MATH101 |
| **PHYS243** | General Physics (2) | 4 | PHYS101 |
| **PHYS211** | Classical Mechanics (1) | 3 | MATH101 PHYS101 |
| **PHYS231** | Vibrations and Waves | 2 | MATH101 PHYS101 |
| **PHYS243** | Thermodynamics | 3 | PHYS101 |
| **Total** | 17 | | |

**Level 4**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **MATH205** | Calculus for Physics (3) | 3 | MATH201 |
| **PHYS232** | Physical Optics | 3 | Phys231 |
| **PHYS234** | Health Physics | 2 | - |
| **PHYS203** | Mathematical Physics (1) | 3 | MATH201 |
| **PHYS212** | Classical Mechanics (2) | 3 | PHYS211 |
| **PHYS221** | Electromagnetism (1) | 3 | PHYS202 |
| **Total** | 17 | | |

**Level 5**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **BUS103** | Communication Skills | 2 | - |
| **MATH210** | Differential Equations | 3 | MATH205 |
| **PHYS302** | Mathematical Physics (2) | 3 | PHYS203 |
| **PHYS321** | Electromagnetism (2) | 3 | PHYS212 |
| **PHYS351** | Modern Physics | 3 | PHYS232 |
| **PHYS393** | Optics Physics | 3 | PHYS232 |
| **BIO314** | Healthy Culture | 2 | - |
| **Total** | 18 | | |

**Level 6**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **IC104** | Political System in Islam | 2 | IC101 |
| **PHYS303** | Mathematical Physics (3) | 3 | PHYS30 |
| **PHYS350** | Quantum Mechanics (1) | 3 | PHYS212 PHYS351 |
| **PHYS391** | Electromagnetism Lab | 2 | PHYS221 |
| **PHYS393** | Modern Physics Lab | 2 | PHYS351 |
| **PHYS342** | Statistical Physics | 3 | PHYS243 |
| **PQUR126** | Islamic Morals | 2 | |

| **Total** | 17 | | |
|---|---|---|---|

**Level 7**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS422** | Electronics | 4 | PHYS243 |
| **PHYS452** | Quantum Mechanics (2) | 3 | PHYS350 |
| **PHYS471** | Solid State Physics (1) | 3 | PHYS350 |
| **PHYS481** | Nuclear Physics (1) | 3 | PHYS351 |
| | Selective Course (Faculty) | 2 | - |
| **Total** | 16 | | |

**Level 8**

| Course Code | Course Title | Credit | Pre-Course |
|---|---|---|---|
| **PHYS455** | Molecular and Atomic Spectra | 3 | PHYS452 |
| **PHYS495** | Solid State Lab | 2 | PHYS471 |
| **PHYS497** | Nuclear Physics Lab | 2 | PHYS481 |
| **PHYS498** | Project | 2 | PHYS497 PHYS495 |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course (Department) | 2 | - |
| | Selective Course | 2 | - |
| **Total** | 17 | | |

## Course Description:

**CHEM 10 : General Chemistry**

Theoretical part : Chemical calculations, gasea, liquid state, thermochemistry, solutions, chemical kinetics, chemical and ionic equilibria Bohr Theory and electronic configuration of atoms and periodic table . An Introduction to types of chemical bonds .

Practical part : some experiments on properties of matter : density , viscosity, qualitative analysis : identification of acidic and basic radicals for inorganic salts .

**Course Number : CSC 101 Introductions to Computer and Programming**

Credit Hours ( lecture and Lab ) : 3 (2+ 1)

Level : Second

Theoretical parts : Introduction to programming , structured program development, program control, functions, array. Assignments in algorithm design and translation of algorithms in high level language like C language

Practical part: Excercices on the theoretical part.

**Course Number :** ENG **101 - English Language**

The course aims to introduce students to :

An awareness of the basics of the English language in general .

An understanding of the basics of English grammar .

The basics of English pronunciation.

Specialized academic topics in the students, respective disciplines.

Proposed Teaching Methods

The course will be conducted via lectures in the main seminar, workshops and group discussions will also be used .

**Course Number : Math 101 - Calculus -1**

Real number and real line – Inequality. Function – The graph of a function- even and odd functions- composite of functions- Review of Trigonometric functions – inverse functions- Limits – The definition of a limit – Properties of Limits- Techniques for Evaluaring Limits – Infinites Limits. Continuity at a point on an open interval - one sided limits and continuity on a closed interval – Properties of continuity . The Derivative of a function – Differentiability and continuity – chain Rule – Derivatives of Trigonometric function – Logarithmic and Exponential functios ( Differentiation ) - Hyperbolic functions – inverse Trigonometric functions Differentiation . Exterma on an interval- Rolle,s Theorem and mean value theorem – Increasing and Decreasing functions and the first derivative test – concavity and second derivative test- related rates .

**PHYS 101 General Physics (1) (3 + 1) h.**

Theoretical part: Physics and measurements, Units and dimensions, Dynamics of particle in one dimension (displacement, average velocity, instantaneous velocity, acceleration, free fall), vector algebra and geometry, Motion in two dimensions, Projectile motion, Uniform circular motion, Tangential and radial accelerations, Newton's first law and inertial frames, Mass and weight, Newton's second law, Newton's third law, Friction, Work and energy, Vector scalar products, Work of variable forces, Kinetic energy and work-energy theorem, Conservative and non-conservative forces and potential energy, Power, Conservation of mechanical energy, The conservation law of linear momentum, Impulse, Collisions, Collision in one and two dimensions, Rotational motion with constant angular acceleration, Angular quantities, Moment of inertia, Torque and angular momentum, Work of rotational motion, Properties of matter: Elasticity, Stress, Strain, Modulus's, Strain energy, Fluid mechanics: Density and relative density, the concept of pressure, Pascal law, Archimedes principle, Fluid flow, Bernoulli's equation and its applications. State of matters, heat and Temperature and zero law of thermodynamics, Phase transitions, Latent heats, Ideal gases.

Practical part: Error and measurements, Force table, Hook's Law, Free fall, Projectile motion, Boyle's Law, Young's Modulus, Specific Heat of a Solid, Coefficient of Thermal expansion, Surface tension in capillary tube, viscosity, Newton's law of cooling, Determination of the Paraffin wax fusion temperature.

**PHYS 202 General Physics (2) (3 + 1) h.**

Theoretical part: Electric Charge, Insulators and conductors, Coulomb's law, Point charge, The electric field, Electric field of multiple point charges, The electric field of continuous charge distribution, examples of various shapes (disks, rings, spheres, planes), The parallel plate capacitor, Electric dipole, motion of point charge and electric dipole in electric field, Electric flux, Gauss's law, Applications of Gauss's law, Conductor in electrostatic equilibrium, Electric potential, The potential of point charges, The potential of dipole, The electric potential of many charges, Capacitance and capacitors, Energy stored in a capacitor, Fundamental circuits, The electric current, Batteries, current density, Conductivity and resistivity, Ohm's law, Series resistors, Parallel resistors, Kirchhoff's laws, RC circuits, Magnetism and magnetic force, source of magnetic fields, Magnetic field of a current, Magnetic dipoles, Ampere's law and solenoids, The magnetic force on a moving charge, The magnetic force on a current-carrying wire, Forces and torques on current loops, Induced current, Motional emf, Magnetic flux, Lenz's law, Faraday's law, Induced fields and EM waves, Inductors, LC circuits, LR circuits, AC circuits and phase, Capacitors in AC circuits, RC filter circuits, Inductor circuits, The RLC circuits, Power in AC circuits, Wave phenomena, geometrical optics, speed of light, Longitudinal and transverse waves, Sound, The nature of light and the laws of geometric optics, reflection and refraction, Fermat's principle, Snell's law, Image formation.

Practical part: Verification of Ohm's Law, Metric bridge, Charge and discharge of capacitors, Inductive Reactance, Capacitive Reactance, RCL circuits, Transformers, Speed of sound in air , Refractive Index of a Prism, Focal length of Lenses, Focal Length of Mirrors.

**PHYS 211 Classical Mechanics (1) (3 + 0) h.**

Space time, Review of Newton's law and conservation of linear momentum in Cartesian and polar coordinate system, applications on projectile motion in a linear air resistance medium, Quadratic air resistance. Motion of charges in a uniform magnetic field, The center of mass, angular momentum of several particles, Kinetic energy and work, Potential energy and conservative forces, Gradient relation, Time dependent potential energy, Energy for one dimensional linear system, Curvilinear one-dimensional systems, Central forces, The energy of interaction of two particles, The energy of multi-particle systems, CM and relative coordinates, The equation of the orbit, Kepler orbits, The unbound Kepler orbits, Change of orbits, Mechanics in non inertial frames, The tides, Rotating frames and angular velocity vector. Newton's second law in rotating frame, The centrifugal force, Coriolis force, Coriolis force and
free fall, The Foucault pendulum, Coriolis acceleration.

**PHYS 231 Vibration and Waves (2 +0) h.**

Periodic motion, Simple harmonic oscillation, Damped oscillation, Forced oscillation, Application of damped and forced oscillations, Superposition of simple harmonic oscillations, traveling waves, standing, Beats, Transverse wave in wires, Longitudinal wave in rods, Application of longitudinal wave in open and closed air columns, Fourier analysis, Doppler effect.

**PHYS 243 Thermodynamics (3 + 0) h.**

Fundamental concept in heat and thermodynamics, Thermal Equilibrium and zeroth law of thermodynamics, Ideal gases, Kinetic theory of gases, First law of thermodynamic, Application of first law of thermodynamic, isothermal and adiabatic processes. Irreversible process and reversible processes, Carrnot cycle, Otto cycle-cleapeyron latent heat equation, Second law of thermodynamic, Heat Engines, Refrigerators, Entropy, Thermodynamic functions, Maxwell relations, Third law of thermodynamic, Phase change, Applications on thermodynamic laws.

**PHYS 203 Mathematical Physics I (3 + 0) h.**

Determinants, Matrices, Solving linear equations and differential equations by matrices, Application on the motion of the rotation of the rigid body, Vector Algebra: Vector products, Position, Displacement, Vector transformation, Gradient, The Divergence, The Curl, Laplace operator, Line, Surface, and Volume Integrals, Gauss theorem, Stock's theorem, Green's theorem, Spherical polar coordinates, Cylindrical coordinates.

**PHYS 212 Classical Mechanics II (3 + 0) h.**

Calculus of variations, The Euler-Lagrange equation and applications, Lagrange's equations for Unconstrained motion, Constrained systems, Generalized momenta and Ignorable coordinates, Lagrange multipliers and constraint forces, Rotational motion of rigid body, The inertial tensor, Principal axes of Inertia, Precession of a top by weak torque, Euler's equations, Euler's angles, Coupled oscillations and normal modes, The double pendulum, Three coupled pendulum, Hamiltonian mechanics for one dimensional systems, Hamiltonian mechanics in several dimensions, Ignorable
coordinates, Phase space orbits, Liouville's Theorem.

**PHYS 221 Electromagnetism I (3 + 0) h.**

Review of vector Operations and algebra, Linear and rotational transformation of vectors, Vector field, Review of vector differential calculus: (gradient, the divergence, the curl, product rules of algebra , Second Derivatives,), Review of integral Calculus: (linear, surface, and volume integrals of vector functions), The fundamental theorem for: (calculus, gradient, divergence, curl), Curvilinear Coordinates: (spherical polar and cylindrical coordinates), The Dirac delta function in one and three dimension, The divergence of reciprocal square of radial distance, The Helmholtz theorem, Coulomb's law, The electric field, Continuous charge distributions, Divergence and curl of electrostatic field, Field lines and flux, Gauss's law and its applications, Electric potential, The potential of a localized charge distribution, The work done to move a charge, The energy of a point charge distribution, The energy of a continuous charge distribution, Properties of conductors and induced charges, Surface charge and the force on a conductor, Capacitors, Poisson's equation, Laplace's equation in one, two and three dimensions, Boundary conditions and uniqueness theorems, Conductors and the second uniqueness theorem, The Method of images and induced surface charge and calculating force and energy, Multipole expansion and approximate potentials at large distances, The monopole and dipole terms, The electric field of a dipole, Polarization, Field of a polarized object, Induced dipole and dielectrics, Polar molecules, Bound charges, The field inside a dielectric and the electric displacement, Gauss's law in the presence of dielectrics, Boundary conditions, Linear Dielectrics: (susceptibility, permittivity, dielectric constant), Boundary value problems with linear dielectrics, Force and energy in dielectric systems, Magnetostatics and the Lorentz law , Magnetic fields and magnetic forces, The Biot-Savart law, The magnetic field of a steady current, The divergence and curl of the magnetic field, Ampere's law and its applications, Magnetic vector potential, Magnetostatic boundary conditions, Multipole expansion of the vector potential, Magnetic fields in matter and the magnetization, Magnetic materials: (diamagnets, paramagnets, ferromagnets), Torques and forces on magnetic dipoles, Effect of magnetic field on atomic orbits, The field of a magnetized object, Bound currents, The magnetic field inside matter and the auxiliary field, Ampere's law in magnetized materials, Boundary Conditions, Linear and nonlinear media, Magnetic susceptibility and permeability, Ferromagnetism.

**PHYS 232 Physical Optics (3 + 0) h.**

The nature of light , The superposition of waves, Interference of two-beams of light (division of the wave front & division of amplitude) Interferometers( Young , Fresnel's biprism , loyed mirror, Fresnel's double mirrors , wedge interferometer , Newton rings , Michelson interferometer , Jamin & Mach-Zehnder refractometers ), Interference of multiple beams , Fabry-Perot interferometer , Applications of interferometry, Diffraction , Fraunhofer diffraction (single slit, two slits, multiple slits) – diffraction grating - Fresnel diffraction (circular aperture & circular Obstacle ), Polarization - polarization by absorption , reflection, refraction & double refraction, Optical active materials & polarometer .Interference of polarized light , Analysis of polarized light, Electro-optics (Kerr effect & Pockels effect ), Magneto- optics (Faraday effect).

**PHYS 302 Mathematical Physics II (3 + 0) h.**

Complex numbers, Analytic functions, Limits and Continuity, Analyticity, The Cauchy, Riemann Equations, Elementary Functions, Complex Integration, Contoursm, Independence of path- Cauchy integral theorem- Bounds for analytic Functions, Series representations for analytic functions, Residue Theory, Conformal Mapping, Invariance of Laplace's Equation, Geometric Considerations, Bilinear Transformations, The Schwartz, Christoffel Transformations.

**PHYS 321 Electromagnetism II (3+0) h.**

Electromotive force, Ohm's law, Motional electromotive force, Electromagnetic induction, Faraday's law, The induced electric field, Inductance, Energy stored in magnetic fields, The modified Ampere's law, Maxwell's equations in vacuum, Maxwell's equations in matter, Boundary conditions, Conservation laws and the continuity equation, Poynting's theorem, Newton's third law in electrodynamics and momentum, Maxwell's stress tensor, Conservation of momentum, Angular momentum, Electromagnetic waves in one dimension, The wave equation, Sinusoidal waves, Boundary conditions: reflection and transmission, Polarization, Electromagnetic waves in vacuum, Monochromatic plane waves, Energy and momentum in electromagnetic waves, Electromagnetic waves in matter, Propagation in linear media, Reflection and transmission at normal incidence, Reflection and transmission at oblique incidence, Absorption and dispersion, Electromagnetic waves in conductors, Reflection at a conducting surface, The frequency dependence of permittivity, Guided waves and wave guides, TE waves in a rectangular wave guide, The coaxial transmission lines, Electric dipole radiation, Magnetic dipole radiation, Radiation from an arbitrary source, Power radiated by a point charge, Radiation reaction with matter.

**PHYS 351 Modern Physics (3 + 0) h.**

Special Theory of Relativity: wave propagation, Michelson Morley experiment, Galilean transformation, Lorentz transformations, Relative velocity, Lorentz contraction, Time Dilation, relativity of mass, Mass and energy, Applications, The particle like properties of Electromagnetic radiation: Electromagnetic waves, The photoelectric effect, black body radition, The Compton Effect, X-rays Waves like properties of particles: De-Broglie hypothesis, Electron diffraction experiment of Davison and Germer, Electron microscope, Uncertainity principle, quantum theory, Atomic Structure: atomic properties, The Thomson model, Rutherford Model for atomic nuclei, alpha particle scattering, Atomic Spectra, Bohr theory of the hydrogen atom, Sommerfeld's Model, Failure of the Bohr theory Frank-Hertz experiment, The basic ideas of the Quantum Mechanics.

**PHYS 393 Optics Lab (0 + 2) h.**

Prism spectrometer (refractive index and dispersion), Grating spectrometer, Fresnel's biprism with He-Ne laser, Fresnel's double mirrors with He-Ne laser, Newton's rings, Michelson interferometer, Mach-Zehnder-interferometer, Diffraction at a single slit, Diffraction at double slits, Diffraction at one-and two dimensional gratings, Diffraction at a single slit measuring and evaluating with Video Com, Polarimter and optical activity, Abbe's refractometer, Inverse square law of light radiation and absorption coefficient of glass or plastic materials, Polarization of light.

**PHYS 303 Mathematical Physics III (3+0) h.**

Series Method for solving linear differential equations, Fuch's theorem, Second solution, Legendre polynomials, Hermite polynomials, Lagurre polynomials, Bessel Functions, Fourier transformation and its application, Laplace transformation and its application, Eigenvalue problem, Differentional equations of Boundary value problem.

**PHYS 342 Statistical Physics (3 + 0) h.**

Probability, One random variable, Some important probability distributions, Many random variables, Sums of random variables and the central limit theorem, Rules for large numbers, entropy, Kinetic theory of gases, Maxwell's distribution of the velocities of gas molecules and its applications, Distribution function of the energy of molecules, Liouville's theorem, Equilibrium properties, The microcanonical ensemble, Two-level systems, The ideal gas, Mixing entropy and the Gibbs paradox, The canonical ensemble, Canonical examples, The Gibbs canonical ensemblem, The grand canonical ensemble, Quantum statistical mechanics, Maxwell-Boltzmann distribution, Bose Einstein distribution, Fermi-Dirac distribution, Vibrations of a solid, Black-body radiation, Quantum microstates, Quantum macrostates, Ideal quantum gases, Hilbert space of identical particles, Canonical formulation, Grand canonical formulation, The degenerate fermi gas, The degenerate bose gas.

**PHYS 352 Quantum Mechanics (3 + 0) h.**

Reviews of the fundamental experiments in modern physics, the need for quantum mechanics. Wave packet and uncertainty principle, Schrödinger equation for free particle, Continuity relation, The dynamical variables and calculating the expectation values, Schrödinger equation with a potential in one dimension, Dynamical variables and calculating the expectation values in momentum space, Commutation relations, Hermitian operators, Linear operators, Completeness relation and orthonormality, Schrödinger equation in three dimensions, The fundamental postulates of quantum mechanics, Particle in an infinite well, Spectral expansion theory, The parity, Constants of motion and conservation laws, Momentum eigen functions and free body, One-dimensional potentials:(The potential step, The finite potential well at scattering and bound states, The potential barrier, The delta function potential at Scattering and Bound states, Simple harmonic oscillator, Oscillator eigen functions and eigen values, Ladder operators and dynamical variables, Schrödinger equation in three dimensions in Cartesian coordinates, Schrödinger equation in three dimension curvilinear coordinate system, Angular momentum and its eigen functions and eigen values, The addition of angular momentum, The central potentials.

**PHYS 392 Electromagnetism Lab (0 + 2) h.**

Measurement of e/m of the electron, Verification of Biot - Savart law , Verification of Faraday's law, Transformers , Measuring the force on current carrying conductors in a homogenous magnetic fields, RLC circuits, Generators, Motors, Transformers, Magnetic moment of magnetized rod, Helmholtz coils, Magnetic induction.

**PHYS 395 Modern Physics lab (0 + 2) h.**

Characteristics of microwaves, Franck- Hertz experiment, Stefan-Boltzmann law for heat radiation, Determination of Planck's constant by means of the photoelectric effect using the compact arrangement, Faraday effect, Fabry – Perot interferometer, Kerr effect, The Balmer series of hydrogen and determination of Rydbergs constant, Pockels effect, Zeeman effect.

**PHYS 422 Electronics (3 + 1) h.**

Theoretical part: Analog Electronics: The P-N junction diode and Zener diode with their applications Junction Field effect transistor - Bipolar junction transistor (Bias and amplifiers: JFET & BJT) – Differential and Operational Amplifiers, Introduction to Feedback Circuits, Multivibrators and Oscillators, Digital Electronics: Binary and Hexadecimal System, Logic Gates, Karnaugh Maps, Flip Flops, Shift Registers, Counters, Memories. Practical part: P-N junction application (half-wave rectifier, full-wave rectifier, clampers and limiters, Zener regulation) - Transistors JFET & BJT amplifiers. Amplifiers with 741(Inverting & Non inverting Amplifiers, Active Filters, Wien Oscillator, Astable Multivibrator). Half and Full Adder (7483), Flip Flop (7474-7476), Shift Register (7495-74194), Counters (7493-74193).

**PHYS 452 Quantum Mechanics II (3 + 0) h.**

Dirac notation, Vector space algebra and Hilbert space, Rephrasing wave mechanics and operator methods in abstract view, Angular momentum commutation relations, Raising and lowering operators for angular momentum, Expansion theory in abstract view, Matrix representation of angular momentum operators, General relations in matrix mechanics, Eigen states of spin ½, The intrinsic magnetic moment of spin ½ particles, Addition of two spins, Addition of Spin ½ and orbital angular momentum, Time independent perturbation theory and energy shifts, Degenerate perturbation theory, The Stark effect, Hyperfined splitting, Variational principle and its applications, The WKB approximation, Time-dependent perturbation theory, The interaction of charged particle with electromagnetic field, Two level-system, emission and absorption of radiations, spontaneous emission, Transition rate, selection rule, scattering theory, Partial wave analysis, The Born approximation.

**PHYS 471 Solid State Physics I (3 + 0) h.**

Different states of matter, classification of solids, crystal structure (Bravais lattices & Miller indices), methods of determination of crystal structure (X-ray diffraction, electron and neutron diffraction), crystal defects, crystal binding (interatomic forces, types crystal bonds), Methods of crystal growth, lattice dynamics (crystal vibration modes and phonons), thermal properties of insulators (specific heat of insulators: classical model, Einstein's model, Debye model,-thermal conductivity of insulators), Dependence of thermal conductivity on temperature, Free electron theory (classical model of free electron, Fermi gas of free electrons, Maxwell-Boltzmann distribution, Fermi-Dirac distribution function), band theory (zone theory and tight binding theory).

**PHYS 481 Nuclear Physics I (3 + 0) h.**

Properties of the nucleus: determination of nuclear charge, radius and mass, Nuclear binding energy, Natural Radioactivity: Decay law, Nuclear stability, Radioactivity and theory of transformation .Artificial Radioactivity: Discovery of artificial radionuclides, Transuranium elements, Interaction of radiation with matter: Interaction of heavy elements, interaction of light electrons, interaction of gamma rays with matter, interaction of neutrons with matter, Radiation Detectors: Gas detectors, Scintillation detectors, solid state detectors, Nuclear Reactions: Reactions of matter by gamma rays, reactions by alpha particles, reactions by protons, reactions by neutrons, Nuclear fission: Discovery of Nuclear fission, theory of Nuclear fission, Nuclear fusion: Energy production in stars, control of thermonuclear reactions.

**PHYS 455 Molecular and Atomic Spectra (3 + 0) h.**

Introduction: Comparing between atomic emission spectroscopy and atomic absorption spectroscopy; Optical spectroscopy, Atomic spectrum, Quantization of hydrogen atom, Atomic emission / absorption spectrophotometry Molecular spectroscopy , Spectroscopy of inner electrons. Zeemen's effect, Sodium spectrum, Effect of magnetic field on the energy levels of atom. Theory of magnetic energy, Anomalous Zeeman's effect and Lande splitting factor. Molecular Spectra of diatomic molecules, Vibrational energy levels in both classical mechanics and quantum mechanics. Rotational spectra of diatomic molecule in gaseous state and rotational energy levels, Molecular spectra; harmonic Oscillator, Non Rigid Rotator, Infrared Vibration, Rotation spectra, spectrum, IR spectrum, RBS spectra, XRD spectrum, measurements of Absorbance, Transmitting and Reflecting using double beam Spectrophotometers in all ranges of wavelengths (UV-VIS-NIR-IR), Normal modes of vibrations; Natural of infrared absorption, Basic Laser principles, Laser behavior, Properties of laser radiations, Different types of lasers, Laser spectroscopy, The total losses of the laser system, Transmission at the mirrors, Absorption and scattering by the mirrors, Absorption in the laser medium, Diffraction losses at the mirrors, The Ruby Laser, Three Level Laser (Helium-Neon

Laser)-Four Level Laser ( Carbon dioxide Laser), Laser applications.

**PHYS 497 Solid State Physics lab (0 + 2) h.**
Studying the characteristics of the solar cell, electron diffraction experiments characteristics curves of an optical (photo) resistor, studying the electron spin resonance (ESR), calculation of the energy gap of germanium by an electrical method determination of the thermal coefficient of resistance of a noble metal (platinum) by computer, the magnetic susceptibility of some materials and its classification, X-ray spectroscopy and calculation of Planck's constant and Miller indices of crystal planes in NaCl single crystal, thermoelectric effect in semiconductors (calculation of Seebeck, Peltier and Thomson coefficients), superconductivity and determination of the transformation temperature TC of YBCO specimen by computer, determination of the absorption coefficient of aluminum for X-ray, Hall effect, studying the crystalline structure by using the field effect microscope.

**PHYS 498 Nuclear Physics Lab (0 + 2) h.**
Statistical nature of Radioactive decay law, Rutherford Scattering, Attenuation of gamma radiation, Absorption of beta radiation passing through different materials, Inverse square law in case of gamma-rays, Determination of the range of beta particles in absorbers by beta gamma source, Backscattering of beta particles, determination of the dead time of GM tube, Effect of a magnetic field on beta particles motion, Assessment of natural radionuclide in NaCl, Compton scattering.

**PHYS 499 Project (2 + 0) h.**
The student carries out a research under the supervision of one of the Staff members in one of the following branches: Theoretical Physics, Nuclear Physics, Solid State Physics, Fiber Optics, Laser, Plasma, Electronics. The student submit a a report about his work, and is evaluated by a committee selected by the department.

# Community College of Buraidah

## Vision:

A nationally unique community college in education, participating in local development.

## Mission:

Developing the cognitive and applied capabilities of individuals by providing a highly advanced and accredited education to meet the needs of the labor market, providing appropriate opportunities for university education, providing a stimulating work environment and developing resources and partnership with the parties concerned

- **Goal-1: Academic Programs**

Buraidah Community College will offer and develop high quality, responsive and flexible academic programs according to the ambitions of the students and matching the requirements of the labor market.

- **Goal-2: Study Courses**

BCC will update the present study courses to meet the requirements of modern knowledge and skills.

- **Goal-3: Students**

BCC will produce graduates with associate degree being able to compete in the workforce market.

- **Goal-4: The faculty**

BCC will upgrade the quality of its faculty and other human resources.

## About:

Kingdom of Saudi Arabia is endeavoring to develop all fields of life through different plans, strategies and efforts. Special emphasis is on imparting quality education to the citizens. There are a lot of schools, colleges, universities, and technical institutes. Community colleges are part of the educational plan providing quality education in order to achieve advancement in knowledge and to fulfill the needs and requirements of the Saudi community and the job market.

Buraydah Community College is one of these community colleges, established under the royal decree bearing NO: 1402 dated: 08/08/1426 H, playing its role in imparting quality education, according to national standards, to the Saudi students. Keeping in view the objectives of the community colleges, BCC is making utmost efforts to educate and train the students to make them suitably skilful and trained to meet the requirements of the community and the local business and job market.

In order to fulfill these tasks, Buraydah Community College has devised strategic plan for next 10 years (2010-2019) to meet the above mentioned objectives and to execute the educational plans of the government of Saudi Arabia.

## Program:

**The college offers two major types of programs**:

a) The Transfer Programs
b) The Qualifying Programs

**(1) The Transfer Program:**

The program does not end up with an academic certificate, but it qualifies the student to begin a two-year study, the successful completion of which allows him to enter a previously-determined bachelor program at Qassim University. The college council proposes the specifications of these programs, which must then be approved by the university council. The student receives close supervision during his study progress.

**(2) The Qualifying program:**

Different from the transfer program, the qualifying program ends up with an intermediate university degree known as the Associate Degree, which is equivalent to the diploma of the intermediate universities.

The qualifying program offers applied specifications to meet the labor market needs. These specifications are proposed by the college council and approved by the university council.

**Buraydah Community College provides the following qualifying program:**

a) Computer Sciences

## Study Plan:

**(a) Computer Science Program , (Weekly Clock Hour Chart)**

**Level -1**

| Sr. No. | Course Code | Course Title | Clock Hours | | Total |
|---|---|---|---|---|---|
| | | | **Class room** | **Practical** | |
| **1.** | ENG 101 | English Language-1 | 3 | 2 | **5** |
| **2.** | ARAB 101 | Language Skills | 2 | - | **2** |
| **3.** | MCA 101 | Communication Skills | 2 | 1 | **3** |

| | | | | | |
|---|---|---|---|---|---|
| **4.** | IC 101 | Introduction to Islamic Culture | 2 | - | **2** |
| **5.** | MOG 101 | Job Ethics | 2 | - | **2** |
| **6.** | HISR 101 | History & System of the Kingdom | 2 | - | **2** |
| **7.** | COS 101 | Principles of Computers | 2 | 2 | **4** |
| **8.** | COS 113 | Introduction To Information Technology | 1 | 2 | **3** |
| Total | | | **16** | **7** | 23 |

**Level-2**

| Sr. No. | Course Code | Course Title | Clock Hours | | Total |
|---|---|---|---|---|---|
| | | | **Class room** | **Practical** | |
| **1.** | ENG 120 | English Language-II | 3 | 2 | **5** |
| **2.** | COS 121 | Introduction to Computer Science | 2 | 4 | **6** |
| **3.** | COS 122 | Programming Language-1 | 2 | 4 | **6** |
| **4.** | COS 123 | Programming Language-2 | 3 | 4 | **7** |
| **5.** | COS 124 | Discrete Mathematics | 4 | - | **4** |
| Total | | | **14** | **14** | 28 |

**Level -3**

| Sr. No | Course Code | Course Title | Clock Hours | | Total |
|---|---|---|---|---|---|
| | | | **Class room** | **Practical** | |
| **1.** | COS 211 | Visual Programming | 3 | - | **3** |
| **2.** | COS 212 | Data Structure | 3 | - | **3** |
| **3.** | COS 213 | Database Management System | 3 | - | **3** |
| **4.** | COS 214 | Computer Architecture | 3 | - | **3** |
| **5.** | COS 215 | Operating System | 3 | - | **3** |
| Total | | | **15** | **-** | 15 |

**Level-4**

| Sr.No | Course Code | Course Title | Clock Hours | | Total |
|---|---|---|---|---|---|
| | | | **Classroom** | **Practical** | |
| **1.** | COS 221 | Computer Networks | 3 | - | **3** |
| **2.** | COS 222 | Analysis and Design of Algorithms | 3 | - | **3** |
| **3.** | COS 223 | DBMS Lab | 1 | 4 | **5** |
| **4.** | COS | System Analysis | 3 | - | **3** |

| | | | | | |
|---|---|---|---|---|---|
| | 224 | and Design | | | |
| **5.** | COS 225 | Internet Technique s | 3 | - | **3** |
| Total | | | **13** | **4** | 17 |

**Summary**

| Level | Clock Hours/Week | No. of Courses |
|---|---|---|
| **Level 1** | 23 | **8** |
| **Level 2** | 28 | **5** |
| **Level 3** | 15 | **5** |
| **Level 4** | 17 | **5** |
| Total | 83 | 23 |

**Note:** Course comprises of four semesters (Two Years). An associate degree is awarded at the successful completion of the course.

**Summary:**

**Note:** Course comprises of four semesters (Two Years). An associate degree is awarded at the successful completion of the course.

## Faculty (Computer Science):

Dr. Yakzan Kassem, Ph. D (Business Management)

Dr. Jamal Mustafa Sheta, Ph. D (Arabic Language)

Dr. Rushdi Abdul Ghani Rushdi, Ph. D (Business Administration)

Dr. Ayman Badri, Ph. D (Instructional Technology)

Dr. Sami Abdul Wahab Safaan, Ph. D (Education Technology)

Anjum Altaf Khan, M.S (Computer Science)

Amjad Iqbal Khawaja, M.S (Computer Science)

Khawaja Zahoor Ahmed, M.A English (Linguistics & Literature)

Riyadh Nimas Atteah, M.S (Mathematical Statistics)

Homidan Bin Abdullah Al-Homidan, B.A (English Language)

Faisal Othman Al-Braidy, B.S (Computer Science)

Dr. Yasser Shaban, Ph. D (Computer Science)

## Faculty ( Human Resources Management):

Dr.El-Sayed Abdul Haleem, Ph. D (Accounting)

Dr.Ali Hassan Feataroni, Ph. D (Economics & Management)

Dr.Yakzan Kassem, Ph. D (Business Management)

Dr.Jamal Mustafa Sheta, Ph. D (Arabic Language)

Dr. Islam Muhammad Al-Banna, Ph. D (Economics)

Dr. Rushdi Abdul Ghani Ismaiel, Ph. D (Business Administration)

Dr. Ayman Badri, Ph. D (Instructional Technology)

Dr. Sami Abdul Wahab Safaan, Ph. D (Education Technology)

Khawaja Zahoor Ahmed, M.A English (Linguistics & Literature)

Homidan Bin Abdullah Al-Homidan, B.A (English Language)

Badr Soliman Al-Nasyan, M.S (Mathematics)

Riyadh Nimas Atteah, M.S (Mathematical Statistics)

Dr. Hamdy Salim, Ph. D (Mathematical Statistics)

# Community College of Unaizah

## Vision:

To contribute in the community development by providing education and training programs, locally and nationally, and to meet the needs of the labor market.

## Mission:

To provide a learning environment for students to complete their university education, and preparation of qualified skills to meet labor market requirements, and contribute to community development, using the latest tools and techniques.

## Objectives:

1. Qualifying students in disciplines that are more in need the labor market and do not require a university degree.

2. To enable the students to continue their studies who are unable to join the university for their studies.

3. To enable the students, who are not graduated from the university due to certain academic reasons, to have a university degree.

## About:

Unaizah Community College was established by a decision of the Council of Ministers vide order No.73 dated 5-3 -1422. The first group of students got admission in the second term of the academic year 1423 /1424 H, and their number was then 900. The college is seeking, from its inception, to the creation of a comprehensive development of all aspects of the educational process and academics by modifying and developing plans and programs, linking them directly to the requirements of the labor market, and establish partnerships with companies and institutions.

The college has created partnerships with a number of companies and institutions at national level, for training and employment. The college has an agreement with the United Community College Houston, U.S.A. for joint programs and exchange of faculty members and students.

An ambitious college does not stop at this point, as it strives for further agreements of partnership. These agreements are important for the academic and professional development of the students, and it has positive impact on the process of development in the college.

The college aims to produce qualified graduates to provide the labor market with its needs of people with expertise and specialties in different areas.

## Programs:

1- Associate of Computer Science

2- Associate of Medical Labs

**College Deanship:**

Soliman Alrohiany Professor
**Dean**

Khaled Alshepel Assistant Professor
**Vice Dean**

Abdoullah Almeman Assistant Professor
**Vice Dean**

**Academic departments:**

**Department of Applied Sciences**

1. Computer Science
2. Networks (Under establishment )
3. Mathematics (closed)

**Department of Applied Medical Sciences**

1. Medical Laboratories

## Department of Applied Sciences

## Vision:

Department of Applied Sciences is a Learning environment and research services in contributing to sustainable community development.

## Mission:

Section is seeking for excellence through the preparation of qualified members in the field of computer science to meet the requirements of the labor market, conduct scientific research and provide advisory services and training in the areas of computer sciences to the various sectors of society.

Objectives

Preparation and qualification of specialists to meet the requirements of the labor market, both public and private sectors in Computer Science through diversification in the ways of learning, teaching and training students to apply knowledge and skills gained to solve problems.

Provide outstanding academic programs in the field of computer science, both theoretical and applied, and consistent with international standards of academic quality and meet the needs of the labor market.

Encourage and develop scientific research in the areas of computer science in general and the areas of artificial intelligence and robotics and networks in particular.

Preparation of a stimulating environment for faculty members to develop their knowledge and skills of teaching and research.

Building and developing partnerships with government and private sectors.

## About:

The Department of Applied Sciences was created in Unaizah Community College in 1426. The department includes specialty in computers. The study plan includes four levels of instruction (two years) of (67 credit units) and credits are distributed to (4) levels of instruction. The student is awarded, after completion of study modules, approved degree in the "Computer", a university degree equivalent to diploma.

## Faculty Members:

Moustafa Youssef Makki Prof.

Taha Mohamed Morsi Prof.

Islam Ahmed Sayed Associate Prof.

Ahmed Abdalkhalq Assistant Prof.

Mustafa Shukairy Assistant Prof.

Hashim Hassanein Assistant Prof.

Khaled Haron Assistant Prof.

Muhammad Kashif Sidho Masters degree

Usama Farouk Masters degree

Abdulah Alarage Bachelor

## Study Plan:

**level -1**

| Course Code | Course Name | Units |
|---|---|---|
| **ARAB 101** | Language skills | 2 |
| **COS 101** | Principles of Computer | 2 |
| **COS 113** | Introduction to Information Technology | 2 |
| **ENG 101** | English | 3 |
| **HIST** | History of the kingdom and regulations | 2 |
| **IC** | Introduction to Islamic Culture | 2 |
| **MCA 101** | Communication skills | 2 |
| **MOG 101** | Ethics | 2 |

**level-2**

| Course Code | Course Name | Units |
|---|---|---|
| **COS 121** | Introduction to Computer | 4 |
| **COS 122** | Computer Programming (1) | 3 |
| **COS 123** | Visual programming | 3 |
| **COS 124** | Discreet Structures | 4 |
| **ENG 120** | English | 3 |

**Level-3**

| Course Code | Course Name | Units |
|---|---|---|
| **COS 123** | Computer Programming (2) | 4 |
| **COS 212** | Data Structures | 3 |
| **COS 213** | The foundations of database systems | 3 |
| **COS 214** | Computer Architecture | 3 |
| **COS 215** | Operating systems | 3 |

**level -4**

| Course Code | Course Name | Units |
|---|---|---|
| **COS 221** | Computer Networks | 3 |
| **COS 222** | Design and Analysis of | 3 |

| | | | |
|---|---|---|---|
| | | Algorithms | |
| COS | 223 | Systems analysis | 3 |
| COS | 224 | Arab Liberation | 2 |
| COS | 225 | Internet Technology | 3 |

## Course Description:

**Cos 101 Principles of Computer (2h)**

This course teaches basic concepts in computing and electronics. This course covers the basic principles of computer software, computer and writing. It focuses on the components of minute machines. This course deals with issues related to Internet and multimedia authoring.

**Cos 113 Introduction to Information Technology (2h)**

This course aims to inform the students of information technology and the various applications of electronic systems on the Web and to identify the role played by these systems in the development of enterprises and communities. Among the most important of these systems: distance education, e-government, supply systems and finance, e-marketing, etc. It reviews the basic components to be analyzed and the needs and specifications of these systems with exposure to some of the ways, design, implementation and management.

**Computer 122 Programming -1 (3h)**

This course aims to familiarize students with the basic programming language (language x + +)

This course aims:

• students will be able to use different methods to solve the problems, the alternative (Introduction to algorithms).

• students will be able to design and analysis of algorithms.

• students will be able to implement different programs using the language C + +.

Computer 124 Discrete Structures (4h)

This course aims to introduce students to discrete mathematics.

It aims to:

• students will be able to use managers and logical functions and sets.

• Students will be able to design algorithms.

• students will be able to use mathematical induction.

• Students will study methods of proof.

• Students will study the theory of graph.

• Students will study the theory of probability.

**Computer 211 Visual programming (3h)**

This course is the entrance to the main themes in the visual programming to program participants in the Computer Science and Technology Management. Students will learn to write Windows programs using the various controls available in the graphical user interface, and how to better design programs using these controls. Upon completion, students will be able to create and manipulate models using text and picture boxes, buttons, menus, scroll bars and menu bars.

**Computer 121 Introduction to Computer (4h)**

This course provides an overview of system features and components. Types of microprocessors and specifications. Motherboards, slots and arcade cards and I / O and memory, power supply, input devices, video projectors, and audio devices. Floppy disk drives and controllers, hard drives and controllers. CD-ROM drives, network cards. Preventive maintenance, backup, and guarantees. Programs and tools diagnostic equipment. Software and hardware troubleshooting.

**Computer 212 Data Structures (3h)**

This course aims to:

Familiarize students with the basic data structures that should be used as tools in the development of solutions to the problems.

Describe the use of different data structures in the interpretation and explanation of joint operations to maintain the data structures,

Recognition of the processes associated with algorithms and complexity.

**Computer 214 Computer Architecture (3h)**

This course introduces students to the fundamentals of digital logic and algebra functions and design of logic circuits and sequential aggregate. It also includes to introduce students to the internal construction of the computer and the study of the major internal parts of a computer and how to link them in terms of compatibility and control work.

**Computer 215 Operating systems (3h)**

This course introduces students to the basic structures and algorithms that work intermediary between the user and the so-called hardware or operating systems. It covers basic operating systems and modern methods of design and the comparison between the methods of work in terms of efficiency and reliability. It also compares the algorithms used in the construction of operating systems in terms of speed and use of space.

**Computer 213 Introduction to databases (3h)**

This course covers basic concepts of the database for conceptual modeling. Relational data model. Relational theory and languages. Database design. Database security and safety. Introduction to query processing and optimization. Introduction to synchronization and recovery.

**Computer 123 Programming -2 (4h)**

In this course, students will be able to:

1 – Understanding how C + + is developed such as built-in functions, single-player's decision and the scope of the vast amount of definition and function, and function templates, etc..

2 - Understanding the basics of a net such as class, objects, member functions and data members, construction, and the scope of the class, when they are called constructors, etc. ..

3 - Knowledge about the operator overloading, inheritance, polymorphism, and virtual functions.

4 - The ability to solve complex problems and write good algorithms.

5 - Ability to self-learning new languages, such as net and Java.

**Computer 221 Introduction to Computer Networks (3h)**

This course is used to teach the approach from top to bottom. Topics covered include introduction to computer networks, open system model for connecting networks, wide area networks and local networks design of these networks. Designs are discussed and the application layer protocols. Designing the transport layer and protocols as well as congestion control mechanisms. Or clarify linkage programs. And provide in-depth analysis for the design of network layers and the link between networks and displays design layer and MAC protocols.

**Computer 222 Design and Analysis of Algorithms (3h)**

This course aims to introduce students to analyze and design algorithms.

This course aims to:

• students will be able to use different calculation methods (Introduction to algorithms).

• Students will be able to design algorithms.

• students will be able to analyze algorithms.

• Students will examine the types of algorithms.

**Computer 223 Databases Lab (3h)**

This course is on advanced topics in databases.

1. Entity relationship.

2. Database management systems parallel and distributed.

3. Database design and implementation.

4. Optimal performance.

5. The security database.

6. Transaction processing.

7. Data warehouses and data mining.

**Computer 224 Systems Analysis and Design (3h)**

This course is Introduction to Systems Analysis and Design in Engineering Computer Science and technology units. Programs will be presented with an understanding of the life cycle of the project. Students will be trained how to design the system and project management.

**Computer 225 Internet technologies (3h)**

The aim of this course is to provide you the developments and concepts and technology in the field of Internet and web design with a focus on comprehensive knowledge of the Internet and its applications, and TCP / IP protocols published widely for the provision of Internet connective tissue in all parts of the world. Has become a global network with the interest on a large scale is an integral part of the Internet. Therefore, this course also places emphasis on the basic concepts of web design.

## Department of Applied Medical Sciences

## Vision:

Exceptional department in education and academic debate between the disciplines in community colleges in the Kingdom.

**Mission:**

To prepare technically qualified staff to meet the medical needs of the labor market within the Kingdom and provide services to the community and conduct applied research related to the problems of society.

**Objectives:**

**Special objectives:**

• Provide an opportunity to university students who were unable to continue their studies for academic reasons for the degree that qualifies them functionally.

• Support the university's ability to absorb more students through this qualifying program.

• Provide rehabilitation program to strengthen rehabilitation and employment of Saudis.

**General objectives:**

• Knowledge of students' basic knowledge and applied specialization of medical laboratories and by teaching in English to employ them in the areas of medical laboratory work, which needs a lot of familiarity with English terminology.

• Providing human resources to contribute to community service through the preparation of technicians qualified to work in the medical field.

- Provide students with basic skills needed for professionals working in the field of medical laboratory applications through laboratory and field training exercises.

## Faculty Members:

| | |
|---|---|
| Ibrahim Al-Ajmi | Prof. |
| Mohammed Suleiman | Assistant Prof. |
| Mohamed Ali | Assistant Prof. |
| Mohammad Rizk | Assistant Prof. |

## Study Plan:

**Level-1**

| Course | Course Name | Units |
|---|---|---|
| **Him 101** | Introduction to Islamic Culture | 2 |
| **101 Arabs** | Language skills | |
| **ENG 113** | Reading in English | 3 |
| **ENG114** | Writing in English | 3 |
| **ENG115** | Listening and speaking English | |
| **DAR 101** | Communication skills | |
| **Adam 101** | Ethics and conduct career | |
| **Computer 102** | Computer and Information Technology | |

**Level-2**

| Course | Course Name | Units |
|---|---|---|
| **112** | Physical chemistry | |
| **Chem 122** | Applied Organic Chemistry | |
| **102** | Medical terminology | |
| **104** | Medical reports of laboratory | |
| **112** | Cell Biology | |
| **114** | Anatomy and tissue | |
| **116** | Physiology and disease | |

**Level-3**

| Course | Course Name | Units |
|---|---|---|
| **233** | Analytical Chemistry | |
| **241** | The foundations of Biochemistry | |
| **221** | The basis of diagnostic immunology | |
| **225** | Medical Parasitology | |
| **231** | Hematology | |
| **233** | Samples of medical care | |
| **223** | Bacteria and fungi diagnostic | |

**Level-4**

| Course | Course Name | Units |
|---|---|---|
| **CHEM 204** | Chemistry vital diagnostic | |
| **CLS 212** | Diagnosis of pathological tissues and cells | |
| **CLS 222** | Viruses medical | |
| **CLS 224** | Epidemiology and Biostatistics | |
| **CLS 232** | Blood bank | |
| **CLS 242** | Laboratory techniques and quality | |
| **CLS 244** | Health care systems | |
| **CLS 246** | Laboratory management and health and safety | |

**Level-5**

| Course | Course Name | Units |
|---|---|---|
| **Tabm 250** | Field training in medical Skills | 8 hours per day |

## Course Description:

Specialization courses for medical laboratories and objectives

**Subjects of the first level:**

**(Salem 101) Islamic Culture:**

This course aims to enable the students to understand the culture and Islamic sources and their characteristics. It introduces students to the Islamic faith, its importance, its characteristics and effects in the individual and society. It aims to help the students to be aware of the concept of worship in Islam, and wrong practices that accompany the application of the creed, behavior deviations and suspicions against doctrines of intellectual and society.

**(Arab 101) Arabic Language:**

This course aims to provide students with issues in language and literature, to employ them in the use of language. It aims to teach the students some of the basic rules of grammar, some of the rules setting the spelling, and developing students' language of literary taste and rhetoric through the application on some model literary prose and poetry.

**English Reading (ENG 115) :**

The goal of this course is to enable the students to read various types of texts with reasonable comprehension.

**English Listening & Speaking (ENG 116):**

The goal of this course is to enable the students to handle simple conversations.

**English Writing (ENG 117):**

The goal of this course is to enable the students to produce well-organized pieces of writing.

**(DAR 101) Communication Skills Language:**

This course aims to teach students the nature of business organizations and their organizational structures as a general framework for communications management. It provides students with the knowledge related to the concept of administrative communication, and its importance, objectives, types, and means .

**( DAR 103 ) Professional Ethics & Job Behavior:**

This course aims to provide students with the knowledge related to the concept of morality, stages of its formation, and its relationship with different professions.

**(Computer 101) Computer and Information Technology:**

This course aims to identify the concepts of information technology, to identify the various components of computer and their functions.

## Subjects of the second level:

**(CHEM 113) Physical Chemistry:**

The aim of this course is to study the basics of physical chemistry needed by the students of medical laboratories to accommodate the theoretical foundations upon which to build the various techniques of medical tests.

**(CHEM 122) Applied Organic Chemistry:**

The aim of this course is to study the foundations of organic chemistry and its applications in medical laboratories

**(CLS 102) Medical Terminology:**

This course aims to provide students with analysis of medical terminology for the human body organs, diseases and symptoms that may endure, as well as some medical terminology commonly used in hospitals and other medical institutions.

**(C LS 104) Medical Laboratory Reports:**

This course aims to introduce English language skills necessary to deal with requests for laboratory tests (Laboratory Request ) and to learn how to write lab reports.

**(CLS 112) Cell Biology:**

This course aims to introduce students to the cell, its components, types and characteristics.

**(CLS 114 ) Anatomy & Histology:**

This course aims to introduce students to the various organs of the human body at the level of anatomical description, as well as general types of tissue.

**(CLS 116) Physiology and Pathophysiology of diseases:**

This course aims to introduce students to the mechanisms of the human body, work equipment and the use of physiological indicators to differentiate between the natural state of body and illness, identify the different stages of the infection and its effect on cells and tissues of the human body as a result of microbial factors - physical - chemical – biological

## Subjects of the Third Level:

**(CLS 221) Basic & Diagnostic Immunology:** This course aims to introduce students to the basics of immunology and medical chemistry immune reactions and applications used in medical laboratories.

**(CLS223) Diagnostic Bacteriology & Mycology:** This course aims to introduce both the bacteria and fungi in terms of structure and reproduction and their relationship to diseases that affect humans and how to resist.

**(CLS 225) Medical Parasitology:** This course aims to introduce students to the medical importance of the parasites that infect humans and the diseases they cause, and symptoms associated with these diseases and the life cycle, and modes of transmission and prevention, with emphasis on accurate laboratory diagnosis of diseases common parasitic.

**(CLS 231) Hematology Hematology:** This course aims to understand the physiological and pathological foundations upon which the pathology of blood and blood products are based. It also introduces ways to deal with it and the role of the blood bank in the clinical work.

**(CLS 233) Samples of medical care:** Medical Laboratories Introduce students to the methods used in the collection, preparation and care of various samples required for testing in medical laboratories. It also introduces sources of the different results that arise from technical errors and biological reasons.

**(CHEM 233) Analytical Chemistry**: The aim of this course is to study the basics of analytical chemistry and the foundations of the automatic analysis used in medical laboratories.

**(CHEM 246 ) Basics of Biochemistry:** This course aims to introduce the partial composition of the components of the human body and their properties and their interactions within the body and its role in maintaining a healthy body with emphasis on pathological relations.

## Subjects of the fourth level:

(**CHEM 204) Diagnostic Biochemistry:** This course aims to enable the student to a knowledge of the theory and laboratory applications of biochemistry in medical laboratories .

**(CLS 212 ) Diagnostic Histopathology:** This course aims to Definition of the principles and foundations of disease diagnosis using the methods of microscopic examination of cells and tissues .

**(CLS 222) Medical Virology** virus in terms of structure and reproduction and their relationship to diseases that affect humans and how to resist and components that can be used in laboratory diagnosis.

**(CLS 224) Bio- Epidemiology and Bio-Statistics:** The course aims to study the basic principles of epidemiology and epidemiological surveillance, methods and statistical methods used in the field of epidemiology

**(232 CLS) Blood Banking:** The course aims to Introduce students to the principles and methods in the follow-up blood banks in order to complete the transfer of blood and blood products to patients roads safe.

**(CLS 242) Laboratory techniques** and quality tests Laboratory Techniques and Quality Control The course aims to Definition of the various techniques and devices used in medical laboratories and absorb the concepts and assess the accuracy of the results.

**(CLS 244) Health Care Systems:** The course aims to introduce students to health care systems and the basic principles of health care management and medical records, quality and communication skills and health education.

(**CLS 246) Laboratory Organization and Occupational Safety:** This course aims to introduce students to the administrative management and technical support for medical laboratories and the safety systems.

### Subjects of the fifth level:

**CLS 250 Field training of medical laboratories** Hospital Based Laboratory Clerkship The course aims to acquire the practical skills to work as a technician qualified medical laboratories.

# Research Centers

## Research Center of the College of Pharmacy

### Scope of Specialization

The center conducts research on pharmaceuticals, pharmaceutical care, herbal medicines and complementary medicine.

### Activities

Studies related to the specialization areas include:

- Bioavailability,
- Drug Stability,
- Pharmacokinetics,
- Toxicology,
- Pharmaceutical Industry,
- Pharmaceutical Education,
- Drug Analysis and
- Drug Development.

### Services and Consultations

The center offers the following services and consultation activities:

- Scientific research in specialization areas applicable to the public and private sectors,
- Studies in the specialization areas,
- Studies in the program structure for the College of Pharmacy,
- Consultation in the pharmaceutical industry, pharmaceutical services for hospitals, pharmaceutical education, pharmacokinetics, bioavailability, medical and pharmaceutical logistics, and pharmacy management.

## Research Center of the College of Medicine

### Scope of Specialization

The center specializes in basic and clinical medical sciences, family and society medicine, and medical education.

### Activities

Activities of the Research Center of the College of Medicine include:

- Adopting research on basic and clinical medical sciences, family and society medicine, and medicine education.
- Securing the required financial support for research activities.
- Training and qualifying human resources and acquiring modern medical devices.
- Encouraging and adopting cooperative research work in and outside the University.
- Supporting research work related to Saudi society in general and the Qassim area in particular.
- Following up on current research activities and facilitating the technical and administrative aspects for researchers.
- Supporting and preparing statistical studies for health research and facilitating publishing activities for researchers.

### Services and Consultations

The center offers the following services and consultation activities:

- Introduction of its services to the University and related areas by performing integrated research work to solve health problems of society,
- Training of research personnel in and outside the University and building of close relationships between the college and service institutions, health institutions and other organizations in the field and
- Preparation of training and consultation in health fields and medical education.

## Scientific Research Center of the College of Applied Medical Sciences

The Scientific Research Center includes staff members of the college. It is supported by both the College Deanship and the Deanship of Scientific Research. The two deanships and the University administration encourage scientific research that aims to provide solutions to health problems specific to the Qassim region and the Arabian Peninsula.

Following the inception of the Scientific Research Center, special laboratories were built and equipped with essential apparatuses intended to provide the core in its development. This development will continue and yield a distinguished and versatile scientific research center.

### Support and Development of Scientific Research

Support and development of scientific research is achieved as follows:

- By encouraging new staff members to participate in refereed research work and preparing scientific studies that aim to serve the community,
- By building close relationships between investment and industrial sectors on the one hand and the academic

research work of the college on the other hand,

- Through the organization of conferences and seminars and by encouraging attendances and
- By supporting the training authorities in their related activities and building better relationships with universities in and outside the Kingdom.

## Engineering Research and Consultation Center

The Engineering Research and Consultation Center provides engineering consultation services that are intended to serve the environment and benefit the scientific and practical capabilities of the college. The college has the following specialization areas:

- Electrical Power Engineering,
- Communication Engineering,

Structural Engineering,
Concrete Structures,
Sanitary Engineering and Sewage Drainage,
Soil Mechanics and Foundation,
Road Engineering,
Survey Engineering (preparing topological and detailed maps),
Water Structures,
Surface and Underground Water Hydraulics,
Irrigation and Drainage Systems,
Design of Metal Structures,
Research on Water Structures (bridges and dams),
Refrigeration and Conditioning,
Electrical Power Stations,
Solar Energy,
Automatic Control in Industry,
Resistance and Testing of Engineering Materials,
Recycling of Industrial Solid Wastes,
Material Chemical Decay,
Structure Dynamics and Earthquake Engineering and
Design and Testing of Concrete Mixtures.

Engineering research and consultation services will be available in the following areas:

### Electrical Engineering

- Control of Electrical Motors
- Testing Electrical Transformers
- Testing Electrical Machines
- Design and Execution of Electrical Wiring
- Improving Power to Industrial Structures
- Electrical Network and Power Transmission Line Design
- Calculating Load for Structures

### Civil Engineering

- Design of Concrete Structures
- Inspection and Evaluation of Concrete Structures
- Design of Concrete Mixtures
- Testing Hardened Concrete
- Design of Earthquake Resistant Structures
- Design of Metal Structures
- Studies on Soil and Foundation Research
- Research on Water Structures (bridges and dams)
- Underground Water Research
- Feasibility Studies for Water and Sanitary Drainage Projects
- Design and Supervision of Implementing Water Networks, Drinking Water Sanitations and Sanitary Drainage
- Design of Interior Sanitary Work and the Fire Prevention
- Environmental Protection Methods
- Design and Supervision of Implementing Landfill Projects for Solid Waste

- Design of Drainage Networks

### Mechanical Engineering

- Designing and Supervising the Implementation of Refrigeration and Air Conditioning Projects
- Design and Supervising the Implementation of Electrical Power Stations
- Design of Heat Transfer Equipment
- Diagnosing Machine Defects
- Digital Machine Tools
- Industrial Automatic Control
- Maintenance of Modern Machines
- Advanced Automatic Control
- Mechatronic Applications
- Examining Mechanical Parts Failures
- Mechanical Tests to Determine the Mechanical Properties of Materials
- Microscopic Inspection of Engineering Materials
- Recycling Industrial Solid Wastes
- Thermal Design of Electronic Matrix
- Design Internal and External Gas Networks
- Works of Boilers, Furnaces, and Fire Works
- Works of Ventilation, Suction, and Drawing Gases
- Refining Water Stations

## Research Center of the College of Computer Science

### Scope of Specialization

- **Computer Science**
- **Computer Engineering**
- **Information Technology**

### Activities

The center conducts scientific research and related services by:

- Encouraging researchers to publish their work in scientific periodicals and journals and to attend conferences locally and internationally,
- Determining research areas for work groups according to the University and college priorities and facilitating communication with research institutions in and outside the University,
- Collecting and documenting research abstracts and research projects to be used as necessary for development,
- Building research groups in the college to work on short-term, medium-term and long-term research projects,
- Providing sufficient support to help researchers purchase required materials for their research projects according to the center's policy,
- Encouraging participation in projects from the City of King Abdulaziz for Science and Technology and
- Documenting and introducing results of scientific activities to the college at the end of each year.

### Services and Consultations

- Offering mechanisms to identify the problems looming in the local areas of the University and the industrial and services sectors and finding effective ways to handle them;
- Determining the nature of each problem and identifying case studies, such as the industrial town in Qassim;
- Organizing workshops in cooperation with industrial and services sectors to study and prepare cooperation protocols with them;

- Conducting training programs to the institutions of Qassim on demand;
- Offering general and specialized training programs in all computer science, engineering and information technology fields and
- Providing programming and engineering consultation services, such as industrial operations control, special software design and development, and maintenance of networks.

## Research Center of the College of Science

The Research Center of the College of Science concentrates on offering the following services:

### Scope of Specialization

The center supports the research activities of the college according to applicable rules and the annual budget of the center. In addition, it strives to

- Encourage departmental staff members to apply for support of their research projects and suggest the budget of each project and
- Provide documentation and housing of research project blueprints, materials and reports, including publications.

### Activities

- Following up with researchers who have attended scientific conferences and seminars,
- Classifying new research and exchanging it with other departments in the Colleges of Sciences and with other universities,
- Working in coordination with the Deanship of Scientific Research and
- Following up on departmental research work and encouraging researchers to introduce seminars on their work.

### Services and Consultations

- Facilitating, through coordination with the deanship, the process of finding a specialized researcher in one of the college's fields;
- Exchanging research with other sectors to encourage trial research work intended to create a cooperative environment;
- Offering consultation activities related to research activities in mathematics, physics and chemistry and
- Assisting the college staff members in their application for financial support of their research work from the SABEC annual grant to Qassim University.

## Research Center of the College of Agriculture and Veterinary Medicine

The center was established in 1984 to encourage and direct agricultural and veterinary research required in addressing problems facing the Qassim region. This area of research is a priority to the college and University because Qassim is the most important agricultural area of the Kingdom.

The center is involved in different agricultural research, including horticulture and disease prevention. This includes crop production and gardening, vegetable crops and nutrition. The center also surveys and determines the most important problems facing agricultural activities in the Kingdom by seeking input from all branches of the center and working to secure financial support for research. Under the guidance of college staff members, the center seeks to build relationships with the Ministry of Agriculture and individuals working in the field to form discussion circles organized and supervised by the Deanship of Scientific Research. Through the participation of researchers and local agricultural professionals, the center hopes to uncover important obstacles and to assist researchers in obtaining the best results.

Given the appropriate financial and human resources, the center hopes to introduce several services to the community. It aims to provide useful research in the fields of plant production and prevention, animal production, veterinary and food science. The research will be conducted in cooperation with the Deanship of Scientific Research and with links to the local community. The center's goal is to employ specialized staff capable of providing services and consultation to local farmers to develop the agricultural sector of the Qassim economy.

## The University Directorates

Several directorates provide the University with the much needed resources necessary to perform day-to-day operations effectively and help the University achieve its goals and objectives.

A list of these Directorates includes:

- Computer and Information Systems Directorate
- Scientific Publication and Translation Directorate
- Administrative Communications Directorate
- Budgetary and Planning Directorate
- Projects and Maintenance Directorate
- Safety and Security Directorate
- Personnel Directorate
- Finance Directorate
- Purchasing and Inventory Directorate
- Public Relations and University Information Directorate.
- Legal Directorate
- Services Directorate
- Transportation Directorate