PREFACE

In the name of Allah and peace be upon His prophet Mohammed.

It gives me immense pleasure to introduce the new issue of the Bulletin for the Faculty of Engineering at King Abdul Aziz University in Jeddah. The Bulletin's current issue coincides closely with the thirty third year of the establishment of the Faculty during which it has rendered valuable services by harnessing engineering manpower for the kingdom. Let me also recall the history of our Faculty in brief. The first milestone of the Faculty of Engineering was laid by the Royal Decree in the month of ZulHijja, 1394H (January, 1974G). The academic activities at the Faculty commenced in the early part of 1395H (1975G) where initial emphasis was laid on developing the English language proficiency of the students, in addition to the preparatory educational plan of the Faculty which included common courses for all engineering specializations. Furthermore, a number of visits were arranged to some reputed universities and research centers in the U.K. and the U.S.A. in order to be acquainted with their educational systems and to make use of their academic experience in the field of engineering. It is also note worthy that the Faculty of Engineering had also benefited from the corresponding experiences of sister faculties of other Universities of the Kingdom of Saudi Arabia. Consequently, to start with the Faculty recruited a good number of academic staff with different specializations who had outstanding careers in the field of engineering education at different universities within the Kingdom as well as abroad. The Faculty, then, embarked on drawing up a proposed plan of studies for various engineering programs which were later on ratified by the University Council.

At the very early stages, the Faculty identified a number of goals to be pursued by the students and staff of the faculty which are continued to be reflected in the vision and mission of the Faculty till to-day. These early tenets were:

- Equipping students with basic knowledge in scientific, social and engineering fields.
- Enhancing students' professional abilities for analytical and imaginative thoughts.
- Stressing on the already existing ethical and Islamic values in the educational curricula through the appropriate cultural and educational enhancements in the Engineering programs.
- Preparing qualified engineers well suited to carry out their engineering responsibilities with a thorough understanding of the effective role that they are expected to play in the Kingdom's national development plans.
- Refining the students' practical capability and applied experience and increasing there knowledge in the use of computers, technical writing and communication skills.
- Emphasizing the significance of scientific research and community services with particular attention to encouraging academic staff and students to conduct research work; taking all steps to provide necessary facilities and required funds.
- Encouraging the establishment of Graduate study programs leading to M.Sc. and Ph.D. degrees in various departments in the Faculty.
- Realizing the importance of continuous updating and development of the engineering curricula to match the accelerated development in all fields of life allover the world.

In the light of these goals set up by the founding Faculty members, the Faculty has strived all along and this Bulletin outlines the results of these efforts.

In 1415H (1995G), guided by the general educational policy of the Kingdom, the Faculty of Engineering once again undertook the task of improving its educational programs, in the light of the world's rapid technological developments and to satisfy the Kingdom's needs for well qualified engineers of high caliber. Accordingly, the Faculty reviewed its educational plan for B.Sc. degrees taking into consideration the directives of the Kingdom's development plans. The long process for curriculum development of the B.Sc. degree programs which started in 1415H (1995G) culminated in the approval by the University Council in 1421H (2000/G). The University Council in addition to the Master's Degree Programs also approved the first Ph.D. program in the Department of Civil Engineering and hopefully similar programs will be started in other departments in the Faculty in near future.

During the academic year 1423H (2003G), the faculty’s 12 B.Sc. educational programs were evaluated for accreditation by the Commission of the US-based Accreditation Board of Engineering and Technology (ABET). It gives me pleasure to state that all the 12 B.Sc. degree programs in engineering were successful in meeting the substantial equivalency criteria of ABET.

In 1400H (1980G), the Faculty established a Technical Arabization Program for authoring and translating technical materials including engineering textbooks and technical dictionaries. The main idea has been to enhance students' understanding and raise their proficiency as well as to enrich the Arabic language with modern knowledge. This program has resulted in the publication of about twenty-five textbooks and reference books in addition to a number of specialized technical dictionaries. The program is progressing well and more technical knowledge is expected from it to be translated in Arabic language.

The Faculty of Engineering has also been involved in launching and organizing a number of scientific conferences and engineering symposia over the years. A strategic plan for the Faculty has been drawn which is being followed. It has been outlined in the Bulletin. There has been a substantial improvement and growth in the ancillary services of the faculty which have been highlighted in the Bulletin. The facilities related with computer services have witness phenomenal development both for the Faculty members and students over the past five years which have been dually mentioned in the Bulletin. The Faculty is also in the process of developing a computer based administrative system by employing the intranet system, in order to reduce all paper work which will result in saving of time and physical resources. In short, this latest issue of the Bulletin is an authentic compendium of information regarding the administrative and academic issues and also is reflective of past achievements and future aspiration of the Faculty.

All the above activities and contributions of the Faculty have been possible with the unlimited support from the higher authorities of the University led by His Excellency the President, Professor Osama Bin Sadiq Tayeb, and the Vice-Presidents, Professor Abdulrahman Al-Ayuby, Professor Abdullah O. Bafail, Professor Waleed Abulfaraj, and Professor Zuhair Damanhori. Furthermore, the Faculty recognizes and appreciates the esteemed efforts of past Deans, Vice-Deans, academic staff and associates who laid the firm foundation of Engineering education and exerted their dedicated efforts for the realization of our current goals of Engineering education. We do hope, with the help of Allah, that such efforts will continue to enable us to attain all our goals with high standards which will satisfy the aspirations of all citizens in our beloved country.

It is with honor and sincere wishes that this Faculty Bulletin is prepared and it contains full documentation of the useful and beneficial material that highlights all significant educational aspects of the Faculty of Engineering at King Abdul Aziz University in Jeddah. Finally, I wish to add a word of thanks to all those who have contributed their time and effort in the preparation, editing and publishing of this Bulletin. The efforts of all Faculty Associates are greatly appreciated.

MAY ALLAH HELP US ALL

Dr. Faisal Iskandarani
Dean, Faculty of Engineering
King Abdul Aziz University
Jeddah, Saudi Arabia.

FACULTY ADMINISTRATION

Faculty Dean
Dr. Faisal Ibrahim Iskandarani

Vice-Dean
Dr. Abdulaziz Uthman Al-Abdulaziz

Vice-Dean
(Post-Graduate Studies and Scientific Research)
Prof. Abdulrahim Ahmed Al-zahrani

Vice-Dean
(Development and Total Quality Management)
Dr. Abdullah Mohammed Dobaie

Heads of Departments

Aeronautical Engineering	Dr. Khalid Ahmed Aljohani
Chemical & Materials Eng.	Dr. Yahia A. S. Al-hamed
Civil Engineering	Dr. Sabry Ahmed Shihata
Electrical & Computer Eng.	Prof. Rabah Wasel Aldhaheri
Industrial Engineering	Dr. Ibrahim A. Al-Darrab
Mining Engineering	Dr. Mohammed Noor Almaghrebi
Nuclear Engineering	Dr. Mohammed Subian Aljohani
Prod. Eng. & Mech. Sys. Design	Dr. Saad Mohammed Aldousari
Thermal Eng. & Desalination Tech.	Dr. Ahmed Yahia Bokhary

Directors of Administration

Academic Affairs and Training	Mr. Khalid Hassan Swedan
Post-Grad. Studies & Sc. Research	Mr. Hassan Mansour Al-Ahmadi
Eng. Sciences Arabization Program	Dr. Abdullah Mustafa Mohorjy
Photo and Edu. Develop. Tech.	Dr. Hisham Saeed Bamufleh
Maintenance Committee	Dr. Ismail Mohamed Najjar
Director of Faculty Administration	Mr. Essam Omer Shaban
Financial Affairs	Mr. Ali Hisein Al-Malki
Information Technology Unit	Dr. Abdullah Saeed Balaamash

Former Faculty Deans

From 30/12/1396 H To 30/12/1402 H
Dr. Mohammed Mohammed Omar Jamjoom

From 1/1/1403 H To 30/12/1405 H
Prof. Mohamed Nour Yaseen Fatani

From 1/1/1406 H To 7/2/1412 H
Prof. Fouad Muhammed Ghazali

From 8/2/1412 H To 7/2/1415 H
Prof. Abdul-Rahman Ahmed Fouad Abdul-Fattah

From 29/4/1415 H To 28/4/1419 H
Prof. Mohammed Saddik Al-Jiffry

From 8/6/1419 H To 7/6/1425 H
Prof. Waleed Hussain Abulfaraj

From 8/6/1425 H To 18/1/1428 H
Dr. Abdullah Omer Bafail

Former Faculty Vice – Deans

Dr. Mohammad Omar Jamjoum
Dr. Mahmoud Wanas Abdulzahir
Dr. Ibrahim Yousef Shugdar
Dr. Ibrahim Hassan Al-Madhoun
Dr. Yousef Agab Nour
Dr. Abdul-Raouf M. Mannaa
Prof. Waleed Hussain Abulfaraj
Prof. Ibrahim Ismail Kutbi
Dr. Muhammad A. Daous
Prof. Yusuf Abdulaziz Al-Turki
Dr. Faisal Ibrahim Iskanderani
Dr. Abdulghaffar Azhari Nawawi
Prof. Adnan Hamza Zahed
Dr. Fawaz Abdulsatar El-Elmy
Dr. Abdullah Yahia Bokhari
Prof. Mohamed Noor Yaseen Fatani
Prof. Fouad Muhammed Ghazali
Dr. Farouq Hussain Mofti
Dr. Abdelrahman A. Abdelfatah
Dr. Mustafa Muhammad Al-Idrisi
Dr. Hedayat-Allah Nazear Gari
Prof. Soliman Ibrahim Al-Noury
Dr. Abdulhaiy M. Radhwan
Dr. AbdulRaheem A. Kensara
Dr. Abdullah Mustafa Mohorjy

Former Heads of Departments

Aeronautical Engineering

Dr. Hany Mohammad Nigm
Dr. Mohammad Abdellah Ghazi
Prof. Gafar Abdel Rahman Sabagh
Dr. Ibrahim Ali Olwi
Dr. Sami Saed Habib
Dr. Ibrahim Ali Olwi

Chemical and Materials Engineering

Dr. Othman Mohammad Dawoud
Dr. Mohammad Amin Gashgari
Dr. Mohammad A. Daous
Dr. Uthman Mohammed Dawoud
Dr. Abduaziz AbdulRaheem Wazzan
Dr. Mohammad A. Eltajem
Dr. Mohammad Amin Jefri
Dr. Faisal Ibrahim Iskanderani
Dr. Mohamed Abdelsalam
Prof. Abdulraheem Ahmed Al-Zahrani

Civil Engineering

Prof. Herbret Eberhart
Dr. Ibrahim Hasan Elmadhon
Prof. Zaki Abdallah Boghdadi
Prof. Sabri Ahmed Shehata
Dr. Abdullah Mustafa Mohorjy
Dr. Shaher Zahran Zahran
Dr. Sayed Nazer Ahmed
Dr. Soliman Ibrahim Elnory
Prof. Mohammed Nour Yasin Fatani
Prof. Faisal Fouad Wafa
Dr. Mohamed Hkamees Basalamah

Electrical & Computer Engineering

Prof. Abdulfatah Kher Eldin
Prof. Saad Eldin Mahmoud Ali
Prof. Abdulmonaem Yousef Belal
Dr. Yousef Agab Nour

Dr. Fouad Amin Dahlawi
Prof. Yousef Abdelaziz El-Turki
Dr. Abdulaziz Uthman Abdulaziz
Prof. Adnan Mohammad Afandi
Prof. Ali Hasan Bamani

Industrial Engineering

Dr. Abu Al-Taher Mohammad Jamil
Dr. Sayed Hassan El-Din Ahmed
Prof. Mohammad Sadik Al-Jiffry
Dr. Mohammad Ali Hassan
Dr. Abdullah Omer Bafail
Dr. Abdelrazik Abu Al-Nor
Prof. Mustafa Mohammed Al-Idrisi
Dr. Siraj Yousef Abed
Dr. Ahmed Abdallah El-Moreb
Dr. Seraj Yousef Abed

Mechanical Engineering

Dr. Salah Mohammad Gahin
Prof. Gafar Abdelrahman Sabagh

Mining Engineering

Prof. C. E. Gregory
Dr. I. M. Etani
Dr. A. A. Fadol
Dr. Mohammed Saad Aljuhani
Prof. M. M. El-Gendy
Prof. M. A. Darwish
Dr. Mohammed Noor Al-Maghrabi

Nuclear engineering

Prof. Samir Abdulmagid Elzaidi
Prof. Ibrahim Ismail Kutbi
Prof. Waleed Hussain Abulfaraj
Dr. Abdulghani M. Melabari
Dr. Tawfik Ahmed El-Kasir
Prof. Abdelrahman A. Abdulfatah
Dr. Abdallah M. Al-Masomi

Production Eng. & Mechanical Systems Design

Prof. Abdul Malik Abu Khashaba
Prof. Ahmed Fouad Rashid
Dr. Talal Mohammad Abu Mansour
Dr. Saad Mohammed Al-Dousari
Dr.Abdul Raouf M. Mannaa
Prof. Ahmed Khairy Abdellatif
Dr. Abdel Ghafar Azhari Nawawi

Thermal Eng. & Desalination Technology

Dr. Mohammad Ali Darwish
Dr. Hidaia Allah Nazer Kari
Dr. Anas Amin Madani
Prof. Omer Mohammed Al-Rabghi
Dr. Abdulhai Mohammad Radwan
Prof. Abdallah Mohammad El-Turki
Dr. Mohammed H. Beirutty
Dr. Majed Mulla Al-Hazmy

EDITORIAL

The Editorial Committee constituted by the Dean of the Faculty of Engineering carried out the task of editing the current issue of the Faculty Bulletin. The Bulletin reflects various activities carried by in the Faculty and the aspirations which are followed in order to keep the process of continues improvement going in the light of the vision and mission of King Abdulaziz University.

The Bulletin contains a full description of the Faculty undergraduate programs for all the nine academic departments. In addition, interdisciplinary courses offered to engineering students by the Faculty of Arts and Humanities as well as by the Faculty of Sciences are also included.

Furthermore, the Bulletin comprises of the record of broad outlines of Faculty regulations governing the smooth running of academic, professional, disciplinary and social affairs. Research activities are also presented in the Bulletin for the internally (university) funded and the externally funded projects. The Bulletin also provides a brief review of ancillary Faculty units that support the educational process, e.g. the Educational Computer Center, the Library facilities etc.

A brief background of all the Faculty members is included in the Bulletin for reference purposes.

Finally, I wish to commend the dedicated efforts of the members of the Editorial Committee whose contributions have culminated in the publication of the current issue of the Faculty Bulletin.

Dr. Abdulaziz Uthman Abdulaziz
Vice-Dean and Chairman of the Editorial Committee
Faculty of Engineering
King Abdulaziz University

EDITORIAL COMMITTEE

The Editorial Committee for the Faculty Bulletin consists of the following members:

Dr. Abdulaziz Uthman Al-Abdulaziz	Chairman
Dr. Abdullah Mohammed Dobaie	Member
Prof. Ali Muhammad Rushdi	Member
Prof. Ali M. Al-Bahi	Member
Dr. Muhammad Din Bashir	Member
Eng. Nahel Ahmed Abdelaziz	Member and Convener

CONTENTS

	Page
PREFACE	v
FACULTY ADMINISTRATION	ix
EDITORIAL	xiii
INTRODUCTION	1
Historical Background	1
Vision and mission of King Abdulaziz University	2
Vision and mission of the Faculty of Engineering	3
Guiding Principles and Core Values	3
Qualities of Engineering Graduates	3
Outcomes of Students Learning Experience	4
Strategic Plan of the Faculty of Engineering	5
Faculty Departments and Degree Programs	6
Departments that Offer Graduate Programs	6
Graduation Requirements for the Bachelor's Degree Programs	7
GENERAL REQUIREMENTS APPLIED TO ALL ENGINEERING PROGRAMS	9
Undergraduate Programs	9
Admission	9
Transfer from Other Universities	10
Transfer of students within KAU	10
Study Load and Courses	11
Add and Drop	11
Study Postponement and Discontinuation	12
Evaluation	12
Grade Distribution	13

Numerical and Symbolic Notation for Grades 13
Continuation of Study 14
Regular Attendance 14
Specializations 15

STUDENT SERVICES 17
Awards 17
Housing, Nutrition, and Medical Care Student 17
Activities 18
Facilities for Sport Activities at the University 21
The Ideal and Outstanding students 22
Alumni Association 22
Student Advisory Committee (SAC) 23

ANCILLARY ACADEMIC UNITS 25
Academic Affairs and Training Unit 25
Training Unit 28
The Cooperative Program Stream 29
Engineering Consulting and Professional Development Office 30
Faculty Library 31
Technical Arabization Program 32
The Educational Computer Unit 34
Academic Accreditation Unit (AAU) 35
Industrial Advisory Board 36
Students' Consultation Unit 37

GENERAL OUTLINE OF B.Sc. DEGREE 39
General Program 39
University Requirements 41
Faculty Requirements 41
Departmental Requirements 43
Guide Lines for First 4- Semesters for All Engineering Programs for Students in Different Departments 43
Program guidelines for the first four semesters for both programs (Regular and Cooperative) 44
Designations of Codes for Departments 45
Designations of Codes for Engineering Departments 45

Designations of Departments from other KAU Faculties 45
Course Numerals 46

ACADEMIC PROGRAMS 47
Aeronautical Engineering 49
Chemical and Materials Engineering 67
Civil Engineering 91
Electrical and Computer Engineering 117
Industrial Engineering 173
Mining Engineering 199
Nuclear Engineering 217
Production Engineering and Mechanical Systems Desi 261
Thermal Engineering and Desalination Technology 283

COURSES OFFERED BY OTHER FACULTIES 305

FACULTY MEMBERS 313

INTRODUCTION

Historical Background

King Abdulaziz University carries the name of the establisher of Saudi Arabia (God bless him). This university was established in the year 1387H (1967G) as a national university aiming at spreading higher education in the western area of Saudi Arabia. This dream has come true through the continuous efforts of the loyal citizens of this country. The members of the founding committee had the chance to meet King Faisal Bin Abdulaziz (God bless him) and His Majesty showed all support for this idea. The founding Committee was formed and was headed by King Faisal (God bless him) and his highness the Minister of Education at that time Sheikh Hasan Bin Abdullah Al Al- Sheikh.

The university started its first academic year in the year 1388H (1968G) by inaugurating the preparation study program with a few number of students (68 male and 30 female). One year after, the university inaugurated its first faculty (the Faculty of Economics and Management,) and in the following year the Faculty of Arts and Human Sciences was established.

Following a resolution of the Council of Ministers in the year 1394H (1975G), the university was transferred under the control of government and from the private university it was converted into a governmental university. The adoption by the government of this young university and the continuous support of the high authorities resulted in transforming King Abdulaziz University into a modern university with a number of students that now have reached to 82152 students (male and female). The university also occupies a distinguished place among higher education institutions in the Kingdom.

The faculty of Engineering was established by a Royal Decree issued by His Majesty King Khaled Bin Abdulaziz on 6th Dhul Hijja 1394H (January 9th, 1975). Students started their studies in the academic year 1395/1396 (1975/1976) in six departments namely, Civil Engineering, Mechanical Engineering, Electrical Engineering, Industrial Engineering, Nuclear Engineering and Mining Engineering.

Starting from the academic year 1401/1402H (1981/1982G) several changes were introduced in the structure of the Faculty of Engineering. In that year the Department of Chemical Engineering was established as a separate Department which was working as a division of the Department of Mechanical Engineering from 1394H (1975G) until 1401/1402H (1981/1982G). The University Council, in 1402H (1982G), reorganized the Department of Mechanical Engineering into three separate departments: Production Engineering and Mechanical Systems Design, Thermal Engineering and Desalination Technology and Aeronautical Engineering. Also in the same year, Sanitary Engineering was introduced as one of the main specializations of the Department of Civil Engineering and Biomedical Engineering was introduced as one of the main specializations of the Department of Electrical Engineering. In the year 1407H (1987G), The University Council approved the change in the name of the Department of Electrical Engineering to the Department of Electrical and Computer Engineering. Finally in 1410H (1990G), the University Council decided to change the name of the Department of Chemical Engineering to the Department of Chemical and Materials Engineering.

The Faculty of Engineering at King Abdulaziz University is unique in certain respects. It is the only faculty in the Kingdom that has departments offering programs in Nuclear Engineering, Aeronautical Engineering, and Biomedical Engineering.

Vision and mission of King Abdulaziz University

The **vision** of King Abdulaziz University is to be a beacon of knowledge, with Islamic values and inherited academic traditions, while exhibiting ultimate professional integrity and technical competence, and providing development leadership through innovation, diversity and sustainability of academic and research excellence to serve the needs of the society.

The **mission** of the King Abdulaziz University (KAU) is the advancement of society through pioneering research, and encouraging academic and scientific excellence.

Vision and mission of the Faculty of Engineering

The **vision of the Faculty of Engineering** at King Abdulaziz University is to pioneer and innovate in Engineering sciences and their applications.

The **mission of the Faculty of Engineering** is to prepare distinguished engineers and to pioneer in conducting research and studies and in transferring knowledge and technology, all for ultimately serving and developing the society.

Guiding Principles and Core Values

All the activities of the Faculty are guided by the following principles and core values which are deeply rooted in our Islamic and cultural heritage:

- Pioneering (innovation, creativity, distinction)
- Quality (continuous improvement and development toward perfection)
- Professional ethics
- Team work
- Belonging and loyalty.

Qualities of Engineering Graduates

The Faculty of Engineering is fully aware of its responsibilities towards its graduates as depicted in the above mentioned mission statement. In order to support the mission of the faculty as well as the mission of the university the Faculty is preparing engineering graduates who possess the following career and professional capabilities which are implicitly included in the educational objectives of different Engineering Programs:

- **Perform professionally:** exhibit integrity, behave ethically, accept responsibility, take initiative, and provide leadership.
- **Demonstrate technical competence:** think creatively, search

broadly and use state of the art engineering tools to identify and formulate safe innovative approaches.

- **Work efficiently:** act as an effective team member and use formal and informal communication skills as well as project management techniques to ensure timely and within-budget completion of work projects.
- **Keep commitment:** remain business focused, quality oriented, and committed to personal professional development as well as the sustainable development of the society.

Outcomes of Students Learning Experience

The study programs in the Faculty of Engineering are designed to give the students a learning experience to progressively build up a set of skills that help them achieve educational objectives of their study programs. The Faculty of Engineering has adopted the following eleven ABET outcomes (i.e. a-k criteria) as general learning outcomes which are explicitly included in the learning outcomes of all engineering programs in addition to any other outcomes stipulated by the Department for the achievement of its educational objectives.

Learning outcomes are considered as statements that describe what students are expected to know and be able to do by the time of graduation and they relate to the skills, knowledge and behaviors that students acquire in their matriculation through the engineering program. It is the responsibility of each engineering program to have one or more processes that identify, collect, and prepare data to evaluate the achievement of these outcomes by the time of graduation. Each program must also have one or more processes to interpret the data and evidences accumulated through the assessment practices to determine the extent to which the eleven outcomes are being achieved, and to take decisions and actions to improve the program.

Engineering programs in the Faculty of Engineering provide the students with a learning experience that permits them to build up the following skills and abilities:

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze

and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Strategic Plan of the Faculty of Engineering

As the Faculty of Engineering was approaching its 30th anniversary in 2004, the Faculty sought to identify the changes in the external environment that were likely to impact the programs and services it provides and the expectations and needs of its constituencies. The Faculty also attempted to take an unbiased look at its strengths, weaknesses, opportunities and threats to provide new levels of service to the Saudi Society and to attract additional resources to support current and proposed programs. This resulted in the 5-year strategic plan for year 2005-2010.

The strategic planning process was initiated by developing a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis. The main purpose of this analysis was to complement the strategic planning activities and to help in establishing strategic objectives.

The principles and core values, and the college mission statement, were used as principal guide lines to develop the strategic objectives along with the results of the SWOT analysis. A closer examination of the SWOT analysis revealed that the college strategic plan should stress on achieving excellence in instruction, research and services to the society.

After a careful review of the results of the SWOT analysis, five strategic priorities and goals were identified as follows:

- Academic Excellence.
- Implementation of total quality management.
- Outreach to new beneficiaries.
- Strategic partnerships and alliances inside and outside the university.
- Optimal utilization of resources and assets.

These strategic objectives were divided into several detailed objectives that were subsequently developed into initiatives and programs, with responsibilities, success metrics, and implementation timeline during the 2005-2010 time interval. The plan is an important milestone in an ongoing process of discussion and reassessment of the goals of the Faculty of Engineering and the processes by which these goals could be achieved.

Faculty Departments and Degree Programs

The Faculty consists of the following nine Departments:

- Aeronautical Engineering
- Chemical and Materials Engineering
- Civil Engineering.
- Electrical and Computer Engineering.
- Industrial Engineering.
- Mining Engineering.
- Nuclear Engineering.
- Production Engineering and Mechanical Systems Design.
- Thermal Engineering and Desalination Technology.

Departments that Offer Graduate Programs

All the nine departments offer programs leading to Bachelor of Science Degree (B.Sc.) which have been evaluated, in 2003, as "substantially equivalent" to ABET-accredited programs. The departments also offer graduate programs as tabulated below.

Name of Department	M. Sc. degree (with thesis)	M. Sc. degree (Non-thesis)	PhD degree
Aeronautical Engineering	✓	✓	
Chemical and Materials Engineering	✓	✓	
Civil Engineering.	✓	✓	✓
Electrical and Computer Engineering.	✓	✓	
Industrial Engineering.	✓	✓	
Mining Engineering.	✓	✓	
Nuclear Engineering.	✓	✓	
Production Engineering and Mechanical Systems Design.	✓	✓	
Thermal Engineering and Desalination Technology	✓	✓	

Graduation Requirements for the Bachelor's Degree Programs

The Faculty offers the Bachelor's Degree in the following 12 programs.

- Chemical Engineering.
- Civil Engineering.
- Electrical Engineering (Biomedical).
- Electrical Engineering (Computer).
- Electrical Engineering (Electrical Power and Machines).
- Electrical Engineering (Electronics and Communications).
- Industrial Engineering.
- Mechanical Engineering (Aeronautical).
- Mechanical Engineering (Production Engineering and Mechanical Systems Design).
- Mechanical Engineering (Thermal Engineering and Desalination Technology).
- Mining Engineering.
- Nuclear Engineering.

The Bachelor's programs in Engineering are based on a strong background in mathematics and basic Engineering sciences. All the programs also include 14 credit hours of the university requirements in Islamic Studies and Arabic Language. In order to qualify for a B.Sc. degree in Engineering, a student must successfully complete 155 credit hours with an overall GPA of 2 out of 5 or better while satisfying the curricular requirements of his program of specialization. Each student is also required to complete one summer training of 10 weeks in industry under the supervision of a faculty member. The typical study period is five years (10 semesters) and the credit hours are distributed as follows;

a. *University requirements (14 credit hours)*

Every student is required to pass the following university core courses:

- Four Islamic Studies courses: 8 credit hours.
- Two Arabic Language courses: 6 credit hours.

b. *Faculty requirements (61 credit hours)*

The Faculty of Engineering requirements for the B.Sc. degree consist of 61 credit hours. Out of this, 54 credit hours are compulsory Faculty Core Courses and 7 credit hours of electives for different programs. The University and Faculty core courses (75 credit hours) are distributed as follows;

- 24 credit hours in Social Sciences, Humanities, and Skills.
- 33 credit hours in Mathematics, Physics, Chemistry and Statistics.
- 18 credit hours in Basic Engineering Sciences.

GENERAL REQUIREMENTS APPLIED TO ALL ENGINEERING PROGRAMS

Undergraduate Programs

The study in the Faculty of Engineering follows a ten-semester system. This system of studies caters for;

- Concentrating on the courses that must be completed in scheduled time and on the student's ability to understand the courses and to interact with his colleagues.
- Taking into account the aptitude differences among students, consequently more capable students can complete their studies earlier.
- Giving the student self-confidence by selecting courses that suit his interests within the program constraints.
- Variation of assessment methods, such as homework, quizzes, major exams, midterm, final test, projects, and various types of assignments.
- Maintaining a strong relationship between students and instructors by appointing an academic advisor for each student upon admission to the engineering department.

Admission

Conditions for admitting a student to the Faculty of Engineering for a Bachelor's degree are as follows:

- The student must have obtained a recent Secondary School Certificate, or its equivalent, (not earlier than five years). The University has the right to waive off this condition for an otherwise acceptable applicant.
- The student must be of Saudi nationality. Non-Saudis are treated in accordance with King Abdulaziz University regulations.
- The student must have good behavior and conduct.
- The student must be of good health.
- Only full-time students are enrolled. An employed prospective student should have a written permission from his employer

allowing him to attend classes on a full-time basis.

- Admission is based on a combination of the student score in the General Certificate of Secondary Education (GCSE), known as THANAWIA, and scores in two standard national exams organized and administered by the “National Center for Assessment in Higher Education” (QIYAS). These two Exams are:
  1. General Aptitude Test, known as QUDRAT.
  2. Scientific Track Admission Test, known as TAHSEEL.

QUDRAT is designed, similar to the American SAT Reasoning Test, to measure critical thinking skills that the student needs for academic success in college. TAHSEEL, on the other hand, is a three-hour MCQ exam that covers the basic concepts of Math, Physics, Chemistry, Biology, and English Language at the secondary school level.

For the time being, the acceptance of the students into KAU Faculty of Engineering is based on a weighed score composed of the three above mentioned Exams as follows:

*Weighed Score = 0.6 * THANAWIA + 0.15 * QUDRAT + 0.25 * TAHSEEL*

Transfer from Other Universities

A student may transfer from another university or educational institution to the Faculty of Engineering, KAU, provided that an academic degree granted by that institution is equivalent to a KAU degree. The following criteria also apply:

- The student should have a general grade of 70% or a minimum GPA level of 3.0 out of 5.0, and should not have been dismissed for ony disciplinary reasons from the institution that he has transferred from.
- The student must complete 50% of the credit hours of study required for graduation at KAU.
- A transferred student will be exempted from certain courses required for the B.Sc. degree at KAU, if he has already taken their equivalents at his previous institution. However, a course taken at the previous institution will be considered equivalent to a course offered at KAU provided (a) the student has passed the former course with a grade of C or better, (b) the credit hours of

the former course are no less than those of the latter course, and (c) the detailed contents of the two courses are ascertained to be essentially equivalent by the concerned KAU Department. Courses from which a transferred student is exempted can be listed in his transcript but will not contribute to his cumulative GPA at KAU.

Transfer of students within KAU

- A student may transfer from one faculty to another within the University only once, if a chance is available. He may do this in accordance with the following admission terms and conditions:
  - The student must have a GPA average of not less than 3.0 out of 5.0
  - The student must complete one academic year before transferring to the Faculty of Engineering. He must also complete a minimum of 12 technical credit hours with a cumulative average of not less than C +.
  - The student must pass at least one course in Mathematics with a grade of not less than C.
  - The student must pass at least one course in Physics or Chemistry with a grade of not less than C.
  - The acceptance of transferred applicants depends on the available capacity.
- The grades of the courses taken by a student in his previous faculty will be accepted and considered in his new specialization according to the degree requirements. Courses that are not transferred will remain in the student's record, but will not be counted towards the cumulative average.

Study Load and Courses

(a) The maximum study load is 18 credit hours per regular semester and 9 credit hours in the summer session.

(b) The minimum allowable load is 12 credit hours per regular semester.

(c) The registered credit hours are decided according to the following:
  - A student having a cumulative average of 2.75 or more may register for up to 18 credit hours.
  - A student who has a cumulative average of less than 2.75 may register for up to 16 credit hours.

– As an exception, a student who is expected to graduate may register for up to 24 credit hours, if his cumulative average is equal to or more than 3.75.

Add and Drop

- A student, on the approval of his academic advisor, may add one course or more up to the end of the first week of the semester.
- A student, on the approval of his academic advisor, may drop one course or more up to the end of the fourth week of the semester.
- A student can withdraw from the whole semester up to the tenth week of each semester.
- In some exceptional cases and upon recommendation of the Academic Advisor and approval of the Vice Dean of the Faculty of Engineering, a student may withdraw from one or more courses. Approval for withdrawal may be granted on condition that the student has a minimum number of 12 registered credit hours after the withdrawal.

Study Postponement and Discontinuation

- A student, during his university study, may apply for a postponement of his studies (for a reason acceptable to the pertinent Faculty Committee) for a period of not more than two consecutive main semesters (or three separated semesters) and only after finishing one main semester or more, with a cumulative average of not less than **(2.75)**. If his cumulative average is less than **2.75**, his request will be submitted to the University Admission and Registration Committee.
- If the student terminates his studies for one semester without submitting an application for a postponement, his registration will be canceled. The following rules will be taken into consideration;
  - If the period of the discontinuation is more than two main semesters and is for reasons unacceptable to the Admission and Registration Committee, the student's registration will be canceled. However, he may apply to rejoin the university as a fresh candidate.
  - The discontinuation period will not be counted as a part of the period fixed for the completion of an academic degree.

– A student who withdraws during his first semester may apply to rejoin the university as a fresh candidate.

Evaluation

- The student evaluation procedure should be in conformity with the teaching policies of the University, and in line with the nature of the course. The instructor of the course should hold periodic tests. In addition, a mid-term test is usually given in the 7th week of the main semester and the 4th week of the summer semester during the class periods. A final test should also be held during the last week of each semester in accordance with the schedule issued by the Admission and Registration Deanship of the University.
- Any student who fails to attend the final test without an acceptable excuse is assigned a grade "Fail". However, any student who is absent from the test for a valid reason may submit his case to the Departmental Council to decide whether or not he would be given the grade of “Incomplete” (IC). The student who is given an IC grade has to complete the requirements of the course during the following semester; otherwise his grade is automatically changed into the grade of “Fail” (F).
- An honors degree is granted to the student who attains a cumulative average of 4.5 or more, at the time of graduation, provided that he has not failed in any course taken at the University.

Grade Distribution

The full marks for every course are100, which are typically distributed as follows:

20	Marks for Midterm Exam
40	Marks for Final Exam that covers the entire course contents.
40	Marks for Semester work such as: verbal and written tests, reports or research work or additional studies, experimental lab, and weekly or monthly homework.

Instructors could alter this distribution given that the grade of the Final Exam does not exceed 70% of the total course grades.

Numerical and Symbolic Notation for Grades

- The grades of Marks obtained by the student in the course can be recorded as follows:

Range of Marks	Symbol	Points
From 95 to 100	A^{+}	5
From 90 to 94	A	4.75
From 85 to 89	B^{+}	4.5
From 80 to 84	B	4.0
From 75 to 79	C^{+}	3.5
From 70 to 74	C	3.0
From 65 to 69	D^{+}	2.5
From 60 to 64	D	2.0
Less than 60	F	1.0

- The grade of "Incomplete" (IC): It is permitted to delay the grade of a course due to non-completion of its requirements with the permission of the instructor and the approval of the Department Council. But this delay should be for no more than one main semester. If this delay lasts for more than one semester, grade will automatically change to "Fail" (F) grade.
- The grade of "In Progress" (IP): Some courses need more than one semester to complete their requirements particularly those including research work or training. For these courses, the student can postpone his grade for no more than two further semesters. In this case, the student grade would be "In Progress " (IP).
- The grade of "Fail" (F): The student is permitted to repeat a course in which he earned an F grade. The new grade does not cancel the old one. The old grade is kept in the student's transcript and is counted in his GPA.

Continuation of Study

- The basis for the continuation of study in the Faculty of Engineering for the student is to maintain the grade of "Good," the equivalent to a cumulative average of 2.75.
- The student will be dismissed from the Faculty of Engineering in the following circumstances:

- If he receives a maximum of three consecutive warnings due to his lower cumulative average (less than 2.75 out of 5). Upon a recommendation, from the Faculty Council, the University Council can give a fourth opportunity to the student who can raise his cumulative average by taking the available courses.
- If he does not fulfill the graduation requirements within a maximum period of one and a half of the program period (i.e. 15 semesters), the University Council can give an exceptional opportunity to the student to fulfill the graduation requirements with a maximum period of twice the program period (i.e. 20 semester).

Regular Attendance

- The student must attend at least 75% of the total number of classes. If the student is absent for more than 25% classes in any course without an acceptable reason he will be denied attendance in the remaining classes of this course and its final exam and will be given the grade of "Denial" (DN). The student can submit a request to the Academic Affairs of the Faculty to attend the final exam only if he can supply documented excuses, provided his absence does not exceed 50% of the course.
- Sick leave is only accepted on the basis of a medical report issued by the Medical Center of the University or one endorsed by it.

Specializations

- Conditions for specialization for a student are:
  - Completing at least two semesters.
  - Complete a minimum of 30 hours at the end of the semester during which he applies for specialization.
  - Passing the first and second levels of the English language courses ELCE 101 and ELCE 102.
  - Not being a transfer student to the Faculty in the semester during which he applies for specialization.
  - Having a GPA of not less than 2.75 out of 5.0.

- Conditions for changing the specialization are:
  - The student should not have completed 50% or more of credit hours in the original specialization, the semester during which he applies for changing specialization.
  - Having a GPA of not less than 2.75 out of 5.0.
  - The student is allowed to change specialization only once during the whole study period in the University.

Graduation

The student graduates from the Faculty of Engineering after successfully completing the graduation requirements, according to the degree plan, provided his cumulative GPA is not less than "Good" (2.75 out of 5.00). In case of having a graduation GPA less than 2.75, the student should repeat a number of suitable courses, determined by the concerned department, to improve his cumulative GPA to 2.75.

STUDENT SERVICES

Awards

The following awards are available to students in the Faculty of Engineering:

- **Monthly award**: An award of 1000 Saudi Riyal per month is given to every Saudi B.Sc. student and also to every non-Saudi B.Sc. student who is on a granted scholarship.
- **Distinction award**: An award of 1000 Saudi Riyal is granted to every student who secures an average grade of distinction (A or A+) in two consecutive semesters. This award serves as an incentive for advanced students to maintain their high level of achievement.
- **Books and References Allowance**: An amount of 3000 Saudi Riyal is given to every graduate student once during his regular period of study.
- **Thesis Allowance**: An amount of 3000 Saudi Riyals for the M.Sc. student and 4000 Saudi Riyals for the Ph.D. student are given to the student to cover some of the costs incurred in preparation of the thesis.

Housing, Nutrition, and Medical Care

Housing

The University has constructed an ample number of student housing units within or at the outskirts of the University campus. Two types of housing are available:

- Married Student Housing: Available to all married students.
- Single Student Housing: Available to all students whose families reside outside Jeddah (including those who are on scholarships). This type of housing is also available if a student's family circumstances necessitate.

Supervision of students in these housing units, and the general management of the units is the responsibility of well-trained and qualified personnel. These supervisors are helped by assistant supervisors who take over the supervision duty as well as the task of handling emergencies during evening and night periods. New students are to contact the Deanship of Students Affairs to obtain their free housing.

Nutrition
The University has a central kitchen that prepares meals to be distributed to a certain number of dining halls within the housing units or inside the University campus. Meals are offered to all students at highly subsidized prices.

Medical Care
The university provides free medical treatment for all students at the University Clinic which is conveniently located at the center of University campus, and has clinics covering all main medical specialties.

Student Activities
The first article of the basic statutes of King Abdulaziz University has set five main goals amongst which one is: *To Promote cultural, sporting, social and scientific activities*. This goal is to be pursued for the well being of the Saudi society in general and for the University, in particular. The Deanship of Student Affairs in the University collaborates through various committees with the various Faculties in supervising the extra-curricular activities, which aim at achieving the following objectives:

- To participate in developing the integrity and balanced personality of the university students.
- To support Islamic education and to direct students to commit themselves to the Islamic code of conduct.
- To develop the talents of the students and improve their capabilities and assist them in acquiring useful knowledge and experience.
- To get the students accustomed to participating in social activities, to develop brotherly relations among them, and to develop a harmonious relationship based on mutual respect among

themselves and their professors.

- To provide students with means of comfort, convenience and assurance.
- To educate the students about the roles they have to play in their society and to enforce in them the feelings of belonging to their country.

In recognition of the importance of student activities and their role in the bringing up of the youthful students, the university rules prescribe that the university Rector should act as the General Chairperson of the Higher Committee for Student Activities, with the Dean of Student Affairs acting as his Deputy in this respect. The Faculty of Engineering takes care of, and supports, the student activities, through the following committees with specific objectives assigned to each of them:

1. Committee for Promotion of Islamic Awareness

This Committee strives to help develop students' understanding of Islamic theology and law, to enforce practical commitment to the Islamic code of conduct, to strengthen the association with the glorious Qur'an through memorization, recitation and mastering the rules for perfect recitation, to strengthen the Islamic brotherly relations and to prepare students to face foreign ideologies. The Committee for Promotion of Islamic Awareness organizes lectures, meetings and trips, which are usually of an educational nature. The committee also participates in the activities organized by the General Committee for Promotion of Islamic Awareness and it also takes part in the central programs arranged by the Deanship of Student Affairs at the University level.

2. Committee for Cultural Activities

This Committee aims at the development and improvement of student talents and potentials in cultural, artistic and literary fields. It also tries to develop creativity and inventiveness within students, to enable them to acquire general knowledge and to lead them to interact wisely with the different cultures of the world.

The committee organizes lectures, cultural, scientific and literary meetings, trips as well as scientific and cultural visits. Its members also take part in the activities of the University Central Committee for

Cultural Activities and in the central activities of the Deanship of Student Affairs. These activities are numerous and diverse which include the following:

- Hobby Clubs (e.g. Photography, Theatre, Arabic Calligraphy, Drawing)
- Literary Clubs (Poetry, Novels, Short Stories and Plays)
- Cultural Competitions, Scientific Research Competitions and Technical hobbies.
- Cultural and Artistic Exhibitions
- Social Club.

3. Committee for Social Activities

This Committee tries to help students develop adaptation qualities, strengthen the relationships between students and professors, realize proper social life for the youth in the light of Islamic ethics and principles, bring about a spirit of cooperation, friendship and intimacy, establish avenues for appropriate and useful entertainment and finally, to train students to do and give their best with sincerity, self-denial and appreciation of the public interest.

The committee organizes lectures, meetings and social trips and visits. It participates in social competitions and arranges get-to-know-each-other parties. It also participates in the activities of its sister committees in the Faculty as well as in the programs of the Deanship of Student Affairs.

4. Committee for Athletic Activities

This Committee attempts to spread knowledge about various sports, promote physical fitness and facilitate student training and participation in sport competitions. The aim is to develop perseverance, sport-man spirit and attitudes, spirit of positive competition, leadership, organization, and collectivism.

The student sporting activities in the Faculty of Engineering and in the University include among others, soccer, basketball, volleyball, handball, tennis, table tennis, horsemanship, swimming, judo and karate.

The committee participates in sport competitions organized by the University. It also participates in the activities of its parent committee at the University level as well as in the activities of the Deanship of Student Affairs. The various teams representing the Faculty of Engineering normally win distinguished positions in these competitions.

5. Scouting Society

The students of the Faculty of Engineering can participate in the activities of the Scouting Society of the University. The objectives of this Society include training the students to get prepared for public service at any time, train them to the ethics of truthfulness, honesty, preferring others to oneself, obedience, and full adherence to the rulings of Islam. Further objectives include stressing the brotherly feeling and attitudes among the believers, establishing the good examples to be followed and strengthening the meaning of manhood, gallantry and both self-reliance and self-denial.

The society organizes trips, camps, and camping expeditions. Its members participate in all scouting activities and competitions organized within the Kingdom of Saudi Arabia and the Arabian Gulf States.

6. Equestrian Club

King Abdulaziz University distinguishes itself among all Saudi and Arab Universities in the great interest it takes in horsemanship and in the great care it directs toward recreating the Arab heritage associated with it. The University has established a special club for horsemanship in which all students of the university can take part so as to get ample training in this popular sport.

Participation in all activities of the committees is open to all students of the Faculty of Engineering, who desire to do so. Every committee for students activities consists of one staff member acting as its head or facilitator beside six members including the activity supervisor within the Faculty of Engineering plus five student members who are elected by the general body of students under the supervision of the Deanship of Students Affairs. The committee selects one of its members to act as its secretary.

Facilities for Sport Activities at the University

King Abdulaziz University provides several facilities where the students can participate in individual and team events. These facilities include:

- The soccer (football) stadium: which incorporates a soccer field, a running track, a jumping domain and a hall for exertion sports.
- The physical-training tent: It includes playgrounds for basketball, volleyball, handball, table tennis and the flying feather beside facilities for judo, taykondo and physical fitness.
- The swimming pool.
- The horsemanship club.
- Playgrounds in the housing units for basketball and tennis.

The Ideal and Outstanding students

Every year the Faculty of Engineering honors one of its students as an ideal or exemplary student. Criteria of selecting such student include his scholastic achievement as evidenced by his GPA, which should be no less than 3.75/5.00 or “VERY GOOD”. They also include the nature of student participation in the extra-curricular activities and the rating given to him by his own department as regards to his general behavior, conduct, and commitment. The University elects its own exemplary student from those of the various Faculties.

In addition to honoring an exemplary student, the Faculty of Engineering nominates four students as outstanding students. These should have superior or distinguished contributions in four types of activities: Promotion of Islamic awareness, Cultural, Social, and Athletic.

Alumni Association

Engineers graduated from the Faculty of Engineering at KAU are members of the Alumni Association. This association is the parent body for keeping graduates in touch with each other and with the University. The benefits of being a member of the Alumni Association include newsletters, an alumni directory, ongoing alumni career services, library privileges and access to the alumni home page on the World Wide Web, invitation to special events and having an opportunity to participate in educational enrichment and continuing educational programs.

The Faculty of Engineering Alumni Association is an umbrella organization encompassing the development of graduated Engineers, both professionally and personally. The Association promotes excellence in all aspects of its activities to promote communication among graduates and the community and to develop a powerful professional network. The Alumni Association encourages alumni loyalty, involvement, and investment in advancing the Faculty of Engineering.

Students Advisory Committee (SAC)

In accordance with the directives of the KAU Deans' Consultation Committee, a Students Advisory Committee (SAC) is formed from senior Faculty Administrators as well as representatives of students from all academic levels. The SAC aims at solving students' educational problems and difficulties through mutual discussions between the Senior Faculty Administrators and student representatives. To achieve this purpose, the SAC is required to hold regular meetings on a monthly basis.

The Students Advisory Committee has the following objectives:

- Promotion and development of the educational programs in the Faculty.
- Addressing students' problems and difficulties and helping in finding their solutions.
- Elevating learning capacities of students.
- Improving academic staff/students relationships.

The SAC is constituted having of the following members:

- The Dean of the Faculty of Engineering, — Chairman
- Vice-Dean of the Faculty of Engineering — Member
- Vice-Dean for Post-graduate Students and Research — Member
- Vice-Dean for Development and Total Quality Management — Member
- 22 students selected from various departmental levels and different specialization programs in the Faculty, with one student acting as the Coordinator to the Committee.

ANCILLARY ACADEMIC UNITS

Academic Affairs and Training Unit

The Academic Affairs and Summer Training Unit (AATU) guides and directs Faculty students in all affairs related to their educational progress, e.g., registration, addition, cancellation or determining the equivalence of courses in addition to appointing student advisors, etc. The AATU provides all necessary information concerning registration, addition or cancellation of courses to the respective academic advisors at the start of each semester. Furthermore, the AATU supplies student advisors with an updated record of student grades. In addition, the AATU acts in cooperation with the various Engineering Departments in all matters concerning academic or related student activities.

The AATU endeavors to utilize modern techniques to expedite its activities accurately. Computer programs are developed to regulate various processes for student registration and student counseling. All information concerning every student in the Faculty is continually updated and student records are well documented. Computer programs have been designed to facilitate registration processes, setting time-tables and regulating student specialization at various engineering departments. The Administration has also designed computer programs to regulate and control student training in cooperation with external agencies in the country. The Academic Affairs Administration undertakes the following tasks:

Preparation, Follow-up and Updating Student Files

As students enroll in the Faculty, files are opened containing student personal data. Additional information, e.g., student grades, student attendance records or any other information concerning the student is added up into the file during his tenure at the Faculty.

Student Counseling and Registration

The AATU handles all routine problems facing new students. Students are directed to ways and means of registering, deleting or adding courses according to their educational program. This goes on for about two semesters. Thereafter, students are distributed among Faculty members for purposes of counseling. The various Departments in the Faculty will then be totally responsible for the counseling of students until their graduation.

The Faculty and academic staff are guided by the following objectives for student counseling:

- Discovering a student's real potential and capabilities and directing him to a suitable specialization where he can be very efficient.
- Helping the student to understand the goals of university education and enabling him to select a program of study that suits his interests and to follow up that program.
- Ensuring, through close supervision of his academic records, that the student is continuing in the proper direction and is progressing efficiently towards graduation in his chosen specialization.
- Advising students about proper means of registration at the beginning of each semester and helping them to prepare their time-tables.
- Establishing a cordial relationship between the student and his advisor within the university tradition for the purpose of creating a conducive atmosphere for the student to improve his productivity in education.

On the other hand, the student is also obliged to undertake the following:

- The student has to be aware of all academic programs in the University. He should also to be aware of University Statutes and Regulations.
- He has to set his own objectives in a convincing manner that suits his abilities and tendencies.
- He has to be aware of the ways and means of taking up his own decisions regarding his academic goals.
- He has to be responsible and must project a good impression of himself.

- ***Registration, Dropping, Addition and Withdrawal***
  The Academic Advisor helps the student to register in certain courses according to his program of study. The information is processed through the AATU and the student obtains his computerized time-table. In accordance with the university regulations and on approval of the Academic Advisor, a student may delete or add certain courses. The amended time-table will then be finally approved. Thereafter, the student commences his study for a specific semester.

- ***Major Areas in Departments***
  Before the preregistration period, a student who has completed 40-50 credit hours of Faculty core program should consider opting for a specific major. When a student looks for a department to join, the Departments recommend acceptance of students in their specializations according to availability of opportunities within the Department and the level of competition among students who want to join the Department. Results of acceptance are announced after approval by the Faculty Dean and Vice-Dean. Newly accepted students in academic departments are assigned to different academic advisors.

- ***Course Equivalence of Transferred Students***
  The Faculty receives applications from students who wish to transfer from other universities or from faculties within the University or from departments within the Faculty. The Academic Affairs Department and the concerned co-ordinate these activities of student transfer. Courses studied by those students are evaluated and if course equivalencies are established the corresponding requirements are waived of in favor of the student.

- ***Examination Time-Table for Core Program***
  Faculty core program courses are generally taught in multi sections classes. In accordance with University regulations, the mid-semester and final examinations for such courses must be held in common. Consequently, the Academic Affairs Administration prepares and organizes the time-table for

respective core courses examinations and undertakes measures in order to avoid any conflict a student may be subjected to during the examination period. A student should not be required to take more than two examinations per day.

- ***Communications and Contacts***
  The Academic Affairs Administration acts as a coordinator between students and Faculty Departments. It represents the first entrance to the Faculty where all students affairs are facilitated and their valuable time is utilized constructively. Furthermore, the Administration liaises between the Faculty administration, Registration, and all Engineering Departments in all matters related to student enrollment, preparation of time-table, course registration, addition or omission of courses, opening new sections, closure of sections or increasing the section capacities. The Administration also specifies graduation requirements in cases of ambiguity and finalizes graduation procedures. The Administration coordinates with the Deanship of Admission and Records in all matters related to student interests, e.g., granting letters of introduction, coordinating student non-curricular activities and recommending outstanding students academically and those of good behavior.

- ***Announcements***
  The Academic Affairs Administration handles announcements to students in all matters related to the academic field as it is the sole channel to do so in the Faculty. The student is consequently advised to follow up all announcements displayed in the Faculty premises.

Training Unit

The need for narrow specializations stems from the fact that a graduate from the Faculty is expected to be well equipped with theoretical and practical knowledge. This will encourage the engineering graduate to have a liaison between theoretical and practical solutions for production and construction problems facing the society.

In accordance with the major educational objectives, the Faculty of Engineering has adopted a mandatory policy regarding student training.

All Students have to undergo a summer training period as a pre-requisite for obtaining the B.Sc. degree in any specialization. This period extends over two to three months duration during the summer vacations. The Training Unit helps students to avail of suitable opportunities, or directs them to opportunities closer to their specializations. The Faculty ensures that there will be no conflict between summer training and course work.

The summer training commences when a student has completed 90 credit hours, grasped basic engineering fundamentals and acquired a good background in the English Language. At the end of the training period, each student submits a training report to be evaluated by the respective academic departments. The Faculty through its Summer Training Department arranges summer training opportunities with various establishments (governmental and private) in the country. Steps taken for such arrangement are as follows:

- Submitting list of students who are ready to take up the training, their total GPA and specialization.
- Coordinating with various establishments in the country for training opportunities.
- Filing up training application forms with all relevant information, e.g., specialization, contact address during summer and telephone number in case of an emergency etc. Students are also encouraged to seek training opportunities through personal contacts but these have to be approved by respective departments in the Faculty.
- Training opportunities are then classified, tabulated and distributed to suit the student's training needs in view of their prospective specialization.

The Cooperative Program Stream

The study plan entitles a student to obtain the B.Sc. degree in Engineering either by the regular stream or by the co-operative program stream.

The requirements of the two streams are exactly the same, with the sole exception that the cooperative stream allocates eight credit units for the cooperative work.

To follow the cooperative stream, the student secures the approval of his department to spend a period of 26 weeks at some engineering work/ apprenticeship/ practical training within an organization performing function that is closely related to the student's specialty. This period of cooperative work extends over a summer session and one main semester. It takes place under the supervision of a faculty member so as to ensure that the student is effectively combining the academic and the practical real-life aspects of his work study.

The cooperative stream allows the student to acquire practical skill and experience within his specialty. Moreover, it enjoys the following additional merits:

- Combining the academic or theoretical interests with the practical or real-life experience for the student.
- Bringing about more interactions between the university and the external organizations, and strengthening the relations between the engineering departments within and outside the university.
- Improving the student's chances for appropriate employment after graduation, since it is quite likely for him to get a job offer at the place of his cooperative work.

Engineering Consulting and Professional Development Office

The mission of the Engineering Consulting and Professional Development Office (ECPDO) is to build the most effective partnership between the industry and the Faculty of Engineering at King Abdulaziz University. It is meant to develop research and innovation that benefits society as a whole and foster regional and national industrial and economic development. ECPDO will help to develop innovative programs that provide students with hands-on, real world experience in industry, provide industry with excellent opportunities to advance research, enhance the university's state-of-the-art technology and recruit the engineering talent of the future. ECPDO's primary objectives are intended to be as follows:

- Prepare the engineering students to become young professionals.
- Prepare a comprehensive training program to improve the communication skills of the engineering students.
- Prepare engineers sensitive to the environment and needs of the society.
- Focus on engineering ethics using available economic resources

and applying available regulations.

- Expose students to real-life situations and orient their approach towards the needs of an industrial society.
- Initiate applied research programs suitable for the undergraduate level to develop the creativity and competition between the students.
- Initiate an award program to encourage outstanding students to share and implement their ideas.
- Initiate the link between KAU and the industry.
- Emphasize the need for applied research programs to solve industrial problems.
- Focus on community services and solve community problems at the local and at the national levels.
- Enhance the chances of KAU graduates finding suitable jobs at respectable national and international organazitions.
- Establish consulting services for private and government sectors where faculty members and graduate and undergraduate students work together in professional teams.
- Establish a bank of ideas.
- Establish a reward system for participants.

On achieving the above objectives, it is believed that the Faculty of Engineering will be able to transfer the results of University research to the public by bringing scientists and the business community together in a relationship of mutual advantage.

Faculty Library

The Faculty Library was established in 1976 with 1000 reference books and 9500 textbooks. Since then, the library has expanded continually and now contains more than 24000 reference books and 80000 textbooks. The library also contains encyclopedias, government reports, scientific manuals and copies of B.Sc. projects and M.Sc. and Doctoral theses.

A checkout system is available according to the following rules:

- Faculty members can check out a maximum of 10 books for a four-month period.
- Other academic staff can borrow up to five books for a one- month period.

- Undergaduate and graduate students can check out 3 and 5 books respectively for a one-month period.
- Professors, academic staff, and students can borrow textbooks from the Textbook Center for one-semester period.

The library remains open from 7:30 a.m. till 2:30 p.m. Information about all technical literature is documented in the University Computer System.

Technical Arabization Program

In 1979, the Faculty established a Technical Arabization Program to enhance the educational process. The program includes preparing technical and scientific dictionaries to help students in their education. So far, 50 projects have been completed and others are under preparation as follows:

- 24 projects have been published and distributed.
- 18 projects are at the press.
- 8 projects are being reviewed.
- 6 projects are still under preparation.

List of finished translated or authored books in Arabic

1. Introduction to Engineering
2. Material Science Dictionary
3. Soil Engineering Properties
4. Introduction to Fluid Mechanics
5. Introduction to Production Engineering
6. Engineering Graphics
7. Probabilities and Statistics
8. Engineering Systems for Desalination
9. Dictionary of Production Engineering
10. Islamic Architecture
11. Fundamentals of Heat Transfer
12. Reliability Analysis of Nuclear Desalination Plants
13. Fundamentals of Industrial Engineering
14. Strength of Materials
15. Computer Applications in Civil Engineering
16. Energy Sources and Conversion
17. Basics of Material Science
18. Fundamentals of Casting

19. Air Conditioning and Refrigeration
20. Engineering Economics
21. Mining Engineering
22. Numerical Models for Solar Systems
23. Introduction to Nuclear Physics
24. Calculus
25. Basics of Mining Engineering

Books in the publication process

1. Introduction to Nuclear Engineering
2. Energy in Environmental Design of Dry Provinces
3. Basic Electrical Engineering
4. Basic Analysis of Geotechnical Engineering
5. Dictionary of Aeronautical Engineering
6. Rock Explosions
7. Electronics of Power Systems
8. Fundamentals of Engineering Metrology
9. Applied Finite Element Analysis
10. Aerodynamic Propulsion
11. Internal Combustion Engines
12. Dictionary of Engineering Transportation
13. Analysis of Electrical Power Systems
14. Modern Automatic Control
15. Fundamentals of Machine Elements Design
16. Nuclear Power
17. Introduction to Chemical Engineering Thermodynamics
18. Construction Analysis
19. Basics of Modern Chemistry

Books being reviewed

1. Structural Analysis
2. Introduction to Computer
3. Introduction to Electrical Communications
4. Basics of Engineering Instrumentation
5. Dictionary of Civil Engineering
6. Dictionary of Environmental Design

Books under Preparation

1. Fundamentals of Chemical Engineering

2. Dictionary of Industrial Engineering Terminology
3. Dictionary of Electrical Engineering
4. Operations Research
5. Problem Solving Methods and Algorithms
6. Dictionary of Geotechnical Engineering

The Educational Computer Unit

The Educational Computer Unit at the Faculty of Engineering provides computational facilities for training students and aiding them in their project and homework assignments.

The Unit supports five Personal Computer labs with more than 90 PCs connected together through a modern network. Central network services are provided by many servers, two dedicated file servers using Windows 2000 operating environment, one dedicated print server and one CD-ROM server with a capacity of 14 CDs (it provides on-line access to archived libraries and reference materials). Three more servers use Linux and Windows 2000 operating systems to provide automatic configuration of networked workstations via DHCP, and intranet services like Web, FTP, DNS and connection to the Internet. In addition, the Faculty provides other computing facilities under the direct supervision of individual departments.

The Faculty of Engineering recognizes the importance of having a backbone network, with access to the Internet for advancing the educational and research activities of its staff members and their students. A modern network was built in the Faculty recently, under the supervision and management of the Educational Computer Unit. There are several distribution switches, where each one covers the whole floor. Each switch has a speed of 100 Mbps on each port using the Fast Ethernet technology. Each building has a backbone switch that aids in connecting the building to the other buildings through fiber optics cables.

There are 219 rooms and offices in the Faculty which have network connections excluding those that are not in use at present. Adding at least 214 more nodes the total number of networked PC's in different labs in the Faculty give a grand total of 433 user nodes on the network.

The Faculty of Engineering has a permanent connection to the Internet through a fiber optic line to the University Computer Center, for a speed up to 10 Gbps. This provides to every one, on the Faculty network, access to the web, email and other Internet services.

The Unit provides its computational services 24 hours a day, and maintains 32 lines of remote access available after office hours, so the academic staff can use them to connect to local servers, the intranet, and the Internet at any time.

Academic Accreditation Unit (AAU)

In the year 2002, a Coordination Committee was formed before the evaluation visit of the Accreditation Board of Engineering and Technology. It was chaired by the Dean of the Faculty of Engineering. The Committee held weekly meetings to coordinate and define policies and to review progress of the preparation for the ABET visit. A sub-committee was formed and assigned the task of preparing Volume I of the self-study questionnaire for the engineering Faculty. Individual departmental committees and sub-committees worked on the preparation of Volume II of the study questionnaire for their respective programs. For instructional purposes, other committees were also formed to review the progress of the Faculty and Department activities.

In September 2003, Faculty of Engineering at KAU acquired the substantial equivalency for its 12 Programs from the ABET. The Faculty is now working for its programs accreditation based on the EC 2000. This requires substantial work from Faculty members, administrative leaders, and students. So, for continuous improvement, all the previous committees either on the Faculty level or Department level were reformed. In addition, a few new committees/units were constituted. One of these units is the Academic Accreditation Unit (AAU) which was constituted to work closely with Faculty ABET Committee. The main duties and responsibilities of this unit are:

- Outline all necessary activities at the program and Faculty level.
- Identify the deadlines for all necessary activities at the program and Faculty level.
- Schedule and organize regular seminars and/or workshops for Faculty members, administration staff and students.

- Design common assessment forms for different activities.
- Assist scientific departments in designing the required assessment forms either on the program or course level
- Assist scientific departments in preparing program self-study questionnaire and other materials required by ABET
- Coordinate and follow up the implementation of EC 2000 requirements for Academic departments and administration units in the Faculty.
- Establish an archiving system for the self-study questionnaire Volume I and Volume II (now appendix-D) programs and for any other necessary materials.

Industrial Advisory Board

In order to enhance and regularize the University-Industry cooperation, the Faculty of Engineering has constituted an Industrial Advisory Board in the year 1423H (2003G). The Board consists of leading personalities from public and private organizations besides senior Faculty members. It is observed that the decisions of the Board have positive and lasting influence on the overall role of the Faculty of Engineering towards the service of local industry, in particular, and the community, in general. The following objectives are set out for the Board.

- Consolidating the relationship between the Faculty of Engineering and the Public and Private Sector organizations.
- Providing an opportunity to the Public and Private Sectors to recommend changes and contribute to the development of Faculty's educational programs to suit market manpower needs and professional requirements of the market.
- Synchronizing development in academic programs and the number of engineering graduates according to specialization and market needs.
- Assessing and fulfilling the needs of the private sector by arranging training for their employees, through short courses and seminars.
- Increasing cooperation with the private sector in all engineering disciplines for purposes of promoting scientific research within the Faculty by addressing and solving real-life problems of the local industry and community.
- Increasing cooperation with the Private Sector organizations for all

engineering disciplines for participation in summer training programs for the students as well as by providing an opportunity for the faculty members to professionalize their experience.

Students’ Consultation Unit

The Faculty of Engineering established the Students’ Consultation Unit as a result of the study conducted among the students who faced hardships during their course of study in the Faculty. Some of those students were not able to cope up with the situation and had to drop from the Faculty. From the dialogues with some of such students, the necessity to establish such a unit became imminent. It was evident that some students undergo difficult circumstances and they need some advice to help them find solutions for the challenges they face.

From the experience of some of our faculty members with such cases, it was found that individual meetings of the student with the faculty members could contribute positively paving the way to successful strategies. This may be explained in light of the privacy the student gets in such an atmosphere and due to the parental concern of the faculty member. This is particularly demonstrated when the faculty member is senior person and he employs his expertise in dealing with such circumstances.

However, it should be emphasized that this Unit does not interfere nor create a conflict with the role of the academic advisors, since the role of the Unit is neither registration issues nor course study plans.

With this background, the idea of establishing this unit came about to provide a proper advisory stage available to any student for redressing difficulties during almost any hour of the day. "The vision of the Unit is: Towards a Successful Student Community who can overcome hardships". The mission of the Unit is: to help the Faculty of Engineering students to excel scientifically by developing their personal capabilities and by recognizing the appropriate solutions for the problems they encounter. A group of distinguished senior faculty members were employed to be in the consulting team of the Unit. These members were deliberately chosen from various disciplines to represent most departments in the Faculty. Each of those members devotes couple of hours according to a fixed weekly schedule to be available to students for consultation. The most distinguished characteristic of this Unit is that the personal information about the student is kept quite confidential, in the sense that nobody has the right to access to such information other than the student's advisor. Therefore, the advising sessions are held in the adviser’s office.

It remains to be emphasized that this Unit is not dedicated directly to academic difficulties. Its role is to address also the personal and social aspects of student's life. Its goals are:

- Developing students’ personal capabilities.
- Helping students in overcoming academic, social and personal difficulties.
- Strengthening the relationship between the students and the consulting faculty members.

GENERAL OUTLINE OF B.Sc. DEGREE

General Program

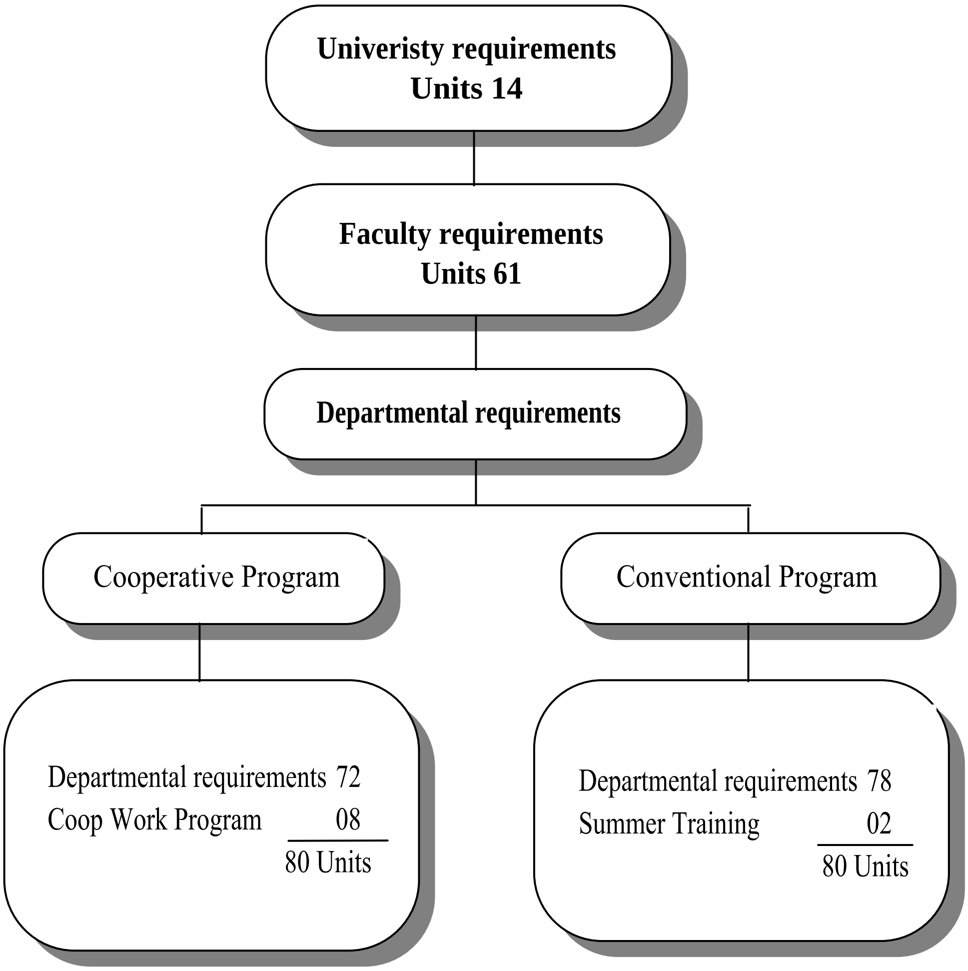
The program of study for the Bachelor of Science Degree in Engineering is designed to provide a strong background in Science, Mathematics, Islamic Studies and Humanities besides the Engineering courses. The main objective of the program is to develop the professional proficiency of high caliber concomitant with personal and cultural maturity of the students consistent with the Islamic values and the social ethics of the society.

Graduation requirement for a Bachelor's Degree in Engineering is to complete not less than 155 credit hours with a "Grade Point Average" of not less than 2.75. (The breakdown of the structure of the curriculum for Bachelor's degree in Engineering is given on the following page) The credit hours are divided in three categories which are:

	Credit Hours (Units)
University Requirements	14
Faculty Requirements	61
Departmental Requirements	80
Total	**155**

Industrial training for students is an integral part of the graduation requirements, which is imparted either as a short spell of summer training program with ten weeks duration or as a single long spell of training under the co-operative work program of 26 weeks duration. The industrial training is supervised / evaluated jointly by the Faculty members as well as by the personnel assigned by the industrial organization.

The University, Faculty and Departmental requirements are further elaborated in the following tables.



The structure of the curriculum for Bachelor's Degree in Engineering

The "general program" comprising of the University and Faculty requirements is divided into three major groups: 54 credit hours of compulsory core courses, 7 credit hours of elective core courses and 14 credit hours of compulsory university requirements. The "general program" courses are offered in the first academic years and the courses are distributed as follows:

- 24 Credit hours in Social Sciences, Humanities and English Language.
- 33 Credit hours in Mathematics, Physics, Chemistry and Statistics.
- 18 Credit hours in Basic Engineering Sciences.

University Requirements (14 Cr. Hours)

Code	Course Title	Credit Hours	Prerequisite
ARAB 101	Arabic Language I	3	-
ARAB 201	Arabic Language II	3	-
ISLS 101	Islamic Culture 1	2	-
ISLS 201	Islamic Culture 2	2	-
ISLS 301	Islamic Culture 3	2	-
ISLS 401	Islamic Culture 4	2	-
Total		**14**	

Faculty Requirements (61cr. Hrs.)
Compulsory Requirement

Code	Course Title	Credit Hours	Prerequisite
ELC 101*	English Language I	2	-
ELC 102*	English Language II	2	ELC 101
MATH 101	Calculus I	4	-
PHYS 101	General Physics 1	4	MATH 101
CHEM 201	General Chemistry I	4	-
IE 201	Introduction to Engineering Design (1)	3	ELC 101, ELC 102
IE 202	Introduction to Engineering Design (2)	2	IE 201
MATH 202	Calculus II	4	MATH 101
PHYS 102	General Physics II	4	PHYS 101
MENG 102	Engineering graphics (1)	3	MATH 101
EE 201	Computer Programming (1)	3	MATH 101
MATH 203	Calculus III	4	MATH 202
MATH 204	Differential equations I	3	MATH 203

Code	Course Title	Credit Hours	Prerequisite
CE 201	Mechanics (1) Statics	3	PHYS 101
EE 332	Computational Methods in Eng.	3	MATH 204
IE 255	Engineering Economy	3	IE 201, ELC102, MATH 203
IE 331	Probability and Eng. Statistics	3	MATH 203
Total		54	

Elective Requirements (7 Credit hours)

Group 1 : Each major chooses one course out of these two courses

Code	Course Title	Credit Hours	Prerequisite
EE 250	Basic Electrical	4	PHYS 102, ELC 102
EE 251	Basic Electrical Engineering	4	PHYS 102, ELC 102

Group 2: Each major chooses one course out of these three courses

Code	Course Title	Credit Hours	Prerequisite
ACCT 101	Principles of Accounting I	3	-
ECON 101	Principles of Microeconomics	3	-
PSY 422	Occupational Psychology	3	-

* The ELC, English Language Center was established at King Abdulaziz University in 1975, when the university invited the British Council to setup a project to teach English to the students of the Faculties of Engineering and Medicine. Over the years, the project developed and matured and in 1984 the ELC became an independent entity linked to the Faculty of Arts and Humanities, for administrative and financial purposes. After the ABET substantial equivalency for evaluation all the B.Sc. degree programs of the Faculty of Engineering in 2003, the ELC part dealing with teaching of English language to the Engineering students was transferred to the administration of the Faculty of

Engineering. It is now functioning as "English Language Unit" in the Faculty with special program for engineering students helping in imparting effective English language skills.

Departmental Requirements (80 Cr. Hrs.)

Each department has its own special requirements which are given in respective departments in the Bulletin. Students can refer to their respective Department for detailed course requirements.

Guide Lines for First 4- Semesters for All Engineering Programs for Students in Different Departments

Students in different departments start their studies in the Faculty under the name “Students of General Program” During which they fulfill most of the University and Faculty Requirements. They stay in this program till the end of the third semester, when they can apply to different departments for specialization, provided they have finished not less than 30 Credit Hours. The allocation of students to various departments is done by the Administration of the Academic Affairs Unit of the Faculty according to the rules and requirement.

A plan prescribed by the Faculty Council for the first 4 semesters of studies as guideline, is outlined in the following tables:

Program guidelines
for the first four semesters for both programs (Regular and Cooperative)

1st Year
Regular & Cooperative

1st semester			2nd semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ELC 101	English Language I	2	ISLS 101	Islamic Culture I	2
CHEM 101 / PHYS 101	General Chemistry I / General Physics I	4	PHYS 101 / CHEM 101	General Physics I / General Chemistry I	4
MATH 101	Calculus I	4	MATH 202	Calculus II	4
ARAB 101	Arabic Language I	3	ELC 102	English Language II	2
			MENG 102	Engineering Graphics	3
Total		**13**	**Total**		**15**

2nd Year
Regular & Cooperative

3rd semester			4th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
PHYS 102	General Physics II	4	IE 202	Introduction to Engineering Design (2)	2
IE 201	Introduction to Engineering Design (1)	3	EE 201	Structured Computer Programming	3
ARAB 201	Arabic Language II	3	MATH 204	Differential Equations I	3
CE 201	Engineering Mechanics (Statics)	3	EE 251	Basic Electrical Engineering	4
MATH 203	Calculus III	4	IE 255	Engineering Economy	3
Total		**17**	**Total**		**15**

Designations of Codes for Departments

Each course is assigned 3 numerals preceded by the code of the department offering it. The following tables provide a key to these codes and numerals as used in the Bulletin.

Designations of Codes for Engineering Departments and Courses

Department	Code
Aeronautical Engineering	AE
Chemical and Materials Engineering	ChE
Civil Engineering	CE
Electrical and Computer Engineering	EE
Industrial Engineering	IE
Mining Engineering	MinE
Production Engineering and Mechanical Systems	MENG
Thermal Engineering and Desalination Technology	MEP
Nuclear Engineering	NE

Designations of Departments from other KAU Faculties*

Department	Code
Accounting	ACCT
Arabic Language	ARAB
Biochemistry	BIOC
Chemistry	CHEM
Economics	ECON
English Language Unite (Faculty of Engineering)	ELC
Environmental Science	ENS
Islamic Studies	ISLS
Mathematics	MATH
Medicine	MED
Mineral Resources and Rocks	EMR
Physics	PHYS
Psychology	PSY

* The description of courses offered by other faculties for the engineering students are given in the Bulletin under a separate section after the course description of engineering faculty courses.

Course Numerals

Hundreds Numerals: signify the level of course offering in the program.

First level	100
Second level	200
Third level	300
Fourth level	400

Tens Numerals:

Signify a specific specialization within the Department

Unit Numerals:

Signify the relative order of the course within a specialization

ACADEMIC PROGRAMS

DEPARTMENT OF
AERONAUTICAL ENGINEERING

FACULTY

Chairman:

Al-Juhany, Khalid A.

Professors:

Al-Bahi, Ali M.

Associate Professors:

Habib, Sami S.
Megahed, Ibrahim E.
Olwi, Ibrahim A.

Assistant Professors:

Al-Juhany , Khalid A.
Al-Qadi, Ibrahim
Bajouda, Abdulrahman
Bourchak, Mostefa
Hafez, Salah M.
Harasani, Wail I.
Kada, Belkacem

Lecturers:

Alharbi, Mohammad
Aly, Maher S.

Engineers

Al-Gahmdi, Khalid S.
Al-Zhrani, Seraj O.

INTODUCTION

The Aeronautical Engineering Department at King Abdulaziz University was established in 1980 to satisfy the needs of the development plans in the Kingdom in the field of Aviation and Space Technology. The goal was to prepare Aeronautical Engineers capable of assuming their responsibilities in such vital fields.

VISION

To offer leadership in aerospace education and research.

MISSION

To provide an environment that promotes creativity, stimulates innovation, enhances life-long learning skills, and professionally serves the society within the Islamic ethical context.

This mission is the way to achieve the vision giving rise to a set of core values which are:

1. Dedication to student-centered, outcome-based teaching and learning.
2. Valuing innovation and creative thinking in teaching and assessment
3. Professional integrity and ethical behavior
4. Commitment to quality assurance and continuous improvement
5. Openness with all program constituencies and stakeholders.
6. Acceptance that the aforementioned values are part of the Islamic ethical standards

OBJECTIVES

The educational program of the Aeronautical Engineering Department at King Abdulaziz University is preparing its graduates to:

1. Engage in productive career in industry, military, academia, or research, enabled by their technical competence in mechanical and aeronautical engineering,
2. Advance in responsibility and leadership in public, private, or military sectors in Saudi Arabia and the Gulf Area, and
3. Demonstrate commitment to personal professional development as well as the sustainable development of the society.

PROGRAMS OFFERED

The Department of Aeronautical Engineering provides a Bachelor of Science degree in Mechanical Engineering (Aeronautical). A Master of Science in Aeronautical Engineering is also offered. The undergraduate program is intended to provide students with a sound background in analytical and experimental fields. The curriculum can be characterized as follows:

- The theoretical and practical sides of the curriculum are well balanced.
- The curriculum provides practical lab experiences where it is needed.
- The curriculum course work is progressive in such a way that the fundamental scientific and practical knowledge gained in earlier years is applied and used in later engineering courses.
- The elective courses are designed to cover different aspects of the Aeronautical Engineering, such as instrumentation, systems, and maintenance. This will help students to gain knowledge in the areas most needed in the Kingdom.
- The curriculum addresses economical, ethical and social aspects of the engineering profession through the related courses.

CAREER OPPORTUNITIES

The Bachelor of Science degree in Aeronautical Engineering and Mechanical Engineering to KAU has recently earned the equivalency of similar degrees which are ABET-accredited in the United States of America. Jeddah area, where King Abdulaziz University is situated, is full of aeronautical activities, e.g., Saudi Airlines, Saudi Royal Air force, Air Defense and Marines. These facilities constitute good employment opportunities for graduates in addition to private industry.

FACILITIES

The Department has several laboratory facilities to serve undergraduate and graduate students in the fields of aerodynamics, structures and composites. The aerodynamics laboratories contain at least ten apparatuses that provide sufficient variety of fluid dynamics experiments. The experiments allow the students to apply fundamental laws to physical problems. They also allow the instructors to clarify differences between theory and real world problems. Several concepts are introduced to the students; they include pressure distribution, lift, drag, wake flow, vortex shedding, and separation. Other peripheral equipments are included in the aerodynamics laboratory, such as the “flight demonstration tunnel”, which could be used to enhance the students’ knowledge in flight mechanics.

The aircraft structures laboratory offers experimental setups that introduce principle concepts of stress and strain. The instructor is able to relay to students fundamental concepts such as shear, torsion, bending, and buckling. Recently, an ultrasonic probe to investigate cracks was added to the lab as an example for non-destructive testing (NDT). The Department has recently established a computer laboratory to serve the needs of undergraduate and graduate students and is connected with the local network of KAAU. Aeronautical engineering students are allowed to use other laboratories within the Faculty of Engineering.

PROGRAM REQUIREMENTS AND CURRICULUM

Units required for the B.Sc. degree in the Department of Aeronautical Engineering.

Conventional Program

Requirements	Cr. Hrs
University Requirements	14
Faculty Requirements	61
Departmental Requirements	80
Total	**155**

Cooperative Program

Requirements	Cr. Hrs
University Requirements	14
Faculty Requirements	61
Departmental Requirements	72
Cooperative Program	8
Total	**155**

Departmental Required Core Courses (77 Cr. hrs)

Course No.	Course Title	Cr. Hr.	Prerequisite
MENG 130	Basic Workshop	2	MENG 102
MENG 204	Computer Aided Graphics	3	MENG 102
MEP 261	Thermodynamics	4	MATH 202
MENG 262	Engineering Mechanics (Dynamics)	3	CE 201
MENG 270	Mechanics of Materials	4	CE 201
MEP 290	Fluid Mechanics	4	MATH 202, PHYS 101
EE 300	Analytical Methods in Engineering (1)	3	MATH 203
AE 301	Fundamentals of Flight	3	MEP 261, MEP 290
MENG 310	Machine Elements Design	3	MENG 270, MENG 204
AE 311	Low Speed Aerodynamics	3	EE 300, AE 301, EE 332
AE 331	Aircraft Structures (1)	3	MENG 270, AE 301
AE 361	Aircraft Performance	3	AE 311
AE 371	Aircraft Engines	3	AE 301
AE 390	Summer Training	2	AE 301, IE 202
MENG 410	Machine Design	3	MENG 310
AE 412	Compressible Aerodynamics	3	AE 311
AE 414	Aerodynamics Lab.	2	AE 412
AE 432	Aircraft Structures (2)	3	AE 331
AE 433	Flight Vehicle Materials	3	AE 331
AE 434	Structures Lab.	2	AE 432
AE 435	Aircraft Design	3	AE 361
AE 436	Aircraft Structural Design	3	AE 432
AE 462	Aircraft Stability & Control	4	AE 361, MATH 204
AE 472	Aircraft Propulsion	4	AE 371
AE 499	Senior Project	4	MENG 410
Total		**77**	

Departmental Technical Elective Courses (3 Cr. hrs)

The student has to choose one out of fourteen courses.

Course No.	Course Title	Cr. Hr.	Prerequisite
AE 413	Viscous Aerodynamics	3	AE 311
AE 415	Hypersonic Aerodynamics	3	AE 412
AE 437	Aircraft Structural Integrity	3	AE 433
AE 451	Avionic Systems	3	AE 361
AE 452	Basic Aircraft Systems	3	AE 462
AE 463	Aircraft Automatic Control	3	AE 462
AE 473	Space Vehicle Propulsion	3	AE 472
AE 481	Air Transport Engineering	3	AE 361
AE 482	Aircraft Maintenance systems	3	IE 331, AE 361
AE 491	Fundamentals of Space Vehicles	3	AE 412
AE 492	Computer Applications in Aeronautical Engineering	3	AE 412
AE 498	Special Topics in Aeronautical Engineering	3	AE 301
E …	Any Other Engineering Course	-	-
UN xxx	Any Other University Course	-	-

Total credit hours required for graduation is 155.

A TYPICAL PROGRAM FOR AERONAUTICAL ENGINEERING STUDENTS

1st Year
Regular & Cooperative

1st semester			2nd semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ELC 101	English Language I	2	ISLS 101	Islamic Culture I	2
CHEM 101 / PHYS 101	General Chemistry I / General Physics I	4	PHYS 101 / CHEM 101	General Physics I / General Chemistry I	4
MATH 101	Calculus I	4	MATH 202	Calculus II	4
ARAB 101	Arabic Language I	3	ELC 102	English Language II	2
			MENG 102	Engineering Graphics	3
Total		**13**	**Total**		**15**

2nd Year
Regular & Cooperative

3rd semester			4th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
PHYS 102	General Physics II	4	IE 202	Introduction to Engineering Design (2)	2
IE 201	Introduction to Engineering Design (1)	3	EE 201	Structured Computer Programming	3
ARAB 201	Arabic Language II	3	MATH 204	Differential Equations I	3
CE 201	Engineering Mechanics (Statics)	3	EE 251	Basic Electrical Engineering	4
MATH 203	Calculus III	4	IE 255	Engineering Economy	3
Total		**17**	**Total**		**15**

3rd Year
Regular & Cooperative

5th semester			6th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ISLS 201	Islamic Culture (2)	2	MENG 130	Basic Workshop	2
MEP 261	Thermodynamics	4	ISLS 301	Islamic Culture (3)	2
MENG 262	Eng. Mechanics (Dynamics)	3	MENG 270	Mechanics of Materials	4
MEP 290	Fluid Mechanics	4	AE 301	Fundamentals of Flight	3
EE 300	Analytical Methods in Engineering (1)	3	IE 331	Probability & Eng. Statistics	3
			EE 332	Computational Methods in Eng.	3
Total		**16**	**Total**		**17**

4th Year
Regular

7th semester			8th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
MENG 310	Machine Elements Design	3	AE 361	Aircraft Performance	3
AE 311	Low Speed Aerodynamics	3	AE 412	High Speed Aerodynamics	3
AE 331	Aircraft Structures (1)	3	AE 432	Aircraft Structures (2)	3
AE 371	Aircraft Engines	3	AE 433	Flight Vehicle Materials	3
MENG 204	Computer Aided Graphics	3	AE 472	Aircraft Propulsion	4
Total		**15**	**Total**		**16**

Training

AE 390	Summer Training	2 Cr. Hrs

4th Year
Cooperative

7th semester | **8th semester**

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
MENG 310	Machine Elements Design	3	ISLS 401	Islamic Studies (4)	2
AE 311	Low Speed Aerodynamics	3	MENG 410	Machine Design	3
AE 331	Aircraft Structures (1)	3	AE 412	High Speed Aerodynamics	3
AE 361	Aircraft Performance	3	AE 432	Aircraft Structures (2)	3
AE 371	Aircraft Engines	3	AE 435	Aircraft Design	3
MENG 204	Computer Aided Graphics	3	AE 472	Aircraft Propulsion	4
Total		**18**	**Total**		**18**

5th Year
Regular

9th semester | **10th semester**

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
MENG 410	Machine Design	3	ISLS 401	Islamic Studies (4)	2
AE 414	Aerodynamics Lab.	2	AE 434	Structures Lab.	2
AE 435	Aircraft Design	3	AE 436	Aircraft Structural Design	3
AE 462	Aircraft Stability and Control	4	AE 499	Senior Project	4
E ……	Social Elective*	3	E ……	Technical Elective	3
Total		**15**	**Total**		**14**

* One of three electives: PSY 422, ACCT 101, or ECON 101

5th Year
Cooperative

9th semester

Course No.	Course Title	Cr. Hrs
AE 400	Coop Work Program (follows the completion of the 4th year courses)	8
Total		**8**

10th semester

Course No.	Course Title	Cr. Hrs
AE 414	Aerodynamics Lab.	2
AE 434	Structures Lab	2
AE 433	Flight Vehicle Materials	3
AE 436	Aircraft Structural Design	3
AE 462	Aircraft Stability and Control	4
AE 499	Senior Project	4
Total		**18**

COURSE DESCRIPTION

AE 301 Fundamentals of Flight (3:3,1)

History of flight. Airplane components and their functions. Nature of Aerodynamic forces. Wind tunnel testing. Atmosphere. Incompressible and compressible one dimensional flow. Two dimensional flow. hydrodynamic theory and circulation. Finite wing. Introduction to boundary layer. Determination of total incompressible drag. Compressible drag. Airfoils. High lift systems.
Prerequisites: MEP 261, MEP 290

AE 311 Low Speed Aerodynamics (3:3,1)

Conservation laws for real flows. Navier Stokes equations. 2-D ideal flows using stream and velocity potential functions. Kutta-Joukowski theorem. Numerical solutions. Complex potential. Joukowski airfoil. Thin airfoil theory. Viscous flow. laminar boundary layer equations. Momentum integral equation. Turbulent boundary layer Skin friction drag. Form drag. Finite wings. Down wash and induced drag .
Prerequisites: EE 300, AE 301, EE 332

AE 331 Aircraft Structures (1) (3:3,1)

Aircraft structural details. Materials of aircraft structures. Loads on aircraft structures. Shear forces and bending and twisting moments. Fundamentals of elasticity. Bending of thin-walled structures. Torsion of thin walled structures. Shear in thin walled structures.
Prerequisites: MENG 270, AE 301

AE 361 Aircraft Performance (3:3,1)

Aircraft performance in steady flight. Straight and level flight. Flight limitations. Drag. Power. Performance curves in terms of thrust and power. Gliding flight. Range and endurance. Other methods of solution to performance problems. Aircraft performance in accelerated flight. Climbing flight. Take off. Landing. Turning flight. Introduction to helicopters. Helicopter performance. Thrust and torque theory. Rotor flow effects. Power required. Vertical climb.
Prerequisite: AE 301

AE 371 Aircraft Engines (3:2,3)

Aircraft engine types. Cycle analysis and performance parameters of piston engines. Cycle analysis and performance parameters of jet and gas turbine engines (ramjets, turbojets, turbofans, turboprops and turboshafts). Rocket engines classification and performance parameters. Ideal chemical rocket. Design concepts of thermodynamic cycles. Design project.

Prerequisite: AE 301

AE 390 Summer Training (10 weeks) (2:0,0)

Training in industry under the supervision of a faculty member. Students have to submit a report about their achievements during training in addition to any other requirements assigned by the Department.

Prerequisites: AE 301, IE 202

AE 400 Cooperative Work (26 weeks) (8:0,0)

Training in industry under the supervision of a staff member. Students should submit a final report about their training in addition to any other requirements assigned by the department.

Prerequisites: AE 301, IE 202

AE 412 High Speed Aerodynamics (3:3,1)

Thermodynamic principles .Conservation laws governing compressible flow. Generalized flow in nozzles. Isentropic flow. Normal shock relations. Nozzle flow with shock waves. Oblique shock waves. Expansion waves. Shock reflection. Airfoils in supersonic flow. Shock expansion method. Thin airfoil theory. Nonsteady gas dynamics. Moving shock waves and expansion waves. Shock tube theory. Aerodynamic facilities. Design of wind tunnels.

Prerequisite: AE 311

AE 413 Viscous Aerodynamics (3:3,1)

Review of conservation equations. Simple problems of viscous flow. Flow at high Reynolds number. Laminar boundary layer. Classical and numerical solutions of laminar boundary layer. Laminar separation. Transition .Turbulent boundary layer. Viscous aerodynamic drag. Turbulent shear flows. Wakes and jets. Computer applications.

Prerequisite: AE 311

AE 414 Aerodynamics Laboratory (2:0,5)

Experiments that accentuate instruments and experimental procedures. Wind tunnel types. Wind tunnel calibration. External and internal balance measurements. Pressure distribution measurement in shear layers. Measurement of laminar and turbulent boundary layers on a flat plate. Hot wire anemometry. Laser Methods (LDV, PLIF). Mach number measurement in supersonic flow. Six-component force measurement.

Prerequisite: AE 412

AE 415 Hypersonic Aerodynamics (3:3,1)

Hypersonic shock and expansion wave theories. Local surface inclination methods. Hypersonic inviscid flow fields. Approximate and exact methods. Hypersonic boundary layer theory. Hypersonic aerodynamic heating. Entry and heating problems. Hypersonic viscous interactions. High temperature gas dynamic. Equilibrium and nonequilibrium flows. Viscous high temperature flows.

Prerequisite: AE 412

AE 432 Aircraft Structures (2) (3:3,1)

Deflection analysis. Indeterminate structures. Bending of plates. Buckling of columns and plates. Local buckling of composite shapes. Buckling of stiffened panels. Crippling.

Prerequisite: AE 331

AE 433 Flight Vehicle Materials (3:3,1)

Imperfections in solids. Requirements from aerospace structural materials. Design philosophy (safe-life and damage-tolerant design). Aerospace applications of fracture mechanics. Airframe fatigue. Creep. Oxidation. Composite materials. Computer applications.

Prerequisite: AE 331

AE 434 Aircraft Structures Laboratory (2:0,5)

Bending of simply supported beams. Bending of cantilever beams. Unsymmetrical bending of beams. Shear center. Deflections of simply supported portal frame. Deflections of simply supported S frame. Deflections of statically indeterminate portal frame. Deflections of closed frames. Buckling of struts. Buckling of thin plates. Local

buckling of thin-walled columns.
Prerequisite: AE 432

AE 435 Aircraft Design (3:2,3)

Mission specification. Weight estimation. Sensitivity of weight to different parameters. estimating of wing area, take off thrust, and lift coefficient. Configuration design. Overall configuration. Fuselage layouts. Wing plan-form design. High lift devices. Empennage design. control surfaces. Landing gear. Propulsion system selection. Design refinement. Computer applications.
Prerequisite: AE 361

AE 436 Aircraft Structural Design (3:2,3)

Structural design of wing, fuselage, tail-plane, fin, and landing gear. Design of ribs, frames, stiffeners, webs, and skins. Spar design. Diagonal semi tension field beams. Optimum design. Computer applications.
Prerequisite: AE 432

AE 437 Aircraft Structural Integrity (3:3,1)

Failure criteria. Slow damage. Fatigue (accumulative damage, crack closure, crack arrest, load spectrum, residual strength, environmentally assisted fatigue). Discrete damage. Impact damage (birds and debris). Reliability. Non-destructive testing. Computer applications.
Prerequisite: AE 433, AE 435

AE 451 Avionic Systems (3:3,1)

Review of basic circuit theory. Introduction to semiconductors. Operation of bipolar junction transistor. Operation of different types of field effect transistors. Introduction to number systems and logic circuits. Introduction to communications. Introduction to wave modulation. Introduction to RADAR.
Prerequisite: AE 361

AE 452 Basic Aircraft Systems (3:3,1)

Instrument displays and panels. Air data instruments. Attitude indicating instruments. Heading indicating instruments. Flight director systems. Power-plant related instruments. Hydraulic and pneumatic systems.
Prerequisite: AE 462

AE 462 Aircraft Stability and Control (4:3,3)

Static longitudinal stability. Neutral point. Longitudinal control. Hinge moments. Control surface balancing. Stick free stability. Stick force. Stick force gradient. Maneuverability. Maneuver point. Center of gravity limits. Directional static stability. Directional control. Rolling static stability. Rolling control. Aircraft equations of motion. Small disturbance theory. Longitudinal dynamic stability. Lateral dynamic stability. Stability derivatives. Flying qualities

Prerequisites: AE 361, AE 412

AE 463 Aircraft Automatic Control (3:3,1)

Aircraft transfer functions. Open loop response. Aircraft response to atmospheric disturbances. Automatic control. Conventional control theory. Modern control theory. Gyrodynamics. Stability augmentation systems. Longitudinal Autopilots. Lateral Autopilots. Design project.

Prerequisite: AE 462

AE 472 Aircraft Propulsion (4:3,3)

Jet engine components. Aerothermodynamics of intakes, combustors and nozzles. Gas turbine engines turbomachines. Axial and centrifugal compressors and axial turbines. Matching of engine components. Design concepts of jet engine components. Design project.

Prerequisite: AE 371

AE 473 Space Vehicle Propulsion (3:3,1)

Types and performance of rocket vehicles. Chemical rockets characteristics, propellants and combustion, expansion in nozzles, thrust chambers. Electrical rocket propulsion. Advanced propulsion concepts.

Prerequisite: AE 472

AE 481 Air Transport Engineering (3:3,1)

Air-worthiness. Fleet planning. Flight safety. Flight operations. Ground operations. Maintenance tasks. Initial maintenance programs. Quality control.

Prerequisite: AE 390

AE 482 Aircraft Maintenance Systems (3:3,1)

Introduction. Reliability theory. Life testing. Maintained systems. Integrated logistic support (ILS). Aircraft handling. Repair station requirements. Quality systems. Inventory control. Structural repair. Engine maintenance and overhaul. Maintenance of aircraft systems and instruments.

Prerequisites: IE 331, AE 361

AE 491 Fundamentals of Space Vehicles (3:3,1)

Classification of aerospace vehicles. Mission sizing. Main components. Selection of Propulsion systems. Launching systems. Aerodynamics. Guidance and control. Structure and materials. Electronic systems.

Prerequisite: AE 412

AE 492 Computer Applications in Aero. Eng. (3:2,3)

Introduction to CFD, Navier Stokes Equations, Partial Differential Equations (PDE's) Basics Of numerical methods for solving PDE's, Finite difference Methods for Hyperbolic, Parabolic, and Elliptic PDE's, Finite Volume Methods, Numerical Grid Generation, Applied CFD using Fluent commercial Package.

Prerequisites: AE 412, AE 432

AE 498 Special Topics in Aeronautical Eng. (3:3,1)

Selected topics to develop the skills and knowledge in a given field of Aeronautical Engineering.

Prerequisites: AE 301

AE 499 Senior Project (4:2,4)

Selection of topic. Literature review. Project design planning. Arranging for data collection and experimental work. Interim report. Experimental work and data collection or field study (if any). Data processing analysis and results. Preparation of a first draft of the final report. Presentation of the project.

Prerequisite: MENG 410

DEPARTMENT OF
CHEMICAL AND MATERIALS ENGINEERING

FACULTY

Chairman:

Alhamed,Yahia A.S.

Professors:

Abdulsalam, Mohammed I.
Al-Zahrani, Abdulrahim A.
Nosier, Shaaban A.
Wazzan, Abdulaziz A.
Zahed, Adnan H

Associate Professors

Alhamed,Yahia A.S.
Al-Turaif, Hamad A.
Bashir, Muhammed D
Daous, Muhammed A.
Dawoud, Uthman M.
El-Shazly, Ahmed H.
Iskanderani, Faisal I.
Noorwali, Mahmoud M.

Assistant Professors

Al-shahrani, Saad S
Al-Tajam, Muhammed A.
Bamufleh, Hisham S.
Idris, Gaber M.
Justanieah, Ahmed M.

INTRODUCTION

Chemical and Materials Engineering are disciplines concerned with the application of basic and engineering sciences to the study of processes in which raw materials undergo both chemical and physical changes to produce value added products. Chemical and Material engineers deal with the design, construction and economic operation of plants and equipments in which these processes take place. Quality and characteristics of manufactured materials are also studied in these disciplines.

The Kingdom of Saudi Arabia is endowed with vast resources of petroleum and minerals, which require the expertise and services of chemical and materials engineers to harness these resources and contribute to the rapid development and progress of the country. In order to meet this challenge, the Department of Chemical and Materials Engineering was established in the year 1981/1982 at King Abdulaziz University. Since its inception, the Department has produced more than 500 qualified chemical engineers who are serving various organizations in different parts of the country.

The Department is well equipped to provide effective training to the graduating engineers. It has a B.Sc degree program of a five-year duration consisting of 155 credit hours with specialized courses, suitable to the requirements of the Kingdom. The programs leading to the Master of Science (M.Sc.) in Chemical Engineering and Materials Engineering started in 1996 G. Each of these programs requires two years of full-time study consisting of 36 credit hours of course work and a thesis. The Department has well equipped laboratories and computer facilities as well as highly qualified faculty and technicians to achieve its educational aims and objectives.

VISION

Commitment to total quality in teaching and scientific research and aspiration to leadership in chemical and materials engineering education.

The Mission of the Department

The mission of the Chemical and Materials Engineering Department at King Abdul-Aziz University (KAU) is to graduate highly qualified chemical and materials engineers who are well trained and prepared to pursue professional careers in industry, government or research.

Moreover, the department thrives to conduct world-class research and provide consultation services sectors of the community in the chemical and materials engineering sciences and technology.

The mission of the program

The mission of the Chemical Engineering Program at King Abdul-Aziz University (KAU) is to graduate chemical engineers who are qualified to pursue professional careers in industry, and prepared for graduate studies.

PROGRAM EDUCATIONAL OBJECTIVES

1. Employ their extensive Chemical Engineering knowledge and skills to actively take part in solving techno-economical problems in private and public industries in general, and in the petrochemicals, petroleum refining, and gas related industries in particular
2. Pursue career building skills through life-long learning in the fields of Chemical Engineering in order to address contemporary local and global issues.
3. Uphold and reflect the core values and lofty principles of Islam through personal and professional integrity, ethical and responsible behaviors, proactivity and a sincere desire and effort to serve society both individually and within teams.

PROGRAM OUTCOMES

Graduates of the Chemical Engineering program at King Abdul-Aziz University (KAU) must demonstrate the following:

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulates, and solves engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) a broad education necessary to understand the impact of engineering solutions in a global and societal context

(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
(l) a working knowledge including material and energy balances applied to chemical processes; thermodynamics; heat, mass, and momentum transfer; chemical reaction engineering; separation processes; process simulation, simulation and control; process design; and appropriate modern experimental and computing techniques.

The first 11 outcomes are identical to the 11 ABET outcomes a to k, while outcome l map to the requirements specified in the ABET Program Criteria for chemical and Similarly Named Engineering Programs

PROGRAMS OFFERED

The Chemical and Materials Engineering Department currently offers a B.Sc. program in Chemical Engineering and M.Sc. programs in both Chemical and Materials Engineering. These programs were designed and have continuously been revised and improved to meet the needs and demands of the ever-growing and diversifying process industries of the country. These programs are now poised to meet the demands and challenges of the 21st century and prepare their graduates with the best education and training which would allow them to capitalize on the ever growing career opportunities available to them as chemical engineers in the global market with professionalism and confidence.

A major feature of the current undergraduate program is its design to provide students with balanced courses in relevant fundamental and engineering sciences, engineering designs, and a variety of technical and applied engineering elective courses, in addition to a variety of humanities and communication courses. The program, thus, focuses on a balanced development and tuning of the students' knowledge, skills and attitudes and their analytical, experimental as well as their intellectual capacities.

CAREER OPPORTUNITIES

Demands for chemical engineers have continuously increased in Saudi Arabia over the past 30 years. This is due to the phenomenal growth this country has been witnessing in the process industry over this period of time, particularly in the oil and gas, petrochemical, water desalination, cement, and food industries, to name a few. The Chemical and Materials Engineering Department at King Abdulaziz University, and since its establishment in 1982, has been a major contributor to meeting this demand by preparing highly qualified and trained chemical engineers to meet the different technical and industrial needs of these diverse industries. The Department has since September 2003 been accredited by ABET (Accreditation Board for Science & Technology) to be "substantially equivalent" to similar American universities' programs.

Such an accreditation is bound to create expanded and diverse career opportunities for the Department's graduates, in the local, regional, as well as the international job markets.

Some of the current major employers of the Department's graduates in the local industries include Saudi ARAMCO, SABIC, Saline Water Conversion Corporation (SWCC), and various private and multinational companies such as Proctor & Gamble, SAVOLA, and the different Cement companies.

FACILITIES

There are six laboratories used for undergraduate instructions in the program and the rest are research labs. The function of these laboratories is to strengthen the instructional material of certain courses by providing adequate practical experience. Additionally, there are some research facilities, which are utilized for faculty research, senior projects and postgraduate research work.

1. Materials Science Laboratories

These laboratories maintain equipment utilized for the metallographic preparation, microscopic studies thermal processing, and mechanical characterization of various engineering materials including metallic alloys, ceramics, polymers and composites.

- **Metallographic device**

Microscopes, metallographic device and micro-hardness testers.

- **Heat treatment device**

A number of tubes, muffle, HF induction, vacuum furnaces and ovens.

- **Mechanical testing device**

Mechanical testing machines and machines for fatigue. Tensile, fatigue, creep, impact, and hardness testing machines

2. Corrosion Laboratory

This laboratory is for teaching various principles and techniques in corrosion measurements and some basics in electrochemistry. Multipurpose corrosion kits, cathodic protection.

3. Unit Operation Laboratory

This laboratory has the following equipment, some of which are of pilot-plant scale: Plate and packed distillation column, Liquid-liquid extraction pulsed packed column, Tunnel dryer unit, double pipe heat exchanger, shell and tube heat exchanger, Gas and liquid diffusion coefficient apparatus, Sedimentation apparatus, screen analysis set, cooling tower and a computer-controlled distillation column.

4. Process Control Laboratory

The process control laboratory is equipped to demonstrate the fundamentals of feedback control theory, process measurements of temperature, level and concentration. This laboratory contains the following apparatus: Temperature control unit, level control apparatus, PH control apparatus, process plant trainer and coupled tank apparatus

5. Computer simulation laboratory

This laboratory has computer software applications (Microsoft Office [word, Excel, PowerPoint], Matlab, Polymath, Mathcad , Chemcad and HYSYS), twenty workstations, and one central printer. This facility serves a number of courses in the program (e.g. ChE 321, ChE 441, ChE 442, ChE 499)

6. Petroleum Testing Laboratory

The experiments conducted in this laboratory are for testing petroleum products according to ASTM standards. The laboratory has the capabilities to carry out the following tests:

- Salts in crude oil, lead in petroleum, oil content of petroleum waxes, copper strip corrosion, distillation of petroleum products, cloud and pour point of petroleum oils, Conrad son carbon residue and flash point by Fensky Martens closed cup methods.
- Density, specific gravity, API gravity of petroleum products,

refractive index of petroleum products and vapor pressure of petroleum products (Reid method).

7. Polymer Laboratory (Research)

This laboratory has equipment for testing and mechanical characterization of various polymeric materials. Equipment for measuring density, melt-flow index, impact resistance and microtone and microscopes are used frequently.

8. Instrumental Analysis Laboratory (Research)

This laboratory contains a variety of analytical instruments such as atomic absorption spectrophotometer, spectrofluorometer, Spectrophotometer and UV/visible spectrophotometer.

9. Industrial Wastewater Treatment Laboratory (Research)

This laboratory contains the following devices; Sedimentation apparatus, oxygen analyzer, drying oven, the Jar test apparatus and turbidity meter, COD and BOD kit and anaerobic digestion unit.

10. Catalyst Preparation and Characterization Laboratory (research)

In this laboratory an automated reactor system is installed by which catalysts can be prepared in full automated procedures. This equipment is installed with pH, amounts of reactants and reaction temperature controlling and monitoring systems. The laboratory also contains a micropycnometer for measurements of true densities of solids, Nitrogen adsorption and surface area determination equipment, drying ovens and pressure batch reactors.

11. Catalysis Testing Laboratory (Research)

The equipment available for catalyst research are: Two automated micro-reactor systems with online gas chromatographs to conduct gas phase catalytic reactions, vacuum drying oven, muffle furnace with variable ramp settings, glove box, high pressure liquid phase reactor (5000 Pisa – 350^{o}C), UV-Vis spectrophotometer and gas phase reactor system.

12. Surface Science Laboratory (Research)

This laboratory has a state – of- the art surface analytical instrument

(MAX 200) developed and manufactured by Leybold (German Company). It is a multi technique electron and mass spectrometric device equipped with real time data system that facilitates completely unattended operations once the samples have been loaded into the high vacuum load lock. MAX 200 consists of various techniques can be performed in one vacuum chamber under ultra high vacuum conditions such as:

XPS (X- Ray Photoelectron Spectroscopy),
AES (Auger Electron Spectroscopy),
ISS (Ion Scattering spectroscopy),
SAM (Scanning Auger Microscopy),
SIMS (Secondary Ion Mass Spectrometry),
SNMS (Secondary Neutral Mass Spectrometry, and
RGA (Residual Gas Analysis) .

PROGRAM REQUIREMENTS AND CURRICULUM

Units required for the B.Sc. degree in the Department of Chemical and Materials Engineering.

Conventional Program

Requirements	Cr. Hrs
University Requirements	14
Faculty Requirements	61
Departmental Requirements	80
Total	**155**

Cooperative Program

Requirements	Cr. Hrs
University Requirements	14
Faculty Requirements	61
Departmental Requirements	72
Coop Program	8
Total	**155**

Departmental Requirements Core Courses (71 Cr. hrs)

Course No.	Course Title	Cr. Hr.	Prerequisite
MENG 130	Basic Workshop	2	MENG 102
CHEM 102	General Chemistry II	4	CHEM 101, ELC 102
CHEM 231	Principle of Organic Chemistry I	4	CHEM 101
CHEM 232	Principle of Organic Chemistry II	4	CHEM 231
CHEM 240	Physical Chemistry for Non-Chem. Majors	4	CHEM 102, MATH 102
ChE 201	Introduction to Chemical Engineering	3	CHEM 102, ELC 102
ChE 210	Materials Science	4	CHEM 101
ChE 301	Chemical Engineering Thermodynamics (I)	3	CHEM 102
ChE 302	Chemical Engineering Thermodynamics (II)	3	ChE 301
ChE 311	Corrosion Engineering	3	CHEM 240, ChE 210
ChE 321	Chemical Reaction Engineering	3	ChE 302, EE332
ChE 331	Momentum Transfer	3	MATH 204
ChE 332	Heat Transfer	3	ChE 301, ChE331
ChE 333	Mass Transfer	3	ChE 331, ChE 201
ChE 334	Separation Processes	3	ChE 302, ChE 333
ChE 390	Summer Training	2	ChE 334
ChE 411	Polymer Engineering	3	CHEM 232
ChE 435	Unit Operation Lab.	3	ChE 332, ChE 334
ChE 441	Modeling and Simulations	3	ChE 321, ChE 334
ChE 442	Process Control	4	ChE 321, ChE 334
ChE 451	Plant Design	3	ChE 321, ChE 334
ChE 499	Senior project	4	ChE 321, ChE 334
Total		**71**	

Departmental Requirements Elective Courses (9 Cr. hrs)

Course No.	Course Title	Cr. Hr.	Prerequisite
ChE 412	Engineering Materials	3	ChE 210
ChE 413	Materials Selection	3	ChE 210
ChE 414	Extractive Metallurgy	3	ChE 210
ChE 422	Catalysis	3	ChE 321
ChE 452	Computer Aided Design	3	ChE 441, ChE 451
ChE 461	Inorganic Chemical Technology	3	ChE 321, ChE 334
ChE 462	Petroleum Refinery Engineering	3	ChE 321, ChE 334
ChE 463	Natural Gas Engineering	3	ChE 321, ChE 334
ChE 464	Petrochemical Technology	3	ChE 334
ChE 465	Industrial Pollution Control	3	ChE 321, ChE 334
ChE 466	Safety in Chemical Industries	3	ChE 334
ChE 471	Selected Topics in Chemical or Materials Engineering	3	ChE 334

Total Credit hours required for graduation (155)

A TYPICAL PROGRAM FOR CHEMICAL AND MATERIALS ENGINEERING STUDENTS

1st Year
Regular & Cooperative

1st semester			2nd semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ELC 101	English Language I	2	ISLS 101	Islamic Culture I	2
CHEM 101 / PHYS 101	General Chemistry I / General Physics I	4	PHYS 101 / CHEM 101	General Physics I / General Chemistry I	4
MATH 101	Calculus I	4	MATH 202	Calculus II	4
ARAB 101	Arabic Language I	3	ELC 102	English Language II	2
			MENG 102	Engineering Graphics	3
Total		**13**	**Total**		**15**

2nd Year
Regular & Cooperative

3rd semester			4th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
PHYS 102	General Physics II	4	IE 202	Introduction to Engineering Design (2)	2
IE 201	Introduction to Engineering Design (1)	3	EE 201	Structured Computer Programming	3
ARAB 201	Arabic Language II	3	MATH 204	Differential Equations I	3
CE 201	Engineering Mechanics (Statics)	3	CHEM 102	General Chemistry II	4
MATH 203	Calculus III	4	ChE 210	Materials Science	4
Total		**17**	**Total**		**16**

3^{rd} Year
Regular & Cooperative

5^{th} semester / 6^{th} semester

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
ISLS 201	Islamic Culture (2)	2	CHEM 232	Principle of Organic Chemistry II	4
ChE 201	Introduction to Chem. Eng.	3	ChE 302	Chemical Eng. Thermodynamics (2)	3
CHEM 231	Principle of Organic Chemistry I	4	CHEM 240	Physical Chemistry	4
ChE 301	Chemical Engineering Thermodynamics (1)	3	ChE 333	Mass Transfer	3
ChE 331	Momentum Transfer	3	MENG 130	Basic Workshop	2
Total		**15**	**Total**		**16**

4^{th} Year
Regular

7^{th} semester / 8^{th} semester

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
IE 255	Engineering Economy	3	ISLS 301	Islamic Culture (3)	2
EE 332	Computational Methods in Eng.	3	ChE 311	Corrosion Engineering	3
ChE 332	Heat Transfer	3	ChE 321	Chemical Reaction Engineering	3
ChE 334	Separation Processes	3	EE 251	Basic Electrical Engineering	4
ChE 411	Polymer Engineering	3	ChE xxx	Elective Course	3
Total		**15**	**Total**		**15**

Training

ChE 390	Summer Training	2 Cr. Hrs

4^{th} Year
Cooperative

7^{th} semester

Course No.	Course Title	Cr. Hrs
ISLS 301	Islamic Culture (3)	2
CHEM 232	Principle of Organic Chemistry II	4
ChE 302	Chemical Engineering Thermodynamics (2)	3
ChE 332	Heat Transfer	3
ChE 333	Mass Transfer	3
IE 255	Engineering Economy	3
Total		**18**

8^{th} semester

Course No.	Course Title	Cr. Hrs
ChE 311	Corrosion Engineering	3
ChE 321	Chemical Reaction Engineering	3
ChE 334	Separation Processes	3
ChE 411	Polymer Engineering	3
ChE xxx	Elective Course	3
ChE 499	Senior project	4
Total		**19**

5^{th} Year
Regular

9^{th} semester

Course No.	Course Title	Cr. Hrs
ISLS 401	Islamic Culture (4)	2
ChE 435	Unit Operations lab.	3
ChE 442	Process Control	4
ChE xxx	Elective Course(2)	3
ChE 499	Senior project	4
Total		**16**

10^{th} semester

Course No.	Course Title	Cr. Hrs
IE 331	Probability and Engineering Statistics	3
ChE 441	Modeling and Simulation	3
ChE 451	Plant Design	3
xx xxx	Elective Course (humanity science)	3
ChE xxx	Elective course (3)	3
Total		**15**

5^{th} Year
Cooperative

9th semester			10th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ChE 400	Coop Work Program (follows the completion of the 4^{th} year courses)	8	ISLS 401	Islamic Culture (4)	2
			ChE 435	Unit Operations Lab.	3
			ChE 441	Modeling and Simulation	3
			ChE 442	Process Control	4
			ChE 451	Plant Design	3
			xx xxx	Elective Course (humanity Science)	3
Total		**8**	**Total**		**18**

COURSE DESCRIPTION

ChE 201 Introduction to Chemical Engineering (3:3,1)

Broad definitions of Chemical Engineering. Introduction to chemical engineering calculations. Material balances in processes not involving chemical reactions/involving chemical reactions. Recycle by-pass and purge calculations. Ideal and non-ideal gases. Critical properties and compressibility charts. Vapor-liquid equilibria, partial saturation and humidity. Computer applications

Prerequisite: CHEM 102, ELC 102

ChE 210 Materials science (4:3,2)

Classification of engineering materials, atomic and molecular bonding. Properties and microstructure, elastic and plastic behavior. Order in solids, phases and solid- solutions, crystal geometry. Disorder in solids, atomic movement and rearrangement, phase diagrams, solid-state transformations. Applications of metals, ceramics, polymers and composites .Service stability, corrosion and failure. Involves laboratory experiments and practices.

Prerequisite: CHEM 101

ChE 301 Chemical Eng. Thermodynamics (I) (3:3,1)

Introduction to thermodynamics concepts, first law of thermodynamics, Mass and energy balances in closed and open systems, volumetric properties of pure fluids, heat effects, humidity charts, second law of thermodynamics, entropy, Computer applications to thermodynamics problems.

Prerequisite: CHEM 102

ChE 302 Chemical Eng. Thermodynamics (II) (3:3,1)

Review of first law and second law of thermodynamics. Thermodynamic properties of fluids. Power and refrigeration cycles. Vapor liquid equilibrium. Theory and applications of solution thermodynamics. Chemical reaction equilibrium.

Prerequisite: ChE 301

ChE 311 Corrosion Engineering (3:3,2)

Electrochemical mechanisms, corrosion kinetics, polarization and corrosion rates, passivity. Methods of testing corrosion of iron and steel and the effects of various parameters. Pourbaix diagrams. Effect of stresses on corrosion, (stress corrosion cracking, cold working, hydrogen cracking, etc.). Corrosion control technologies, corrosion of some engineering alloys. Design of simple processes.

Prerequisite: CHEM 240, ChE210

ChE 321 Chemical Reaction Engineering (3:3,1)

The course is intended to develop the student' s ability to understand mole balances, conversion and reactor sizing, rate laws and stoichiometry for single and multiple reactions and its applications to steady-state isothermal reactor design. Collection and analysis of rate data and catalysis and catalytic reactor.

Prerequisite: EE332, ChE 302

ChE 331 Momentum transfer (3: 3,1)

Fluid statics. Mass, momentum, and energy balance on finite and differential systems. Laminar and turbulent flow in pipes. Fluid flow in porous media. Introduction to boundary layer theory. Fluid flow applications.

Prerequisite : MATH 204

ChE 332 Heat Transfer (3:3,1)

Modes of heat transfer, steady and un-steady-state conduction in different co-ordinates, convective heat transfer with and without phase change. Correlations for forced and natural convection. Analogy between momentum and heat transfer. Heat transfer applications.

Prerequisite : ChE 301,ChE 331

ChE 333 Mass Transfer (3:3,1)

Fundamentals of mass transfer processes. The control volume approach to the mass transfer processes, differential equations of mass transfer. Steady and unsteady –state molecular diffusion. Natural and forced convection mass transfer. Mass transfer theories. Convective mass transfer correlations. Analysis of chemical engineering operations involving mass transfer. Simultaneous heat and mass transfer; mass

transfer accompanied by chemical reaction.
Prerequisite : ChE 331, ChE 201

ChE 334 Separation processes (3:3,1)

Phase equilibria, continuous contact and stage wise processes; fractional distillation, gas absorption, liquid-liquid extraction and other separation processes.
Prerequisite: ChE 302, ChE 333

ChE 390 Summer training (10 weeks) (2:0,0)

Training in industry under the supervision of a faculty member. Students have to submit a report about their achievements during training in addition to any other requirements as assigned by the Department.

Prerequisites: ChE 334

ChE 400 Cooperative work (26 weeks) (8:0,0)

Training in industry under the supervision of a staff member. Students should submit a final report about their training in addition to any other requirements as assigned by the Department.
Prerequisites: ChE 334

ChE 411 Polymer Engineering (3:3,1)

Classification of polymeric materials, calculation of molar mass and molar mass distribution, polymerization reactions, kinetics of polymerization reactions, composites materials, polymer processing, mechanical and physical properties, commercial polymer.
Pre-requisite CHEM 232

ChE 412 Engineering materials (3:3,1)

Ferrous and non-ferrous metals and alloys. Ceramics. Polymers. Composites. Conductors, semiconductors and superconductors. Glasses.
Prerequisites: ChE 210

ChE 413 Materials Selection (3:3,1)

Selection criteria for metals, alloys, ceramics and plastics. Mechanical behavior, corrosion and oxidation resistance at ambient and elevated temperatures. Materials for marine environments, oil production and

transport, refineries, petrochemical and desalination industries. Refractory materials. Computer applications, and economic considerations.
Prerequisites: ChE 210

ChE 414 Extractive Metallurgy (3:3,1)

Major operations in the iron and steel-making industry; direct reduction processes, blast furnaces, converter and electric-arc steel-making and steel refining methods; electroslag (ESR) and vacuum induction refining (VIR). Bauxite production. Electro-thermal reduction of cryolite to produce commercial aluminum. Production of TiO2. Extractive metallurgy of titanium. Gold extraction. Continuous casting.
Prerequisites: ChE 210

ChE 422 Catalysis (3:3,1)

Kinetics of homogeneous and heterogeneous catalytic reactions. Physical and chemical properties of solid catalysts. Preparation, activity, selectivity, deactivation and regeneration of catalysts. Applications to refining and petrochemical industries.
Prerequisites: ChE 321

ChE 435 Unit Operations Laboratory (3:1,5)

Experimental study of unit operations using pilot size equipment. Safety considerations. Data analysis. Selected topics related to unit operations such as membrane separation and mechanical separation, etc.
Prerequisites: ChE 332, ChE 334

ChE 441 Modeling and Simulation (3:3,1)

This course is designed to give a chemical engineering student the ability to solve system of algebraic- differential equations. The course will develop student ability's to drive system models and simulate digitally. The student is also trained on available simulation computer packages (Design II, ChE-Cad & Math-lab).

Prerequisite: ChE 321, ChE 334

ChE 442 Process control (4:3,3)

Mathematical modeling of process control. Transfer functions. Dynamic behavior of chemical processes. Feedback control. Dynamic behavior of closed-loop systems. Stability analysis. Frequency response analysis. Controller design and tuning. Introduction to computer control. Laboratory and simulations applications.

Prerequisites: ChE 321, ChE 334

ChE 451 Plant Design (3:3,1)

Chemical and petrochemical processes plant design. Locations and layout of chemical process plant. Operability, controllability reliability and safety requirement of the design. Cost estimation. Utilization of simulation and design packages.

Prerequisites: ChE 321, ChE 334

ChE 452 Computer Aided Design (3:3,1)

Techniques for computer aided design of chemical processing systems. Thermodynamic property models and data bases. Introduction to linear and nonlinear programming. Design of unit operations and chemical reactors. Flow sheeting. Process integration. Development of algorithm. Case studies with extensive use of computer software.

Prerequisite: ChE 441, ChE 451

ChE 461 Inorganic Chemical Technology (3:3,1)

Fundamentals of the chemical industry. Study of some important industries such as industrial gases, cement, ceramics and glass, mineral acid synthesis, chlor-alkali, phosphate, fertilizers, pigments and paints. Water treatment.

Prerequisites: ChE 321, ChE 334

ChE 462 Petroleum Refinery Engineering (3:3,1)

Oil production. Surface operations. Characterization and classification of crude oils. Physical properties of oils. Refinery operations; atmospheric and vacuum distillation, treatment processes, catalytic cracking, reforming, alkylation , coking, asphalt production and lubricating oil

production. Blending of refinery products. Waste treatment.
Prerequisites: ChE 321, ChE 334

ChE 463 Natural Gas Engineering (3:3,1)

Characterization and properties of natural gas. Gas gathering systems. Gas-oil multistage separation. Gas treatment and liquefaction. Gas transportation through pipelines, signal-telemetering. Industrial usages.
Prerequisites: ChE 321, ChE 334

ChE 464 Petrochemical Technology (3:3,1)

Production technologies of synthesis gas, olefins and aromatic. Manufacture of important petrochemicals derived from base chemicals and synthesis gas. Production technologies of important polymers and plastics.
Prerequisite: ChE 334

ChE 465 Industrial Pollution Control (3:3,1)

Sources of pollution from chemical industries. Standards and legislation. Health and environmental effects of pollution. Air pollutants; particulates, SOx , NOx and organic vapors. Air pollution control. Treatment of industrial wastewater. Handling of solid waste. Monitoring of pollutants. Case studies for specific industries like petrochemicals, fertilizers, desalination and petroleum refining.
Prerequisites: ChE 321, ChE 334

ChE 466 Safety in Chemical Process Industries (3:3,1)

Safety and loss prevention. Major process hazards. Hazard identification, assessment and prevention. Personal safety in industrial environment. Fire explosion and toxic release. Safety systems.
Prerequisite: ChE 334

ChE 471 Special Topics (3:3,1)

Topics in chemical or materials engineering upon the approval of the chemical engineering department council.
Prerequisites: ChE 334

ChE 499 Senior project **(4:2,4)**

Faculty – supervised individual or team of two or more students design projects. Emphasis on the integration of basic and engineering sciences in the solution of chemical processes design problems, including synthesis and economic evaluation of such process.

Prerequisites: ChE 321, ChE 334

DEPARTMENT OF
CIVIL ENGINEERING

FACULTY

Chairman:

Shihata, Sabry A.

Professors:

Abu-Rizaiza, Omar S.
Al-Noury, Solaiman I.
Al-Zahrani, Abdul Rahim H.
Ashour, Sameer A.
Baghdadi, Zaki A.
Fatani, Mohamed Noor Y.
Mohorjy, Abdullah M.
Shihata, Sabry A.
Wafa, Faisal F.

Associate Professors:

Al-Bar, Hamed O.
Al-Ghamdi, Abdullah S.
Hassan Tanweer S.
Hegazy, Yasser A.
Qutub, Saud A.
Radain, Talal A.
Sabbagh, Abdulghany O.
Samman, Tamim A.
Sirajuddin, Abdullah M.
Taha, Mahmoud A.
Zahran, Shaher Z.

Assistant Professors:

Alama, Mohammed S.
Bajarwan, Abdullah A.
Banafa, Ahmed M.
Basalama, Mohammed K.
El-Komy, Adel S.
Hussein, Maged H.
Hussein, Rashad M.
KhallafAllah, Bahjat H.
Khan, Ahmed M.
Khushefati, Waleed H. A.
Maghram, Saleh F.
Makki, Suhail A.
Mansouri, Samir A.
Qutub, Zuhair A.
Zughaibi, Abdul Wahab M.

Lecturers:

Al-Mahmadi, AbdulAziz
Hamdi, Amin S.
Khairy, Ahmed T.
Turki, Ali A.

INTRODUCTION

Civil engineering is the profession which designs, constructs, operates and manages the basic systems that make civilization possible and which assesses the impacts of such systems on the natural environment. The civil engineer must deal with the human impact of engineering, social, moral, legal and environmental issues that concern us to a far greater degree than ever before. As a matter of fact, civil engineering has played a key role in the development of the Kingdom of Saudi Arabia during the past several decades.

The Department of Civil Engineering is one of the major and active engineering departments at King Abdulaziz University (KAU) since 1395H/1975G. It offers B.Sc., M.Sc. (thesis and non-thesis options) as well as Ph.D. degrees in civil engineering. The Department has a strong highly qualified and experienced full-time faculty comprising 9 professors, 11 associate professors, 15 assistant professors, and 4 lecturers, apart from the supporting laboratory and secretarial staff.

Civil engineering programs are intended to satisfy the needs of the country. The rapid introduction of modern materials, measurement techniques, construction methods and management tools require properly trained civil engineers. The civil engineering program and its objectives are continuously updated keeping in view these factors.

The civil engineering program B. Sc. at KAU is designed to develop knowledgeable and creative engineers with strong capabilities for innovation and management. Civil Engineering graduates have a wide variety of employment opportunities in both the private as well as the public sectors. Civil engineering has become an extremely diverse field with many areas of application.

VISION

"A distinguished learning and research community in Civil Engineering knowledge."

MISSION

"Offer high-quality education and conduct innovative research in Civil Engineering to provide sustainable solutions for societal needs."

OBJECTIVES

The educational program of the Civil Engineering department at King Abdul-Aziz University is preparing its graduates to achieve the following:

1. Demonstrate technical competence in the areas of Civil Engineering, through engagement in productive career in public and private sectors, academia, or research.
2. Engage successfully in work place utilizing leadership, team-work, effective communication, life-long learning, ethical behavior and project management tools.
3. Contribute to the sustainable development of the society.

PROGRAM OUTCOMES

The graduating students from Civil Engineering Department will have the following outcomes:

- An ability to apply knowledge of mathematics, science, and engineering.
- An ability to design and conduct experiments, as well as to analyze and interpret data.
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- An ability to function on multi-disciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- A recognition of the need for, and an ability to engage in life-long learning.
- A knowledge of contemporary issues.
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

PROGRAMS OFFERED

The Department of Civil Engineering offers B.Sc., M.Sc. (thesis and non-thesis) and Ph.D. programs as follows:

- **B.Sc. Program**
  The student has to earn a minimum of 155 credit hours to obtain a B.Sc. degree in civil engineering.
- **M.Sc. Degree (Thesis Option)**
  The requirement for M.Sc. degree (thesis option) consists of 27 credit hours of course work, a seminar (1 credit hour) and a M.Sc. thesis (8 credit hours). The graduate student can choose one of the following specializations: construction engineering, environmental engineering, geotechnical engineering, structural engineering, transportation engineering, or water resources engineering.
- **M.Sc. Degree (Non- Thesis Option)**
  The requirement for M.Sc. degree (non-thesis option) consists of 39 credit hours of course work, master's project (3 credit hours) and a comprehensive exam. The graduate student can choose one of the following specializations: construction engineering, environmental engineering, geotechnical engineering, structural engineering, transportation engineering or water resources engineering.
- **Ph.D.**
  The Department of Civil Engineering is the first department in the Faculty of Engineering at KAU that offers a Ph.D. program. The doctoral degree requirements are 30 credit hours of coursework and a Ph.D. dissertation (12 credit hours). This program was started in the Fall Semester 1422H/2001G. The doctoral student can choose one of the following specializations: construction engineering, environmental engineering, geotechnical engineering, structural engineering, transportation engineering or water resources engineering.

CAREER OPPORTUNITIES

Graduates of the Department of Civil Engineering have career opportunities in the following organizations:

- Ministry of Water and Electricity.
- Ministry of Municipalities and Rural Affairs.
- Ministry of Communications.
- Ministry of Planning and Economy.
- Ministry of Defense and Aviation.
- Ministry of Interior.

- Ministry of Education.
- Ministry of Hajj.
- Ministry of Health.
- Saline Water Conversion Corporation.
- Saudi Arabian Airlines.
- Saudi ARAMCO.
- Municipalities.
- Presidency of Meteorology and Environment (PME).
- Semi-Government Organizations.
- Private Organizations.
- All organizations that have an engineering department.
- Consultant and engineering offices.

DEPARTMENTAL FACILITIES

The Department has well equipped laboratory facilities with experienced and qualified technicians and supporting staff. The following are the laboratory facilities of the department.

- **Strength of Materials Laboratory:** for studying the mechanical behavior of different materials.
- **Surveying Laboratory:** for measuring and setting out coordinates, distances, angles and elevations using surveying instruments.
- **Cement and Aggregate Laboratory:** for studying the properties of cement and aggregates.
- **Concrete Technology Laboratory:** for mixing, casting and testing of fresh and hardened concrete.
- **Soil Mechanics Laboratory:** for experimental studies of general properties and mechanical behavior of soils and rocks.
- **Foundation Engineering Laboratory:** For experimental studies of soils and rocks for foundation design.
- **Heavy Structures and Pre-stressed Concrete Laboratory:** for studying behavior of R.C. structural members and pre-stressed members under loads.
- **Hydraulics Laboratory:** used for experimental studies of the basic principles of flow of water.
- **Environmental Engineering Laboratory:** for studying techniques of control of environmental quality by physical, chemical, and biological processes; water and wastewater

analysis.

- **Advanced Hydraulics Laboratory:** for testing hydro-machinery, determining rainfall-runoffs and making hydrographs.
- **Traffic Engineering Laboratory**: used for traffic data analysis and studies.
- **Asphalt Laboratory:** used for asphalt and pavement materials testing.
- **Computer Laboratory**: has software for different courses and computer applications in civil engineering.

UNDERGRADUATE CURRICULUM

The undergraduate curriculum consists of the University-required courses, the Faculty-required courses, the Departmental core courses and a minimum of three Departmental elective courses, making a total of 155 credit hours to be earned by a student for obtaining a B.Sc. degree in Civil Engineering. Some twenty-five departmental elective courses covering all the major branches of civil engineering are offered. A student has the liberty to select the electives with a view to gaining a broad-based education in several fields of civil engineering or to pursue a more specialized education in one particular area of his interest. Units required for the B.Sc. degree in the Department of Civil Engineering are as follows:

Conventional Program

Requirements	Cr. Hrs
University Requirements	14
Faculty Requirements	61
Departmental Requirements	80
Total	**155**

Cooperative Program

Requirements	Cr. Hrs
University Requirements	14
Faculty Requirements	61
Departmental Requirements	72
Coop Program	8
Total	**155**

Departmental Requirements Core Courses (71 Cr. hrs)

Course No.	Course Title	Cr. Hr.	Prerequisite
CE 202	Strength of Materials	4	CE 201
CE 321	Construction Management	3	IE 255
CE 327	Construction Engineering	3	CE 321, CE 341
CE 332	Geology for Civil Engineers	3	CE 202
CE 333	Geotechnical Engineering	4	CE 332
CE 340	Structural Analysis - I	3	CE 202
CE 341	Materials of Construction	3	CE 201
CE 342	Reinforced Conc. Design- I	3	CE 340
CE 351	Hydraulics	3	MEP 290
CE 353	Hydrology and Water Resources Engineering	3	CE 351
CE 371	Surveying	3	MATH 202
CE 381	Transportation Engineering	3	CE 371, IE 331
CE 434	Foundation Engineering	3	CE 333
CE 390	Summer Training	2	CE 327, CE 333, CE 342, CE 353
CE 440	Structural Analysis – II	3	CE 340
CE 442	Reinforced Conc. Design- II	3	CE 342
CE 461	Environmental Engineering	4	CE 351
CE 482	Highway Design and Const.	4	CE 381
CE 499	Senior Project	4	CE 327, CE 333, CE 342, CE 353
MENG 204	Engineering Drawing (2)	3	MENG 102
MENG 262	Dynamics	3	CE 201
MEP 290	Fluid Mechanics	4	PHYS 101 MATH 202
Total		**71**	

Departmental Requirements Elective Courses (9 Cr. hrs)

Course No.	Course Title	Cr. Hr.	Prerequisite
CE 422	Construction Organization & Planning	3	CE 321
CE 423	Construction Estimating	3	CE 321
CE 424	Construction Planning and Scheduling	3	CE 321
CE 427	Advanced Methods of Construction	3	CE 321
CE 439	Soil Improvement	3	CE 434
CE 441	Design of Steel Structures	3	CE 340
CE 443	Advanced Structural Analysis	3	CE 440
CE 444	Advanced Reinforced Concrete Design	3	CE 442
CE 451	Design of Hydraulic Structures	3	CE 351
CE 454	Groundwater Engineering	3	CE 353
CE 456	Harbor & Coastal Engineering	3	CE 351
CE 457	Water Resources Planning and Management	3	CE 353
CE 458	Irrigation & Drainage Engineering	3	CE 353
CE 462	Water & Wastewater Engineering Design	3	CE 461
CE 463	Solid Waste Technology	3	CE 461
CE 464	Coastal & Inland Water Pollution	3	CE 461
CE 465	Wastewater Reclamation & Reuse	3	CE 461
CE 466	Industrial Wastewater Control	3	CE 461
CE 471	Remote Sensing	3	CE 371
CE 472	Photogrammetry	3	CE 371
CE 483	Traffic Engineering	3	CE 381
CE 485	Pavement Design	3	CE 482
CE 486	Transportation Planning	3	CE 381
CE 488	Airport Planning & Design	3	CE 381
CE 497	Special Topics in Civil Engineering	3	CE 342, CE 353, CE 434, CE 461
XX XXX	Any other Dept or College or Univ. Course	3	

A TYPICAL PROGRAM FOR CIVIL ENGINEERING STUDENTS

1st Year
Regular & Cooperative

1st semester

Course No.	Course Title	Cr. Hrs
ELCE 201	English Language (1)	2
CHEM 201 / PHYS101	Chemistry (1) / Physics (1)	4
MATH 101	Mathematics (1)	4
ARAB 101	Arabic Language (1)	3
Total		**13**

2nd semester

Course No.	Course Title	Cr. Hrs
ISLS 101	Islamic Studies (1)	2
CHEM 201 / PHYS101	Chemistry (1) / Physics (1)	4
MATH 202	Mathematics (2)	4
ELCE 102	English Language (2)	2
MENG 102	Engineering Graphics	3
Total		**15**

2nd Year
Regular & Cooperative

3rd semester

Course No.	Course Title	Cr. Hrs
PHYS 202	Physics (2)	4
IE 201	Introduction to Engineering Design (I)	3
ARAB 201	Arabic Language (2)	3
CE 201	Engineering Mechanics (Statics)	3
MATH 203	Differentiation, Integration & Vectors	4
Total		**17**

4th semester

Course No.	Course Title	Cr. Hrs
IE 202	Introduction to Engineering Design (II)	2
EE 201	Structured Computer Programming	3
MATH 204	Differential Equations	3
EE 251	Basic Electrical Engineering	4
IE 255	Engineering Economy	3
Total		**15**

3rd Year
Regular & Cooperative

5th semester

6th semester

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
CE 202	Strength of Materials	4	CE 340	Structural Analysis-I	3
CE 332	Geology for Civil Engineers	3	CE 341	Materials of Construction	3
CE 371	Surveying	3	CE 333	Geotech. Engineering	4
MENG 262	Dynamics	3	MEP 290	Fluid Mechanics	4
MENG 204	Engg. Drawing-II	3	ISLS 201	Islamic Studies-II	2
Total		**16**	**Total**		**16**

4th Year
Regular

7th semester **8th semester**

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
CE 440	Structural Analysis-II	3	ISLS 301	Islamic Studies -III	2
CE 321	Construction Management	3	CE 342	Reinforced concrete Design I	3
CE 351	Hydraulics	3	CE 327	Construction Engg.	3
CE 381	Transportation Engg.	3	CE 353	Hydrology and Water Resources Engineering	3
IE 331	Probability and Statistics for Engineers	3	**EE 332**	Computational Methods in Engineering	3
			CE 434	Foundation Engineering	3
Total		**15**	**Total**		**17**

Training

CE 390	Summer Training	2 Cr. Hrs

4th Year
Cooperative

7th semester / 8th semester

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
CE 381	Transportation Engineering	3	ISLS 301	Islamic Studies (3)	2
CE 321	Construction Management	3	CE 342	Reinforced Concrete Design -I	3
CE 440	Structural Analysis-II	3	CE 482	Highway Design & Const	4
CE 351	Hydraulics	3	EE 332	Computanional methods in Engineering	3
IE 331	Probability and Statistics	3	CE 353	Hydrology and Water Resources Engineering	3
CE 327	Construction Engineering	3	CE 434	Foundation Engineering	3
Total		**18**	**Total**		**18**

5th Year
Regular

9th semester / 10th semester

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
ISLS 401	Islamic Studies -IV	2	CE xxx	Elective from Table B	3
CE 442	Reinforced Conc.- II	3	CE 482	Highway Design and Construction	4
CE 461	Environmental Engg.	4	CE xxx	Elective from Table B	3
CE 499	Senior Project	4	xx xxx	Any Humanities and Soc-Sci Course	3
CE xxx	Elective from Table B	3			
Total		**16**	**Total**		**13**

5th Year
Cooperative

9th semester			10th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
CE 400	Coop Work Program (follows the completion of the 4th year courses)	8	ISLS 401	Islamic Studies (4)	2
			CE 461	Environmental Engineering	4
			CE 442	Reinforced Concrete Design-II	3
			CE 499	Senior Project	4
			CE xxx	Elective from Table B	3
			xx xxx	Any Humanities and Soc-Sci Course	3
Total		**8**	**Total**		**19**

COURSE DESCRIPTION

CE 201 Engineering Mechanics (Statics) (3:2,3)

Vector operations. Equilibrium of a particle. Freebody diagram. Moment of forces about a point and about an axis. Equivalent systems. Joints. Equilibrium of a rigid body in two and three dimensions. Trusses. Frames and machines. Dry friction. Wedges. Frictional forces on screws and flat belts. Rolling resistance. Virtual work for a system of connected rigid bodies.

Prerequisite: PHYS 101

CE 202 Strength of Materials (4:3,3)

Review of basic principles of statics. Plane stresses and strain and their relations. Normal force. Shear force and bending moment diagrams for determinate members. Relation between load. Shear force and bending moment. Review of properties of plane sections. Bending stresses in beams. Symmetric and unsymmetric bending. Shear flow and shearing stresses in beams. Torsion of circular members. Compound stresses. Transformation of plane stress and strain. Mohr's circle of stress. Deflection of beams. Double integration and moment-area methods. Buckling of columns. Euler's formula. Laboratory experiments.

Prerequisite: CE 201

CE 321 Construction Management (3:3,0)

Characteristics of Construction Industry; project delivery systems; the design and construction process; construction contracting; construction planning; project control, conceptual cost estimation; and Quality and Safety Management.

Prerequisite: IE 225

CE 327 Construction Engineering (3:3,0)

Types, selection, utilization, and unit cost of construction equipment regarding soil compaction and stabilization, excavation and earthmoving operations. Formwork design types and unit cost for horizontal and vertical structural elements. Planning process for building construction.

Prerequisite: CE 321, CE 341

CE 332 Geology for Civil Engineers (3:3,0)

Introduction to engineering geology, earth surface and physical properties of earth materials, geological processes, types and classification of rocks, physical and minerological properties of rocks, basics of structural geology, soil formation and properties, clay minerals, groundwater.

Prerequisite: CE 202

CE 333 Geotechnical Engineering (4:3,3)

Weight-volume relationships. Physical properties of soil. Soil classification. Permeability and seepage. Shear strength. Compressibility. Consolidation and settlement. Introduction to lateral earth pressure and slope stability.

Prerequisite: CE 332

CE 340 Structural Analysis I (3:2,3)

Basic principles. Analysis of statically determinate trusses. Beams. Frames. Arches. Composite structures and suspension cables. Influence lines for statically determinate structures. Deflection of structures. Introduction to statically indeterminate problems. Computer application in analysis of structures.

Prerequisite: CE 202

CE 341 Materials of Construction (3:2,3)

Manufacturing, Properties and Tests of metals, aggregate, cementing materials, fresh and hardened PC concrete, asphalt concrete, masonry, wood and plastics. Design and production of PC concrete and asphalt mixtures. Computer applications in mix design

Prerequisite: CE 202

CE 342 Reinforced Concrete Design I (3:2,3)

Introduction to properties of concrete and reinforcing steel. Mechanics and behavior of reinforced concrete. Flexure. Shear and bond. Ultimate strength method of design for beams- rectangular. Doubly reinforced and tee. Continuous beams. Slabs. One-way. Two-way. Ribbed. Flat and stairways. Working stress method. Computer applications.

Prerequisite: CE 340

CE 351 Hydraulics (3:2,3)

Pipe flow analysis and design. Steady flow in closed conduits. Steady uniform flow in open channels. Non-uniform flows in open channels. Flow measurements. Hydraulic machinery (i.e.Pumps and hydraulic turbines), urban storm drainage and outlet works, Computer simulation and analysis.

Prerequisite: MEP 290

CE 353 Hydrology and Water Resources Engineering (3:3,0)

Principles of hydrology and water resources engineering. Objectives of water resources development. Water demand. Hydrologic cycle. Measurement and analysis of precipitation, evaporation, infiltration and stream flows. Water balance. Reservoirs, Dams and Spillways. Conjunctive use of surface and groundwater. Planning for water resources development. Economical analysis of water resources projects.

Prerequisite: CE 351

CE 371 Surveying (3:2,3)

This course is designed to introduce students to the basic surveying theory and practice which include (Units of measurements and conversions, error analysis, distance measurements by taping, leveling, angle measurements, Total Station measurements, traversing and traverse computations, topographic surveying and mapping, area and volume computations, circular curves, use of surveying software such as Wolfpack and Surfer).

Prerequisite: MATH 202

CE 381 Transportation Engineering (3:3,0)

Transportation as a system; Human and vehicle characteristics; Traffic flow characteristics; Highway capacity analysis; Intersection control and design; Public transportation; Urban transportation planning; Parking and terminal facilities; Transportation safety; Intelligent transportation system; Computer applications.

Prerequisite: CE 371, IE 331

CE 390 Summer Training (10 weeks) (2:0,0)

Field training conducted under the supervision of a faculty member. The

student must submit a detailed technical report by the end of training period, explaining what he learned during this training.
Prerequisite: CE 327, CE 333, CE 342, CE 353

CE 400 Cooperative Work (26 weeks) (8:0,0)

Field training conducted under the supervision of a faculty member in a major professional civil engineering enterprise. Student must submit a detailed technical report by the end of the training period. Training must cover at least two semesters (a summer and a fall).
Prerequisite: CE 321, CE 340, CE 351, CE 381,

CE 422 Construction Organization and Planning (3:3,0)

Construction. Industrial plants. Site investigation. Preplanning. Cost estimation. Proposal preparation. Contract types. Negotiations. Management tools. Project monitoring. Personnel management. Professional ethics. Computer applications.
Prerequisite: CE 321

CE 423 Construction Estimating (3:3,0)

Quantity take-off from plans and specifications. Cost determination including labor. Transportation. Insurance etc. Drawing and detailing of a typical civil engineering project. Use of computer programs.
Prerequisite: CE 321

CE 424 Construction Planning and Scheduling (3:3,0)

Project life cycle scheduling. Identification of activities and their sequence. Scheduling of activities using critical path method. Resource leveling and allocation. Time-cost trade-off. Using PERT technique. Probability methods. Project scheduling using MS Project and Premavera software programs.
Prerequisite: CE 321

CE 427 Advanced Methods of Construction (3:3,0)

Production. Transportation and erection methods and equipment for precast concrete. High-rise steel. Suspended and off-shore structures. Construction methods and equipment for underground structures. Planning and monitoring techniques for those projects. Computer usage.
Prerequisite: CE 321

CE 434 Foundation Engineering (3:3,0)

Site exploration and selection. Types of foundations. Bearing capacity of shallow foundations. Foundation settlement. Deep foundations. Lateral earth pressure. Retaining walls. Computer applications.

Prerequisite: CE 333

CE 439 Soil improvement (3:3,0)

Principles of soil improvement. Types of improvement and factors influencing them. Mechanical and hydro improvements. Physical and chemical improvements. Improvement by additives and confinement. Soil reinforcement. Geo-environmental engineering. Computer applications.

Prerequisite: CE 434

CE 440 Structural Analysis II (3:3,0)

Analysis of statically indeterminate structures by method of consistent deformations. Method of slope-deflection and moment distribution. Influence lines for statically indeterminate structures. Introduction to matrix methods of structural analysis. Computer applications.

Prerequisite: CE 340

CE 441 Design of Steel Structures (3:3,1)

Properties of steel. Types of loads. Philosophy of allowable stress design (asd) method. Analysis and design of tension and compression members. Axially loaded columns. Base plate. Design of beams for flexure and shear. Beams with cover plates. Unsymmetrical bending. Deflection. Design of beams-column. Bolted and welded connections computer applications in the design of steel members sections and connections design.

Prerequisite: CE 340

CE 442 Reinforced Concrete Design II (3:3,0)

Design of concentrically and eccentrically loaded columns. Slender columns. Frames and arches. Wall and isolated footings. Design of water-retaining structures and retaining walls. Computer applications.

Prerequisite: CE 341, CE 342, CE 440

CE 443 Advanced Structural Analysis (3:3,1)

Strain energy. Complementary energy methods. Review of matrix algebra. Stiffness method. Boundary conditions. Fixed end forces and equivalent joint forces. Member and joint releases. Inclined and elastic supports. Flexibility method. Choice of redundants. Plastic analysis. Plastic hinge. Redistribution of moments. Mechanism concept. Statical and mechanism methods. Application to beams and frames. Computer applications.

Prerequisite: CE 440

CE 444 Advanced Reinforced Concrete Design (3:3,0)

Design of reinforced concrete water tanks and prestressed concrete members. Topics including types of water tanks. Circular and rectangular tanks. Different types of joints. Type of prestressing. Losses flexural and shear capacity of prestressed concrete. Deflection losses.

Prerequisite: CE 442

CE 451 Design of Hydraulic Structures (3:3,0)

Types. Advantages and functions of hydraulic structures. Flow through orifices. Culverts. Under gates. Over weirs and spillways. Energy dissipation below hydraulic structures. Hydraulic design of culverts. Weirs. Spillways. Aqueducts. Syphons. Regulators and dams. Computer applications.

Prerequisite: CE 351

CE 454 Groundwater Engineering (3:3,0)

Introduction to groundwater. Layers containing groundwater. Groundwater movement. Basic principles and fundamental equations. Water wells. Aquifer test and flow net analysis. Quality of groundwater. Pollution of groundwater. Management of groundwater. Groundwater modeling and techniques with computer applications. Applications in groundwater.

Prerequisite: CE 353

CE 456 Harbor and Coastal Engineering (3:3,0)

Harbor planning and construction. Theory of periodic waves. Wave energy. Power. Refraction. Diffraction and reflection. Winds. Tides and waves. Wave-structure interaction. Wave forces on structures. Design of coastal structures. Coastal zone processes. Long shore sediment transport. Computer applications.

Prerequisite: CE 351

CE 457 Water Resources Planning and Management (3:3,0)

Objectives of water resources planning and management. Project formulation and economic evaluation. Planning for multi purpose projects. Systems analysis and design. Mathematical modeling and optimization. Risk analysis. Techniques and methodologies of environmental impact assessment (eia) and applications to water and public projects. Computer applications.

Prerequisite: CE 353

CE 458 Irrigation and Drainage Engineering (3:3,0)

Irrigation practices and principles. Design of water storage and conveyance systems. Design criteria. Layout. Design and construction of irrigation and drainage systems. Computer techniques. Envelope design. Structural requirements. Equipment and material selection. Operation and maintenance.

Prerequisite: CE 353

CE 461 Environmental Engineering (4 :3,3)

Basic concepts in environmental engineering and sources of environmental pollution. Air pollution and engineered systems for air pollution. Engineered systems for solid waste management. Water quality. Wastewater collection and sanitary sewer design. Water treatment process. Wastewater treatment processes. Preliminary design of various units. Wastewater reuse and disposal. Computer application.

Prerequisite: CE 351

CE 462 Water and Wastewater Engineering Design (3:2,3)

Principles and design of water treatment system. Aeration. Coagulation. Sedimentation. Filtration and disinfection. Principles and design of wastewater treatment systems. Activated sludge process. Trickling filters. Aerated lagoons and waste stabilization ponds. Sludge treatment.

Prerequisite: CE 461

CE 463 Solid Waste Technology (3:2,3)

Types and composition of solid wastes. Design and optimization techniques for the solid waste storage. Collection and transportation facilities. Transfer stations. Design and constructions of sanitary landfills. Incinerators and composting systems. Solid waste reclamation and re-use.

Prerequisite: CE 461

CE 464 Coastal and Inland Water Pollution (3:2,3)

Causes. Consequences and prevention of coastal and inland water pollution. Control of eutrophication. Design and construction of marine outfall systems. Control of floatables and oil in the marine environment.

Prerequisite: CE 461

CE 465 Wastewater Reclamation and Reuse (3:2,3)

Design of advanced wastewater treatment systems for reuse. Land treatment systems and groundwater recharge. Design of non-potable water distribution networks. Potential reuse alternatives. Water reuse economics.

Prerequisite: CE 461

CE 466 Industrial Wastewater Control (3:2,3)

Sources and characteristics of industrial liquid wastes. Pretreatment. Design of joint collection and treatment of industrial wastes with domestic sewage. Industrial reuse systems. Disposal systems. Effects of industrial wastes on sewerage. In-plant pollution control and recycle of the wastewater. Design of chemical and biological treatment units for industrial wastes. Case studies.

Prerequisite: CE 461

CE 471 Remote Sensing (3:2,3)

Foundations of remote sensing. Elements of photographic systems. Airphoto interpretation and applications. Multispectral and thermal images. Landsat and spot satellites. Other remote sensing satellites. Radar images. Digital image processing. Computer applications.

Prerequisite: CE 371

CE 472 Photogrammetry (3:2,3)

Geometric principles. Optics. Photography. Survey camera. Stereoscopy. Orientation. Mosaic. Photo-interpretation. Applications of photogrammetry. Plotting instruments. Remote sensing. Computer applications.

Prerequisite: CE 371

CE 482 Highway Design and Construction (4:3,3)

Highway location. Characteristics of driver. Vehicle. Road and traffic. Geometric design. Pavement design. Highway materials. Construction. Drainage and soil improvement. Highway maintenance. Operation and road safety. Pavement management system. Computer applications.

Prerequisite: CE 381

CE 483 Traffic Engineering (3:3,0)

Traffic engineering studies and measurements. Highway capacity and traffic flow theory. Traffic signals. Markings. Traffic islands. Traffic regulations. Traffic safety. Applications on intersection and streets. Computer applications.

Prerequisite: CE 381

CE 485 Pavement Design (3:3,0)

Stresses in pavement. Vehicle and material characteristics. Base and subbase. Flexible and rigid pavement design. Pavement evaluation. Introduction to soil stabilization. Computer applications.

Prerequisite: CE 482

CE 486 Transportation Planning (3:3,0)

Transportation planning process. Transportation problems. Goods. Field surveys. Landuse models. Travel demand models. Alternative plans: evaluation and assessment. Computer applications.

Prerequisite: CE 381

CE 488 Airport Planning and Design (3:3,0)

Civil aviation. Aircraft characteristics related to airport design. Air traffic control. Capacity and delay. Airport planning. Airport configuration. Geometric design of the landing area. Planning and design of the terminal area. Lighting. Marking and signing. Computer

applications.
Prerequisite: CE 381

CE 497 Special Topics in Civil Engineering (3:3,0)

An in depth study of some civil engineering subjects aimed at enhancing knowledge and understanding of the student in the selected areas.
Prerequisite: CE 342, CE 353, CE 434, CE 461

CE 499 Senior Project (4:2,4)

Team-work on a civil engineering capstone design project involving comprehensive design experience; exposure to professional practice with practitioner involvement. Preparation of the project report and its presentation.
Prerequisite: CE 327, CE 333, CE 342, CE 353

DEPARTMENT OF
ELECTRICAL AND COMPUTER ENGINEERING

FACULTY

Chairman:

Aldhaheri, Rabah W.

Professors:

Affandi, Adnan M.
Aldhaheri, Rabah W.
AL-Nabulsi, Khalid A.
AL-Turki, Yusuf A.
Bamani, Ali H.
Mufti, Anwar H.
Rushdi, Ali M.

Associate Professors:

Adas, Ahmed A.
AL-Abdulaziz, Abdulaziz U.
Alfahied, Mohammad S.
Ashraf, Uddin
Jalal, Abdulaziz M.
Karagozoglu, Bahattin M.
Mahdi, Sulaimanul F.

Assistant Professors:

Abdulwahab, Ahmed S.
AL-Jeffry, Mustafa A.
AL-Khateeb, Abdulhameed F.
AL-Masood, Abdul Rahmen H.
AL-Qassimi, Abdulaghani M.

AL-Rawi, Ghazi A.
AL-Shenkiti, Mohamed A.
AL-Zehary, Abdul Muti Y.
Awedh, Mohammad H.
Balamesh, Abdullah S.
Balamesh, Ahmed S.
Dubaie, Abdullah M.
El-Hindawi, Mohamed M.
Hajjar, Amjad F.
Morfeq, Ali .H.
Saber, Ahmed Y.
Shaikh, Muhammad S.
Sheikh, Muntasir M.
Yousuf, Abdul-Hay A.

Lecturers:

Boshnagh, Haitham
Fattani, Waddah
Kaki, Adnan H.
Tas, Umit M.

Engineers:

Ahmad Muhammed Alkholy
Ahmed Bechir Trigui
Asim Rabah Aldhaheri
Fahad Ali Algarni
Fidallah Mostafa Fidallah
Khalid Hamed Al Harbi
Mohammed Abdelmutalib Ramadan
Mohammed Husni Ahmed
Mohammed Ramadan Alkhouly
Mousa Saad Al Johani
Muzaffar Ali Khan
Nahel Ahmed Abdelaziz
Rached Ali Oualha
Sami Alesawi
Yahya Mugbil Sharab

INTODUCTION

The Department of Electrical and Computer Engineering strives to educate professionals for the most dynamic, much diversified and continuously evolving engineering discipline that has been the fastest growing branch of learning in the last century. The Department intends to prepare electrical engineers through addressing the four distinct fields of Electrical Engineering, namely, Power and Machines Engineering, Electronics and Communications Engineering, Computer Engineering and Biomedical Engineering. The Biomedical Engineering specialization is unique in the entire Kingdom.

The Department is primarily concerned with the provision of high caliber engineers in the four fields of Electrical and Computer Engineering to work for governmental and industrial agencies in the Kingdom and the Gulf area. The Kingdom has developed most of its infrastructure in the last three decades. Yet, there is still scarcity of competent engineers in the society in all four fields. Graduates are expected to contribute in lessening the shortage and drive the nation forward technologically. The scarcity of qualified engineers and limitations in the job positions enforce the graduates to address a wider spectrum of Electrical Engineering applications. Hence, the program is specially tailored to suit the needs of the Kingdom and the Gulf States that are the immediate employers of the graduates.

A student should complete 155 credit hours for graduation. There are two main streams that may be followed. The first one is the regular program that involves a summer training for 10 weeks after the student completes more than 120 credit hours. This training is intended to enhance the student’s practical skills and the student is granted a credit of 2 units for the summer training.

In addition to the regular program, the Department devised a second and totally new concept for getting an engineering degree, that is, the cooperative work program (the co-op route). It will run (in the experimental phase) in cooperation with specialized engineering establishments. This will enable the student to attain a balanced mix of both theoretical and practical expertise, thus upgrading his level of experience. Moreover, this route leads to opening new avenues and contacts with a distinct class of local businesses. The student is required to complete at least 125 credit hours before enrolling in the co-op work program that covers a total duration of at least 26 weeks starting from a summer session and continuing into the following main semester. For this program, the student is granted a credit of 8 units.

PROGRAMS OFFERED

The Department of Electrical and Computer Engineering awards the B.Sc. degree in each of the following specializations:

- Electrical Power and Machines Engineering
- Electronics and Communications Engineering
- Computer Engineering
- Biomedical Engineering

Moreover, the Department awards the M.Sc. degree in each of the following majors:

- Electrical Power and Machines Engineering
- Electronics and Communications Engineering
- Computer Engineering

The various curricula within the Department of Electrical and Computer Engineering are structured in such a way as to provide its graduates with the technical and professional expertise necessary for serving and developing the society and for conducting scientific research within the Islamic ethical framework. When the student completes one of the programs offered by the Department of Electrical and Computer Engineering, he is expected to be capable of:

- Applying basic and specialized engineering sciences as well as basic mathematics and sciences.
- Designing and conducting experiments, using experimental results to verify theory and analyzing and interpreting these results.
- Designing systems, components and projects in various fields of electrical and computer engineering, analyzing and solving problem, acquiring knowledge continually, and following up progressive advances in science.
- Collaborating well and professionally with colleagues, working in teams, and serving customers with diligence and courtesy.
- Understanding and observing safety, ethical, environmental, economical, and aesthetical responsibilities.
- Utilizing modern engineering equipments, instruments, devices and aids.
- Conducting research, scientific studies, and offering consulting services in all fields of electrical and computer engineering.

MISSION STATEMENTS

Mission of the Department of Electrical and Computer Engineering (ECE) is to provide high quality education to students that enable them to enhance services to the community through their professional, technical, managerial, communication, team-work, and research competencies in accordance with Islamic teachings.

Mission of the Electric Power and Machines Engineering (PME) Program is to provide our students an education to serve the society and to instill in them the attitudes, values, and vision required for lifelong learning and leadership in electric power and machine engineering career.
Mission of the Electronics and Communications Engineering (E&CE) Program is to provide a high quality engineering education in electronics and communications and equip graduates with the proper technical, research, learning, communication, and managerial skills to contribute to the development of the society.

Mission of the Computer Engineering (CoE) Program is to prepare and produce highly qualified computer engineers who can participate effectively in the service and sustainable development of the society through their professional, technical, managerial, team-work, lifelong learning and research competencies.

Mission of the Biomedical Engineering (BME) Program is to provide a high quality engineering education with lifelong learning skills so that graduates shall enhance the health-care services through their professional, technical, managerial, communication, team-work, and research competencies.

PROGRAM EDUCATIONAL OBJECTIVES

The Electric Power and Machine Engineering Program

1. **Career:** Graduates will successfully engage in careers in the areas of electric power engineering to serve the needs of industry and academia in both the private and public sectors in Saudi Arabia.
2. **Professional Development:** Graduates will engage in active, continuous and lifelong professional development, seek learning

and training opportunities including graduate studies, adapt to the rapid changes in work environment, and attain leadership positions in their business, profession and community.

3. **Social Responsibility:** Graduates will contribute to the welfare of society and the development of the profession through responsible practice of engineering.

The Electronics and Communications Engineering Program

1. **Career:** Graduates will successfully engage in careers in the areas of electronics and communications engineering to serve the needs of industry and academia in both the private and public sectors in Saudi Arabia.
2. **Professional Development:** Graduates will engage in active, continuous and lifelong professional development, seek learning and training opportunities including graduate studies, adapt to the rapid changes in work environment, and attain leadership positions in their business, profession and community.
3. **Social Responsibility:** Graduates will contribute to the welfare of society and the development of the profession through responsible practice of engineering.

The Computer Engineering Program

1. **Career:** Graduates will successfully engage in careers in the areas of computer engineering to serve the needs of industry and academia in both the private and public sectors in Saudi Arabia.
2. **Professional Development:** Graduates will engage in active, continuous and lifelong professional development, seek learning and training opportunities including graduate studies, adapt to the rapid changes in work environment, and attain leadership positions in their business, profession and community.
3. **Social Responsibility:** Graduates will contribute to the welfare of society and the development of the profession through responsible practice of engineering.

The Biomedical Engineering Program

1. **Career:** Graduates will be successfully employed in the areas of biomedical engineering and electronic instrumentation to serve the needs of health- care services, industry and academia in both private and public sectors in Saudi Arabia and Gulf countries.

2. **Professional Development:** Graduates will engage in active, continuous and lifelong professional development, seek learning and training opportunities including graduate studies, adapt to the rapid changes in work environment, function as part of working teams and attain leadership positions in their business, profession and community.
3. **Social Responsibility:** Graduates will contribute to the welfare of society and the development of the profession through responsible practice of engineering.

CAREER OPPORTUNITIES

The Department of Electrical and Computer Engineering aims at producing high-caliber engineers in various fields of electrical and computer engineering, and qualifying them for work in governmental, military, and industrial institutions in Saudi Arabia and in the rest of Arabian Gulf area. The programs offered by the Department are so strong and efficient as to be considered similar and comparable to programs accredited by the US-based Accreditation Board for Engineering and Technology (ABET). In fact, ABET has certified in October 2003 that each of the four programs offered by the Department at the B.Sc. level is SUBSTANTIALLY EQUIVALENT to the corresponding similar programs in the United States of America.

It is very difficult to make an exhaustive survey of the career opportunities available to the Department graduates. A few representative examples of these opportunities are outlined below:

- Graduates of the Program of Power and Machines Engineering work in
  - Electric power generation stations
  - Transmission lines and substations for high and medium voltage
  - Load dispatch centers
  - Industrial complexes that are heavily dependent on electric power utilization
  - Safe and effective distribution and consumption of electric power in residential areas and in factories.
  - Energy resource management, and programs for energy conservation.

- Graduates of the Program of Electronics and Communications Engineering work in
  - The installation, operation and maintenance of various communication systems, such as microwave and radar systems, optical communication systems, and mobile communication systems.
  - The design, construction, operation and maintenance of
    - Electronic equipment in various industrial installations.
    - Control systems, telemetry equipment, and associated equipment.
    - Information and network technologies
    - Electronic entertainment devices.

- Graduates of the Program of Computer Engineering work in the design, construction, operation, and maintenance of Computer networks
  - Information technology departments
  - Electronic printing (texts and graphics).
  - Specialized computer laboratories
  - Computer interfacing in control, measurement, and telemetry applications.
  - Computer-driven vehicles and transportation systems.
  - Computer-aided design and manufacturing systems.
  - Administration systems.
  - Special-purpose operating systems
  - Database systems

- Graduates of the Program of Biomedical Engineering work in the following fields:
  - As clinical engineers performing engineering tasks required in medical care units, and cooperating with physicians in the design and implementation of programs needed for enhancing and raising the standards of medical care.
  - As specialists in medical equipment and instrumentation, medical electronics, computer medical applications, and bioinformatics.
  - As electrical engineers concerned with equipment, measurement, control, and signal processing.

FACILITIES

The Department of Electrical and Computer Engineering has a large number of laboratories that support its educational and research activities. In addition to the specialized equipment that each lab contains, all the labs are equipped with basic utilities such as DC and AC electric sources, voltage regulators, signal (function) generators, oscilloscopes, and analog and digital multimeters for measuring the basic quantities (voltage, current, and resistance). Labs also have a number of integrated personal computer systems to operate educational software. Every student has a good chance to have a hands-on experience and practice experimental work as the number of students per experimental station ranges from two to four only. The current departmental labs are:

- Power system lab.
- Electrical machines lab.
- Power electronics lab.
- Electrical and electronics measurements lab.
- Basic electrical engineering lab.
- Electronics lab.
- Computer lab.
- Communications lab.
- High voltage lab.
- Experimental engineering lab.
- Digital systems lab.
- Control lab.
- Personal computer lab.
- Microwave lab.
- Biomedical instrumentations lab.
- Biomedical systems lab.
- Mobile communications lab.

PROGRAM REQUIREMENTS AND CURRICULUM

Units required for the B.Sc. degree in the Department of Electrical and Computer Engineering.

Conventional Program

Requirements	Cr. Hrs
University Requirements	14
Faculty Requirements	61
Departmental Requirements	80
Total	**155**

Cooperative Program

Requirements	Cr. Hrs
University Requirements	14
Faculty Requirements	61
Departmental Requirements	72
Coop Program	8
Total	**155**

Departmental Requirements (35 Cr. Hrs.)

Course No.	Course Title	Cr. Hr.	Prerequisite
EE 202	Object-Oriented Computer Programming	3	EE 201
EE 253	Electrical and Electronic Measurements	4	EE 301, IE 331
IE 256	Engineering Management	2	IE 202
EE 300	Analytical Methods in Engineering	3	MATH 203
EE 301	Electrical Circuits and Systems	3	MATH 204, EE 250
EE 311	Electronics I	4	EE 250
EE 321	Introduction to Communications	4	EE 301
EE 331	Principles of Automatic Control	4	MATH 204, EE 300, EE 301
EE 360	Digital Design I	4	EE 311
EE 499	Senior Project	4	EE 321, EE 331, IE 331
Total		**35**	

Submajor Requirements

Specialization of Power and Machines Requirements

- **Compulsory (34 Cr. Hrs.)**

Course No.	Course Title	Cr. Hr.	Prerequisite
MEP 261	Thermodynamics I	4	MATH 202
EE 302	Electromagnetic Fields	3	EE 250, MATH 203
EE 341	Electromechanical Energy Conversion I	4	EE 302
EE 351	Electrical Power Systems I	4	EE 250
EE 441	Electromechanical Energy Conversion II	4	EE 341, EE 351
EE 442	Power Electronics I	4	EE 311
EE 451	Electrical Power Systems II	4	EE 351
EE 453	Power Transmission and Distribution	3	EE 351, IE 331
EE 454	Switchgear and Protection of Power Systems I	4	EE 341, EE 351
Total		**34**	

- **Electives (9 Cr. Hrs. for Regular Stream and 3 Cr. Hrs. for Coop Stream)**

Course No.	Course Title	Cr. Hr.	Prerequisite
MEP 369	Power Plants for Electrical Engineers	3	MEP 261
EE 403	Power Systems Instrumentation and Measurements	3	EE 253
EE 431	Advanced Control Systems	3	EE 331
EE 440	Power System Transients	3	EE 341, EE 351
EE 443	Electromechanical Energy Conversion III	3	EE 441
EE 444	Power Electronics II	3	EE 442
EE 445	Utilization of Electrical Energy	3	EE 341, EE 351
EE 446	HV and EHV AC Transmission Systems	3	EE 351
EE 447	High Voltage Direct Current (HVDC) Systems	3	EE 351
EE 448	Power System Planning and Reliability	3	EE 351, IE 331
EE 449	Power System Stability	3	EE 441
EE 450	Power System Control	3	EE 441, EE 331
EE 452	High Voltage Techniques I	3	EE 351
EE 455	Economic Operation of Power Systems	3	EE 451, IE 331
EE 456	High Voltage Techniques II	3	EE 452
EE 457	Switchgear and Protection of Power Systems II	3	EE 454
EE 458	Computer Applications in Power Systems	3	EE 332, EE 451
EE 459	Electric Power Distribution	3	EE 451, EE 453
EE 465	Microcomputers for Electrical Engineers	4	EE 360
EE 490	Special Topics in Electrical Engineering	3	EE 321, EE 331, IE 331
EE 491	Special Topics in Electrical Power Engineering	3	EE 451
EE 492	Special Topics in Electrical Machines	3	EE 441
xx xxx	Any Course offered by the Department, Faculty or University	2 or 3 or 4	Approved by the ECE Department

Specialization of Electronics and Communications Requirements

- **Compulsory (34 Cr. Hrs.)**

Course No.	Course Title	Cr. Hr.	Prerequisite
EE 302	Electromagnetic Fields	3	EE 250, MATH 203
EE 312	Electronics II	4	EE 311
EE 351	Electrical Power Systems I	4	EE 250
EE 411	Digital Electronics	4	EE 311, EE 360
EE 413	Communication Circuits	4	EE 312
EE 421	Communication Theory I	4	EE 321, IE 331
EE 423	Electromagnetic Waves	4	EE 302, MATH 204
EE 424	Antennas and Propagation	3	EE 423
EE 425	Communication Systems	4	EE 312, EE 421, EE 423
Total		**34**	

- **Electives (9 Cr. Hrs. for Regular Stream and 3 Cr. Hrs. for Coop Stream)**

Course No.	Course Title	Cr. Hr.	Prerequisite
EE 410	Advanced Electromagnetics	3	EE 423
EE 412	Integrated Circuits	3	EE 312
EE 414	Computer-Aided Analysis and Design of Electronic Circuits	3	EE 312
EE 415	Measurements and Electronic Instruments	3	EE 413, EE 423, IE 331
EE 416	Quantum and Optical Electronics	3	EE 312
EE 417	Avionics	3	EE 312, EE 424
EE 418	Microwave and Optical Devices	3	EE 312, EE 423
EE 419	VLSI Layout	3	EE 312
EE 420	Microwave Circuits	3	EE 312, EE 423
EE 422	Satellite Communications	3	EE 421, EE 423
EE 424	Antennas and Propagation	3	EE 423
EE 426	Digital Communications	3	EE 421
EE 427	Communication Theory II	3	EE 421
EE 428	Radar Systems and Applications	3	EE 413, EE 424
EE 429	Digital Signal Processing	3	EE 321
EE 465	Microcomputers for Electrical Engineers	4	EE 360
EE 490	Special Topics in Electrical Engineering	3	EE 321, EE 331, IE 331
EE 493	Special Topics in Electronics	3	EE 413
EE 494	Special Topics in Communications	3	EE 321
xx xxx	Any Course offered by the Department, Faculty or University	2 or 3 or 4	Approved by the ECE Department

Specialization of Computer Engineering Requirements

- **Compulsory (34 Cr. Hrs.)**

Course No.	Course Title	Cr. Hr.	Prerequisite
EE 305	Discrete Mathematics and Its Applications	3	EE 202, MATH 204, IE 202
EE 312	Electronics II	4	EE 311
EE 361	Digital Computer Organization	3	EE 360, IE 331
EE 364	Advanced Programming	3	EE 202
EE 367	Data Structures and Algorithms	3	EE 305, EE 364, IE 331
EE 411	Digital Electronics	4	EE 311, EE 360
EE 460	Digital Design II	4	EE 360
EE 461	Microprocessors and Microcomputers	4	EE 360
EE 462	Computer Communication Networks	3	EE 321
EE 463	Operating Systems	3	EE 361, EE 367
Total		**34**	

- **Electives (9 Cr. Hrs. for Regular Stream and 3 Cr. Hrs. for Coop Stream)**

Course No.	Course Title	Cr. Hrs.	Prerequisite
EE 431	Advanced Control Systems	3	EE 331
EE 432	Digital Control Systems	3	EE 331
EE 433	Introduction to Robotics	3	EE 331
EE 464	Structure of Programming Languages	3	EE 361, EE 367
EE 466	Computer Interfacing	3	EE 361, EE 411
EE 467	Databases	3	EE 367, EE 463
EE 468	Systems Programming	3	EE 361, EE 367
EE 469	Compiler Construction	3	EE 367
EE 480	Modeling and Simulation	3	EE 364, IE 331, EE 305
EE 481	Computer Graphics	3	EE 364, EE 367
EE 482	Introduction to Artificial Intelligence	3	EE 367
EE 483	Advanced Computer Architecture and Modern Peripherals	3	EE 361
EE 484	VLSI Design	3	EE 460, EE 411
EE 488	Formal Languages and Automata Theory	3	EE 305, EE 367
EE 490	Special Topics in Electrical Engineering	3	EE 321, EE 331, IE 331
EE 495	Special Topics in Computer Engineering	3	EE 361, EE 367, EE 331
EE 496	Special Topics in Automatic Control	3	EE 331, IE 331
xx xxx	Any Course offered by the Department, faculty or University	2 or 3 or 4	Approved by the ECE Department

Specialization of Biomedical Engineering Requirements

- **Compulsory (34 Cr. Hrs.)**

Course No.	Course Title	Cr. Hrs.	Prerequisite
EE 302	Electromagnetic Fields	3	EE 250, MATH 203
EE 312	Electronics II	4	EE 311
BIO 321	Biology for Biomedical Eng. Students	3	CHEM 101
BIO 322 OR PHY 372	Physiology for Biomedical Engineers Physiology for Biomedical Engineers	3	BIO 321
EE 341	Electromechanical Energy Conversion I	4	EE 302
EE 370	Biomedical Engineering Primer	3	PHYS 102 , BIO 321, EE 201
EE 465	Microcomputers for Electrical Engineers	4	EE 360, EE 470
EE 470	Biomedical Signals and Systems	4	EE 253, IE 202
EE 471	Biomedical Instrumentation	3	EE 312, PHY 372, EE 470
EE 472	Biomedical Imaging Systems	3	EE 470
Total		**34**	

- **Electives (9 Cr. Hrs. for Regular Stream and 3 Cr. Hrs. for Coop Stream)**

Course No.	Course Title	Cr. Hrs.	Prerequisite
MEP 392	BioFluid Mechanics	3	EE 370
IE 342	Human Factors Engineering	4	IE 341
BIOC 370	Biochemistry for Biomedical Engineers	3	CHEM 101
EE 411	Digital Electronics	4	EE 311, EE 360
EE 431	Advanced Control Systems	3	EE 331
EE 473	Introduction to Therapeutic and Prosthetic Devices	3	EE 470
EE 474	Safety, Reliability and Maintenance in Health Care Facilities	3	EE 370, IE 331
EE 475	Computer Applications in Biomedical Engineering	3	EE 465
EE 476	Biomedical Systems Management	3	EE 370
EE 490	Special Topics in Electrical Engineering	3	EE 321, EE 331, IE 331
EE 497	Special Topics in Biomedical Engineering	3	EE 470
xx xxx	Any Course offered by the Department, faculty or University	2 or 3 or 4	Approved by the ECE Department

A TYPICAL PROGRAM FOR ELECTRICAL ENGINEERING

POWER AND MACHINES GROUP STUDENTS

1st Year
Regular & Cooperative

1st semester			2nd semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ELC 101	English Language I	2	ISLS 101	Islamic Culture 1	2
CHEM 101 / PHYS 101	General Chemistry I / General Physics I	4	PHYS 101 / CHEM 101	General Physics I / General Chemistry I	4
MATH 101	Calculus I	4	MATH 202	Calculus II	4
ARAB 101	Arabic Language I	3	ELC 102	English Language II	2
			MENG 102	Engineering Graphics	3
Total		**13**	**Total**		**15**

2nd Year
Regular & Cooperative

3rd semester			4th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
PHYS 102	General Physics II	4	IE 202	Introduction to Engineering Design (2)	2
IE 201	Introduction to Engineering Design (1)	3	EE 201	Structured Computer Programming	3
ARAB 201	Arabic Language II	3	MATH 204	Differential Equations I	3
CE 201	Engineering Mechanics (Statics)	3	EE 250	Basic Electrical Circuits	4
MATH 203	Calculus III	4	IE 255	Engineering Economy	3
Total		**17**	**Total**		**15**

3rd Year
Regular & Cooperative

5th semester | **6th semester**

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
xx xxx	Humanities Elective (one of 4 courses)	3	MEP 261	Thermodynamics I	4
ISLS 201	Islamic Culture 2	2	EE 311	Electronics I	4
EE 202	Object-Oriented Computer Programming	3	EE 321	Introduction to Communications	4
EE 300	Analytical Methods in Engineering	3	IE 331	Probability and Statistics	3
EE 301	Electrical Circuits and Systems	3			
EE 302	Electromagnetic Fields	3			
Total		**17**	**Total**		**15**

4th Year
Regular

7th semester | **8th semester**

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
EE 331	Principles of Automatic Control	4	EE 253	Electrical and Electronic Measurements	4
EE 341	Electromechanical Energy Conversion I	4	EE 332	Computational Methods in Engineering	3
EE 351	Electrical Power Systems I	4	EE 441	Electromechanical Energy Conversion II	4
EE 360	Digital Design I	4	EE 451	Electrical Power Systems II	4
Total		**16**	**Total**		**15**

Training

EE 390	Summer Training	2 Cr. Hrs

4th Year
Cooperative

7th semester			8th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
EE 332	Computational Methods in Engineering	3	EE 253	Electrical and Electronic Measurements	4
EE 360	Digital Design I	4	ISLS 301	Islamic Culture 3	2
EE 341	Electromechanical Energy Conversion I	4	EE 441	Electromechanical Energy Conversion II	4
EE 351	Electrical Power Systems I	4	EE 451	Electrical Power Systems II	4
EE 453	Power Transmission and Distribution	3	EE 499	Senior Project	4
Total		**18**	**Total**		**18**

5th Year
Regular

9th semester			10th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ISLS 301	Islamic Culture 3	2	IE 256	Engineering Management	2
EE 442	Power electronics I	4	ISLS 401	Islamic Culture 4	2
EE 453	Power Transmission and Distribution	3	xx xxx	Elective I	3
EE 454	Switchgear and Protection of Power Systems I	4	xx xxx	Elective II	3
EE 499	Senior Project	4	xx xxx	Elective III	3
Total		**17**	**Total**		**13**

5th Year
Cooperative

9th semester / 10th semester

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
EE 400	Coop Work Program (follows the completion of the 4th year courses)	8	IE 256	Engineering Management	2
			EE 331	Principles of Automatic Control	4
			ISLS 401	Islamic Culture 4	2
			EE 442	Power Electronics	4
			EE 454	Switchgear and Protection of Power Systems I	4
			xx xxx	Elective	3
Total		**8**	**Total**		**19**

A TYPICAL PROGRAM FOR ELECTRICAL ENGINEERING

ELECTRONICS AND COMMUNICATIONS GROUP STUDENTS

1st Year
Regular & Cooperative

1st semester — **2nd semester**

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
ELC 101	English Language I	2	ISLS 101	Islamic Culture I	2
CHEM 101 / PHYS 101	General Chemistry I / General Physics I	4	PHYS 101 / CHEM 101	General Physics I / General Chemistry I	4
MATH 101	Calculus I	4	MATH 202	Calculus II	4
ARAB 101	Arabic Language I	3	ELC 102	English Language II	2
			MENG 102	Engineering Graphics	3
Total		**13**	**Total**		**15**

2nd Year
Regular & Cooperative

3rd semester — **4th semester**

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
PHYS 102	General Physics II	4	IE 202	Introduction to Engineering Design (2)	2
IE 201	Introduction to Engineering Design (1)	3	EE 201	Structured Computer Programming	3
ARAB 201	Arabic Language II	3	MATH 204	Differential Equations I	3
CE 201	Engineering Mechanics (Statics)	3	EE 250	Basic Electrical Circuits	4
MATH 203	Calculus III	4	IE 255	Engineering Economy	3
Total		**17**	**Total**		**15**

3rd Year
Regular & Cooperative

5th semester			6th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
EE 202	Object-Oriented Computer Programming	3	xx xxx	Humanities Elective (one of 4 courses)	3
EE 300	Analytical Methods in Engineering	3	EE 253	Electrical and Electronic Measurements	4
EE 301	Electrical Circuits and Systems	3	EE 311	Electronics I	4
EE 302	Electromagnetic Fields	3	EE 331	Principles of Automatic Control	4
IE 331	Probability and Statistics	3	EE 332	Computational Methods in Engineering	3
Total		**15**	**Total**		**18**

4th Year
Regular

7th semester			8th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
EE 312	Electronics II	4	ISLS 201	Islamic Culture 2	2
EE 321	Introduction to Communications	4	EE 423	Electromagnetic Waves	4
EE 360	Digital Design I	4	EE 411	Digital Electronics	4
EE 351	Electrical Power Systems I	4	EE 413	Communication Circuits	4
Total		**16**	**Total**		**14**

Training

EE 390	Summer Training	2 Cr. Hrs

4th Year
Cooperative

7th semester / **8th semester**

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
ISLS 201	Islamic Culture 2	2	ISLS 301	Islamic Culture 3	2
EE 312	Electronics II	4	EE 423	Electromagnetic Waves	4
EE 351	Electrical Power Systems I	4	EE 411	Digital Electronics	4
EE 360	Digital Design	4	EE 413	Communication Circuits	4
EE 321	Introduction to Communications	4	EE 499	Senior Project	4
Total		**18**	**Total**		**18**

5th Year
Regular

9th semester / **10th semester**

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
ISLS 301	Islamic Culture 3	2	ISLS 401	Islamic Culture 4	2
EE 421	Communication Theory I	4	IE 256	Engineering Management	2
EE 424	Antennas and Propagation	3	EE 425	Communication Systems	4
xx xxx	Elective I	3	xx xxx	Elective II	3
EE 499	Senior Project	4	xx xxx	Elective III	3
Total		**16**	**Total**		**14**

5th Year
Cooperative

9th semester

Course No.	Course Title	Cr. Hrs
EE 400	Coop Work Program (follows the completion of the 4th year courses)	8
Total		**8**

10th semester

Course No.	Course Title	Cr. Hrs
IE 256	Engineering Management	2
ISLS 401	Islamic Culture 4	2
EE 421	Communication Theory I	4
EE 424	Antennas and Propagation	3
EE 425	Communication Systems	4
xx xxx	Elective	3
Total		**18**

A TYPICAL PROGRAM FOR ELECTRICAL ENGINEERING

COMPUTER ENGINEERING GROUP STUDENTS

1st Year
Regular & Cooperative

1st semester			2nd semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ELC 101	English Language I	2	ISLS 101	Islamic Culture I	2
CHEM 101 / PHYS 101	General Chemistry I / General Physics I	4	PHYS 101 / CHEM 101	General Physics I / General Chemistry I	4
MATH 101	Calculus I	4	MATH 202	Calculus II	4
ARAB 101	Arabic Language I	3	ELC 102	English Language II	2
			MENG 102	Engineering Graphics	3
Total		**13**	**Total**		**15**

2nd Year
Regular & Cooperative

3rd semester			4th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
PHYS 102	General Physics II	4	IE 202	Introduction to Engineering Design (2)	2
IE 201	Introduction to Engineering Design (1)	3	EE 201	Structured Computer Programming	3
ARAB 201	Arabic Language II	3	MATH 204	Differential Equations I	3
CE 201	Engineering Mechanics (Statics)	3	EE 250	Basic Electrical Circuits	4
MATH 203	Calculus III	4	IE 255	Engineering Economy	3
Total		**17**	**Total**		**15**

3rd Year
Regular & Cooperative

5th semester			6th semester		
Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
ISLS 201	Islamic Culture 2	2	EE 253	Electrical and Electronic Measurements	4
xx xxx	Humanities Elective (one of 4 courses)	3	EE 305	Discrete Mathematics and Its Applications	3
EE 202	Object-Oriented Computer Programming	3	EE 311	Electronics I	4
EE 300	Analytical Methods in Engineering	3	EE 332	Computational Methods in Engineering	3
EE 301	Electrical Circuits and Systems	3	EE 364	Advanced Programming	3
IE 331	Probability and Statistics	3			
Total		**17**	**Total**		**17**

4th Year
Regular

7th semester			8th semester		
Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
EE 312	Electronics II	4	ISLS 301	Islamic Culture 3	2
EE 321	Introduction to Communications	4	EE 331	Principles of Automatic Control	4
EE 360	Digital Design I	4	EE 361	Digital Computer Organization	3
EE 367	Data Structure and Algorithms	3	EE 460	Digital Design II	4
			xx xxx	Elective I	3
Total		**15**	**Total**		**16**

Training

EE 390	Summer Training	2 Cr. Hrs

4th Year
Cooperative

7th semester			8th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ISLS 301	Islamic Culture 3	2	EE 361	Digital Computer Organization	3
EE 312	Electronics II	4	EE 367	Data Structures and Algorithms	3
EE 321	Introduction to Communications	4	EE 411	Digital Electronics	4
EE 331	Principles of Automatic Control	4	EE 460	Digital Design II	4
EE 360	Digital Design I	4	EE 499	Senior Project	4
Total		**18**	**Total**		**18**

5th Year
Regular

9th semester			10th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
EE 461	Microprocessors and Microcomputers	4	IE 256	Engineering Management	2
EE 462	Computer Communication Networks	3	ISLS 401	Islamic Culture 4	2
XX XXX	Elective II	3	EE 411	Digital Electronics	4
EE 499	Senior Project	4	EE 463	Operating Systems	3
			XX XXX	Elective III	3
Total		**14**	**Total**		**14**

5th Year Cooperative

9th semester			10th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
EE 400	Coop Work Program (follows the completion of the 4th year courses)	8	ISLS 401	Islamic Culture 4	2
			IE 256	Engineering Management	2
			EE 461	Microprocessors and Microcomputers	4
			EE 462	Computer Communication Networks	3
			EE 463	Operating Systems	3
			xx xxx	Elective	3
Total		**8**	**Total**		**17**

A TYPICAL PROGRAM FOR ELECTRICAL ENGINEERING

BIOMEDICAL ENGINEERING GROUP STUDENTS

1st Year
Regular & Cooperative

1st semester / **2nd semester**

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
ELC 101	English Language I	2	ISLS 101	Islamic Culture I	2
CHEM 101 / PHYS 101	General Chemistry I / General Physics I	4	PHYS 101 / CHEM 101	General Physics I / General Chemistry I	4
MATH 101	Calculus I	4	MATH 202	Calculus II	4
ARAB 101	Arabic Language I	3	ELC 102	English Language II	2
			MENG 102	Engineering Graphics	3
Total		**13**	**Total**		**15**

2nd Year
Regular & Cooperative

3rd semester / **4th semester**

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
PHYS 102	General Physics II	4	IE 202	Introduction to Engineering Design (2)	2
IE 201	Introduction to Engineering Design (1)	3	EE 201	Structured Computer Programming	3
ARAB 201	Arabic Language II	3	MATH 204	Differential Equations I	3
CE 201	Engineering Mechanics (Statics)	3	EE 250	Basic Electrical Circuits	4
MATH 203	Calculus III	4	IE 255	Engineering Economy	3
Total		**17**	**Total**		**15**

3rd Year
Regular & Cooperative

5th semester			6th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ISLS 201	Islamic Culture 2	2	EE 253	Electrical and Electronic Measurements	4
EE 202	Object-Oriented Computer Programming	3	EE 302	Electromagnetic Fields	3
EE 300	Analytical Methods in Engineering	3	EE 311	Electronics I	4
EE 301	Electrical Circuits and Systems	3	BIO 322 OR PHY 372	Physiology for Biomedical Engineers	3
BIO 321	Biology for Biomedical Eng. Students	3	IE 331	Probability and Statistics	3
EE 370	Biomedical Engineering Primer	3			
Total		**17**	**Total**		**17**

4th Year
Regular

7th semester			8th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ISLS 301	Islamic Culture 3	2	xx xxx	Humanities Elective (one of 4 courses)	3
EE 312	Electronics II	4	EE 331	Principles of Automatic Control	4
EE 321	Introduction to Communications	4	EE 341	Electromechanical Energy Conversion I	4
EE 332	Computational Methods in Engineering	3	EE 470	Biomedical Signals and Systems	4
EE 360	Digital Design I	4	EE 471	Biomedical Instrumentation	3
Total		**17**	**Total**		**18**

Training

EE 390	Summer Training	2 Cr. Hrs

4th Year
Cooperative

7th semester

Course No.	Course Title	Cr. Hrs
ISLS 301	Islamic Culture 3	2
EE 312	Electronics II	4
EE 321	Introduction to Communications	4
EE 332	Computational Methods in Engineering	3
EE 360	Digital Design I	4
Total		**17**

8th semester

Course No.	Course Title	Cr. Hrs
XX XXX	Humanities Elective (one of 4 courses)	3
EE 331	Principles of Automatic Control	4
EE 470	Biomedical Signals and Systems	4
EE 471	Biomedical Instrumentation	3
EE 499	Senior Project	4
Total		**18**

5th Year
Regular

9th semester

Course No.	Course Title	Cr. Hrs
IE 256	Engineering Management	2
XX XXX	Elective I	3
XX XXX	Elective II	3
EE 499	Senior Project	4
Total		**12**

10th semester

Course No.	Course Title	Cr. Hrs
ISLS 401	Islamic Culture 4	2
EE 465	Microcomputers for Electrical Engineers	4
EE 472	Biomedical Imaging Systems	3
XX XXX	Elective III	3
Total		**12**

5th Year Cooperative

9th semester			10th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
EE 400	Coop Work Program (follows the completion of the 4th year courses)	8	IE 256	Engineering Management	2
			EE 341	Electromechanical Energy Conversion I	4
			ISLS 401	Islamic Culture 4	2
			EE 465	Microcomputers for Electrical Engineers	4
			EE 472	Biomedical Imaging Systems	3
			xx xxx	Elective	3
Total		**8**	**Total**		**18**

COURSE DESCRIPTION

EE 201 Structured Computer Programming (3:3,1)

Introduction to computers. Simple algorithms and flowcharts. Solving engineering and mathematical problems using a mathematically-oriented programming language. Programming concepts: I/O, assignment, conditional loops, functions and subroutines. Programming selected numerical and non-numerical problems of mathematical and engineering nature .

Prerequisite: MATH 101, ELC 102

EE 202 Object-Oriented Computer Programming (3:3,1)

Object-oriented programming: classes, objects and methods. Object-oriented design. Simple data structures. Best programming practices (structured coding, documentation, testing and debugging).

Prerequisite: EE 201

EE 250 Basic Electrical Circuits (4:3,2)

Electric quantities and circuit elements. Kirchhoff's laws. Mesh and node analyses. Sinusoidal steady-state analysis using phasors. Network theorem and transformations. Ideal transformers. Three-phase circuits.

Prerequisite: PHYS 202, ELCE 102

EE 251 Basic Electrical Engineering (4:3,2)

Elementary circuit analysis. Diode and op-amp circuits. Motors, generators and transformers. High-voltage equipment. Power systems and 3-phase circuits. Measuring instruments.

Prerequisite: PHYS 102, ELC 102

EE 253 Electrical and Electronic Measurements (4:3,3)

Measurements and the generalized measurement system. Analog instruments. Measurement of power and energy. DC and AC bridges. Transducers. Electronic measuring instruments. Digital instruments. Oscilloscopes. Recording instruments.

Prerequisites: EE 301, IE 331

EE 300 Analytical Methods in Engineering (3:3, 1)

Linear algebra: matrices and determinants, eigenvalues and eigenvectors. Complex analysis: complex arithmetic complex, algebra, complex differentiation integration in the complex plane and residue analysis. Graphs, Fundamentae loops and fundamentae cutsets.

Prerequisite: MATH 203

EE 301 Electrical Circuits And Systems (3:3, 1)

Resonance circuits. Magnetically-coupled circuits. Op-amp circuits. Transient analysis via the conventional and Laplace methods. Fourier analysis with applications to circuits. Two-port networks.

Prerequisites: MATH 204 , EE 250

EE 302 Electromagnetic Fields (3:3, 1)

Electrostatic fields. Poisson and Laplace equations. Steady Electric Current. Steady Magnetic Field. Time-varying electric and magnetic fields. Maxwell equations.

Prerequisites: EE 250, MATH 203

EE 305 Discrete Mathematics and their Applications (3:3, 1)

Functions, relations and sets. Basic logic. Proof techniques. Basic counting. Graphs and trees. Modeling. Computation. Types of functions and relations. Cartesian products and power sets. Propositional logic, Logical equivalence quantifiers. Mathematical induction, recursive definitions. Pigeonhole principle, permutations, combinations, recurrence relations. Binary trees, traversals. Graph Isomorphism, connectivity, Euler and Hamilton paths. Planar graphs. Graph coloring. Formal languages, grammars, and finite state machines. Turing machines and computability.

Prerequisite: EE 202, MATH 204, IE 202

EE 311 Electronics I (4:3, 3)

Conduction in metals and semiconductors, P-N junctions, diode circuits. Field-effect and junction transistors. Low frequency equivalent circuits. Basic amplifiers.

Prerequisite: EE 250

EE 312 Electronics (4:3, 3)

Feedback in amplifiers. Frequency response of amplifiers. Operational amplifiers: design and applications as linear and non-linear analog building blocks, adders, subtractors, differentiators, integrators, analog simulation, and active filters. Logarithmic and exponential amplifiers, precision converters, analog multipliers, wave-shapers, sinusoidal and square wave oscillators.

Prerequisite: EE 311

EE 321 Introduction to Communications (4:3, 3)

Fourier Signal Analysis. Linear Modulation: AM, DSBSC, SSB, Frequency Conversion, generation and detection. FDM., Exponential Modulation: FM, PM, NBFM, WBFM. Pulse Modulation, Sampling Theorem, PAM, PDM, PPM, PCM, TDM., Digital Modulation ASK, PSK and FSK.

Prerequisites: EE 301

EE 331 Principles of Automatic Control (4:3, 2)

Introduction to control systems with examples from different fields. Transfer functions and block diagram algebra. Stability analysis (Routh-Hurwitz and Nyquist). Design of Control Systems using Bode diagrams and root locus techniques.

Prerequisites: MATH 204, EE 300, EE 301

EE 332 Computational Methods in Engineering (3:3, 1)

Introduction. Solution of non-linear equations. Solution of large systems of linear equations. Interpolation. Function approximation. Numerical differentiation and integration. Solution of the initial value problem of ordinary differential equations.

Prerequisites: EE 201, MATH 204

EE 341 Electeromechanical Energy Conversion I (4:3, 2)

Theory and modelling of electromechanical devices. Magnetic circuit. Power transformers. Physical construction and applications of D. C. machines. Qualitative introduction to A.C. Machines.

Prerequisite: EE 302

EE 351 Electrical Power Systems I (4:3, 2)

Electrical Characteristics and steady state performance of overhead transmission lines. Equivalent Circuit and Power Circle Diagrams. Per-unit Systems and Symmetrical Short-Circuit calculations. Power systems economics. Introduction to Switchgear and Protection.

Prerequisite: EE 250

EE 352 Electrical Machines and Electronics (for non EE students) (4: 3, 3)

Principles of Electromechanical Energy Conversion. Direct Current Machines. Alternating Current Machines. Semiconductors. Junction Diodes. Transistors. Operational Amplifiers. Analog Op Amp. Systems.

Prerequisite: EE 251

EE 360 Digital Design I (4:3, 2)

Representation and manipulation of digital information Basic Boolean logic. Elements of digital building blocks. Computer arithmetic unit. Memory unit. Input-Output unit. Basic operation of the computer control unit.

Prerequisite: EE 311

EE 361 Digital Computer Organization (3:3, 1)

Basic structure of computers. Addressing methods and machine programs. Instruction sets and their implementation. Central Processing Unit. Micro programmed control. Input-Output Organization. Arithmetic Unit. Main memory. Computer peripherals and interfacing.

Prerequisites: EE 360, IE 331

EE 364 Advanced Programming (3:3, 1)

Structured programming concepts and control structure. Systematic program design. Modularization and scope concepts. Use of a variety of data structures and programming techniques. Iteration and recursion. Memory management. Program correctness, informal verification and testing.

Prerequisite: EE 202

EE 367 Data Structures and Algorithms (3:3, 1)

Basic concepts of data and their representations inside a computer (scalar, structured and dynamic). Manipulation of arrays, strings, stacks, queues, linear lists, circular lists, orthogonal lists, trees and graphs. Sorting and searching algorithms. File organization and file access methods.

Prerequisites: EE 305, EE 364, IE 331

EE 370 Biomedical Engineering Primer (3:2,3)

Biomedical engineering fields of activity. Research, development, and design for biomedical problems, diagnosis of disease, and therapeutic applications. Modular blocks and system integration. Physical, chemical and biological principles for biomedical measurements. Sensors for displacement, force, pressure, flow, temperature, biopotentials, chemical composition of body fluids and biomaterial characterization. Patient safety.

Prerequisites: PHYS 102, BIO 321, EE 201

EE 390 Summer Training (10 weeks) (2:0,0)

Training in industry under the supervision of a faculty member. Students have to submit a report about their achievements during training in addition to any other requirements as assigned by the department.

Prerequisite: EE 321, EE 331, IE 331

EE 400 Cooperative Work (26 weeks) (8:0,0)

Training in industry under the supervision of a staff member. Students should submit a final report about their training in addition to any other requirements as assigned by the department.

Prerequisite: EE 321, EE 331, IE 331

EE 403 Power System Instrumentation and Measurements (3:3, 1)

Principles of DC and AC measurements. Power factor meter. Frequency meter. Synchroscope. Measurement of earth resistance. Symmetrical components measurements. Wave analyzer and harmonic distortion analyzer. Instrument transformers (CTs, VTs, and CVTS). Localization of cable faults.

Prerequisite: EE 253

EE 410 Advanced Electromagnetics (3:3, 1)

Green’s function and its applications Electromagnetic Theorems

(Duality, uniqueness, source representations, reciprocity theorem, reaction theorem, volume, surface equivalence theorem, induction theorem). Scattering from plane and cylindrical geometries. Integral equations, moment method. Current distribution on dipole antenna. Diffraction from a slit. Wave propagation in the ionosphere.

Prerequisite: EE 423

EE 411 Digital Electronics (4:3, 3)

Switching of electronic devices. Integrated circuit gates, multivibrators, registers, charge coupled device. Memories. Digital to analog and analog to digital converters.

Prerequisites: EE 311, EE 360

EE 412 Integrated Circuits (3:3, 1)

Monolithic technology, planar processes, Crystal Growth, Epitaxial growth, implantation-diffusion, oxidation, metallization, photolithography, Bipolar and MOS Technology, Integrated Circuit analysis and design.

Prerequisite: EE 312

EE 413 Communication Circuits (4:3, 3)

Behavior of Transistors at high frequencies. Analysis and design of electronic circuits employed in electronic and communication systems.

Prerequisite: EE 312

EE 414 Computer-Aided Analysis and Design of Electronic Circuits (3:3, 1)

Simulation of LS Circuits, Formation of network equations. Integrative methods for nonlinear algebraic equations. Numerical solution of differential equations. Design and analysis of analog and digital VLSI Circuits. Emphasis on analytical and CAD techniques for high performance circuit Design.

Prerequisite: EE 312

EE 415 Measurements and Electronic Instruments (3:3, 1)

Electronic Instruments. High Frequency and microwave measurements. Measurement of time and frequency. Spectrum measurements of signals. Digital measurements.

Prerequisites: EE 413, EE 423, IE 331

EE 416 Quantum and Optical Electronics (3:3, 1)

Fundamentals of quantum theory, Band theory of solids, Approximation methods, statistical and, thermodynamics approaches, semi conducting and optical properties of solids and applications.

Prerequisites: EE 312

EE 417 Avionics (3:3, 1)

Aircraft radio systems, aircraft navigation systems, flight control systems, Avionics test equipment.

Prerequisites: EE 312, EE 424

EE 418 Microwave and Optical Devices (3:3, 1)

Structure and analysis of microwave and optoelectronic devices, Gunn diodes, IMPATTMESFET . TRAPATT, TWT, Magnetrons - Solid State Lasers, LEDs. Applications, Oscillators, Amplifiers.

Prerequisites: EE 312, EE 423

EE 419 VLSI Layout (3:3, 1)

Partitioning. Floor planning (sliced and nonsliced). Constrained and unconstrained floor planning. Placement (Constructive and iterative). Routing. Single layer routing. Multi layer routing. Compaction.

Prerequisites: EE 312

EE 420 Microwave Circuits (3:3, 1)

Analysis and applications of transmission lines. Filters, DC blockage. Couplers, mixers, radiators.

Prerequisites: EE 312, EE 423

EE 421 Communication Theory I (4:3, 3)

Autocorrelation function and spectral density. Random signal theory: Continuous and discrete random variables, transformation of random variables, stationary random processes, time averages and ergodicity, power spectral density of stationary random processes. Signal-to-noise ratio and probability of error. Noise equivalent bandwidth. Optimum receivers. Pulse detection and matched filters. Signal distortion in transmission and equalization. Noise in linear and exponential modulation. PCM systems: Uniform and nonuniform quantization, noise in PCM, DPCM and DM. Noise in pulse modulation.

Prerequisites: EE 321, IE 331

EE 422 Satellite Communications (3:3, 1)

History of satellites. Orbital and geostationary satellites. Mechanical fundamentals for satellites. Orbital patterns. Look angles. Orbital spacing. Frequency reuse. Radiation pattern. Satellite system. Link models. Up link model. Transpond down link model. Cross links. Satellite parameters. Link budget equations and calculations. Digital modulation techniques used in satellites. Losses and attenuation of waves between satellites and earth.

Prerequisites: EE 421, EE 423

EE 423 Electromagnetic Waves (4:3, 3)

Electromagnetic Theory. Plan waves, Maxwell's equations, boundary conditions, Pointing theorem, Wave equation, Plane waves. Transmission lines: Distributed circuit parameters, HF transmission lines, reflections, standing waves. T.L. measurements. Wave guides: TEM, TM and TE transmission, parallel plates waveguides- TE and TM modes,. Cavity resonators. Impedance Transformation and Matching. Smith Chart.

Prerequisites: EE 302, MATH 204

EE 424 Antennas and Propagation (3:3, 1)

Radiation and Antenna Fundamentals. Linear Antennas, Current distribution, Short dipoles And Monopoles/2 dipoles, radiation resistance and gain, longer dipoles, folded dipoles. Antenna Arrays. Aperture Antennas. Special types of antennas. Traveling wave antennas, loop antennas. Frequency independent antennas, helical Antennas, corner reflector, lenses. Space Wave Propagation. Ground Wave Propagation. Tropospheric waves. Ionospheric waves.

Prerequisite: EE 423

EE 425 Communication Systems (4:3, 3)

Detailed description of at least three out of the following systems. Radio broadcasting Systems. TV and Video Systems. Radar Systems. Microwave Links, Telephony, Telegraphy and Telex systems. Satellite Communication Systems. Optical Communication Systems. Aircraft and Ship navigational systems.

Prerequisites: EE 421, EE 312, EE 423

EE 426 Digital Communications (3:3, 1)

Sampling theorem. PCM. Data compression and quantization Digital modulation. ASK, PSK, FSK, Noise analyses and probability of error. Modern Digital Modulation Techniques. Spread Spectrum techniques.

Prerequisite: EE 421

EE 427 Communication Theory II (3:3, 1)

Error Probabilities. Detection and Decision rules. Hypothesis testing cost function, decision rules, Bayes and W.P. testing, maximum likelihood detection, optimum receivers, Wiener filtering. Matched filters: Matched filter for white noise, matched filter for arbitrary noise, spectral factorization, prewhitening and spectral shaping. Matched filters for different types of communication signals. Information Theory: self information entropy, mutual information, zero memory sources, Markov sources, Shannon theorem. Coding.

Prerequisite: EE 421

EE 428 Radar Systems And Applications (3:3, 1)

Radar equation. CW, FM, MTI and pulse doppler radars, circuits of radar blocks. Radar antennas. Propagation of radar waves. Pulse compression. Tracking radar. Applications.

Prerequisites: EE 413, EE 424

EE 429 Digital Signal Processing (3:3, 1)

Discrete time signals and systems. Fourier analysis of discrete-time signals and systems. Fast Fourier transform. Digital filter design. Computer applications. Advanced topics.

Prerequisite: EE 321

EE 431 Advanced Control Systems (3:3, 1)

State space representation and realization, controllability and observability. Liapunov and popov stability criteria, stochastic and sampled data control theory, optimal control theory.

Prerequisite: EE 331

EE 432 Digital Control Systems (3:3, 1)

Derivation of differential/difference equations for physical systems. The

Laplace transform. The Z transform. The transfer function. Stability in the Z plane. System response in the time domain. Controllability and Observability. Design of Closed-loop digital control systems by conventional means and by the digital computers.

Prerequisite: EE 331

EE 433 Introduction to Robotics (3:3, 1)

Basic components of robotic systems. Coordinate frames. Homogeneous transformations. Solution of kinematic equations. Velocity and force/torque relations. Manipulator dynamics. Motion planning. Obstacle avoidance. Vision controller design.

Prerequisite: EE 331

EE 440 Power System Transients (3:3, 1)

Causes of Transients. Effects of Transients on plant. Calculation of transients. Measurement of transients. Protection against transients.

Prerequisites: EE 341, EE 351

EE 441 Electeromechanical Energy Conversion II (4:3, 2)

Polyphase induction and synchronous machines. Models and performance characteristics for steady-state operations. Fractional horsepower machines, their performance and application.

Prerequisites: EE 341, EE 351

EE 442 Power Electronics I (4:3, 2)

Thyristors, theory of operation, methods of turning on, thyristor limitations, commutation methods. Single and three-phase AC voltage controllers for resistive and inductive loads. Single-phase and three-phase AC-DC converters for resistive and large inductive loads. Analysis of DC-DC converters for resistive, large inductive, and general inductive loads. Single-phase and three-phase inverters for different loads. Single-phase to single-phase cycloconverter, output voltage and frequency control.

Prerequisite: EE 311

EE 443 Electeromechanical Energy Conversion III (3:3, 1)

D.C. machine dynamics. Synchronous machine transient and dynamics. Introduction to the generalized theory of electrical machines.

Prerequisite: EE 441

EE 444 Power Electronics II (3:3, 1)

Static switches. Power supplies. DC drives. AC drives. Traffic Signal Control. Power Transistors. Solid-state temperature and air conditioning control. Light activated thyristor applications. Test and protection of power electronic devices and circuits.

Prerequisite: EE 442

EE 445 Utilization Of Electrical Energy (3:3, 1)

Utilization in mechanical plants: Drives, Electromagnetics. Utilization in chemical plants: Electroplating, Welding. Utilization in urban plants: Illumination, Traction, Electrical Installations.

Prerequisites: EE 341, EE 351

EE 446 HV and EHV AC Transmission Systems (3:3,1)

Transmission Line Trends, Line and Earth Parameters, Voltage gradient of conductors, Corona Effects, Electro-static Fields of EHV Lines, Over voltages in EHV Lines, Lightning and Protection, Transmission Using EHV Cables.

Prerequisite: EE 351

EE 447 High Voltage Direct Current (HVDC) Systems (3:3, 1)

Technology of Power Transmission Using Direct Current, Analysis and Control of Variables, Regulating Reactor and Direct Current Transmission, Reactive Power Control, Harmonics and Filters in Multiterminal Direct Current Systems.

Prerequisite: EE 351

EE 448 Power System Planning and Reliability
(3:3, 1)

Power System Planning, Load Forecasting, Planning Principles for Short and Long Terms, Planning for Future Expansion in Generation and Transmission, Principles of Power Systems Reliability.

Prerequisites: IE 331, EE 351

EE 449 Power System Stability (3:3, 1)

Introduction to Power System Dynamics. Steady-State Stability.

Dynamic Stability. Machine Modelling. Stability of Multi-machine Systems. Machine Excitation. Turbines and Governor.
Prerequisite: EE 441

EE 450 Power System Control (3:3, 1)

Power factor Control, Automatic generation control, Load-frequency Control, Economic dispatch, Unit Commitment, reactive power control, Potential Instability and Breakdown, Reactive power distribution.
Prerequisites: EE 331, EE 441 (concurrent)

EE 451 Electrical Power Systems II (4:3, 2)

Load Flow Analysis, Solution of Load Flow Equations, Gauss-Seidel and Newton Raphson Techniques, Asymmetrical Faults, Phase Sequence Networks, Use of Matrix Methods. Power System Stability: Steady-State and Transient.
Prerequisite: EE 351

EE 452 High Voltage Techniques I (3:2, 2)

Generation of high AC and DC impulse voltages, and impulse currents. Measurement of high voltages and currents. Dielectric loss and capacitance measurements. Traveling waves.
Prerequisite: EE 351

EE 453 Power Transmission and Distribution (3:3, 1)

Transmission line parameters, Mechanical design of overhead transmission lines, Underground cables, Distribution Systems. Distribution substation design. Surges on transmission systems, System earthing.
Prerequisites: EE 351, IE 331

EE 454 Switchgear and Protection of Power Systems I (4:3, 2)

Switch gear, busbar systems, couplers, cubicles, auxiliaries, and single line diagram. Relays, electromagnetic, static, thermal relay, and over current, voltage. Distance relays. Differential relays. Feeder protection system. Transformer protection system. Generator protection system.
Prerequisites: EE 341, EE 351

EE 455 Economic Operation of Power Systems (3:3, 1)

Operating constraints. Short-term load forecast. Load curve analysis. Economical load sharing between units and between stations. Tariffs. incremental costs. Unit commitment and generator scheduling. Voltage and VAR control. Energy conservation.

Prerequisites: EE 451, IE 331

EE 456 High Voltage Techniques II (3:3, 1)

Breakdown in gases: some processes of ionization, pre-breakdown events and breakdown under uniform non-uniform and times varying fields, corona discharges. Breakdown. Discharge in liquids. Breakdown in solids and surface breakdown. Discharge measurements. Insulating materials applications.

Prerequisite: EE 452

EE 457 Switchgear and Protection of Power Systems II (3:3, 1)

System consideration for switchgear. AC switchgear. DC low voltage switchgear. Unit Protection of Feeders. Distance protection. Distance Protection Schemes. Protection of Parallel and Multi-ended feeders. Auto-reclosing. Intertripping. Industrial Power system Protection. Rectifier Protection. The application of microprocessors to substation control. Testing and Commissioning.

Prerequisite: EE 454

EE 458 Computer Applications in Power Systems (3:3, 1)

Power network equations and digital solution techniques, network reduction methods. Computer programs for steady state analysis of power systems: Transmission Line performance, short-circuit calculations, and load flow studies. Digital and analog simulation of power system component dynamics. Digital Evaluation of power system stability. Computer application in utilities and power industry.

Prerequisites: EE 332, EE 451

EE 459 Electric Power Distribution (3:3, 1)

Application of distribution transformers. Design considerations of primary systems. Design consideration of secondary systems.

Distribution system. Voltage regulation. Distribution system protection. Distribution system reliability.

Prerequisites: EE 451, EE 453

EE 460 Digital Design II (4:3, 2)

Analysis and synthesis of gate networks. Elements of minimization techniques. Synthesis using NAND and NOR gates. Analysis of sequential networks. Synthesis of pulse-mode and fundamental mode sequential networks. Flow tables and State diagrams. Hazards. Use of MSI and LSI in the implementation of combinational and sequential circuits.

Prerequisites: EE 360

EE 461 Microprocessors and Microcomputers (4:3, 2)

Technology, architecture and applications of microprocessors. Programming and structure of microcomputer systems. Memory, Input/Output and Interrupts. LSI Interface/control chips.

Prerequisites: EE 360

EE 462 Computer Communication Networks (3:3, 1)

Components of data communication systems. Error detection techniques. Network Protocols including the Open System Interconnection model. Communication carrier facilities. System planning considerations.

Prerequisites: EE 321

EE 463 Operating Systems (3:3, 1)

Operating systems as resource managers. Process concepts. Synchronous concurrent processes. Concurrent programming monitors and the ADA rendezvous. Real and virtual storage management. Processor scheduling. Disk scheduling. File systems. Some case studies.

Prerequisites: EE 361, EE 367

EE 464 Structure of Programming Languages (3:3, 1)

Elements of language design. Paradigms. Language implementation. Data types. Objects. Operations. Type checking. Sequence control. Subprograms. Interrupts. Parallelisms. Data control. Scope rules. Binding. Memory management. Operating environment.

Prerequisites: EE 361, EE 367

EE 465 Microcomputers for Electrical Engineers (4:3, 2)

The concept of microcomputer and micro computing. Its impact, utility, and application areas. Simplified architecture and technology of microcomputer hardware and software. Design and implementation of various functions on the chip level, Microcomputers as controllers. Various application examples in the form of practical term projects. (Open to non-computer option students only).

Prerequisite: EE 360, EE470

EE 466 Computer Interfacing (3:3, 1)

Basics of data transfer (Serial and parallel modes, 110 transfer initiation using polling and interrupt schemes, Standard busses). Interface components and their characteristics (Drivers, receivers, interface chips, Analog-to- digital converters). Designing interface circuits for standard busses.

Prerequisites: EE 361, EE 411

EE 467 Databases (3:3, 1)

The need for the database approach. Storage structures. Basic data structures (relational, hierarchical, and network approaches). The network approach (Architecture of the DBTG system, Set constructs, external level of DBTG, data manipulation commands). The hierarchical approach (IMS data structure, external and internal levels, data manipulation). The Relational approach (relational algebra and calculus. Query-by-example).

Prerequisites: EE 367, EE 463

EE 468 Systems Programming (3:3, 1)

Introduction to machine and assembly languages. Design of two-pass assemblers. Macros and their processing using a two-pass algorithm. Loader schemes (compile-and-go, absolute loaders, relocating and direct linking loaders). Compilers (Lexical, Syntax, and interpretation phases, Optimization, storage assignment and code generation).

Prerequisites: EE 361, EE 367

EE 469 Compiler Construction (3:3, 1)

Languages and grammars. Formal syntax and semantics. Formal grammars, parsing, ambiguities, syntax trees. Techniques for top-down and bottom-up syntax analysis. Regular expressions, finite automata and Lexical analysis. Code generation and syntax-directed translation. Symbol tables and storage allocation. Translator-writing systems.
Prerequisite: EE 367

EE 470 Biomedical Signals and Systems (4:3, 3)

Models for biomedical systems. Non-deterministic nature of biomedical signals, physiological systems and quantitative analysis. Statistical analysis of experimental data. Frequency response of systems and circuits. A/D conversion, sampling, and discrete-time signal processing. Biomedical amplifiers, filters, signal processors and display devices. Power supplies for medical equipment. Laboratory and computational experiences with biomedical applications. Term project.
Prerequisites: EE 253, EE 370, IE202

EE 471 Biomedical Instrumentation (3:2, 3)

Electrical safety and precautions required in medical applications. Electrocardiography (ECG), analog and digital processing of ECG signals. Measurement of blood pressure, heart sound, flow and volume of blood. Statistical analysis of heart rate and blood pressure measurements. Basic respiratory system measurements. Principles of clinical lab instrumentation. Term project.
Prerequisites: EE 312, PHY 372, EE 470

EE 472 Biomedical Imaging Systems (3:3, 1)

Fundamentals of medical imaging physics and systems: X-ray radiography, ultrasound, radionuclide imaging, and magnetic resonance imaging (MRI). Biological effects of each modality. Tomographical reconstruction principles, including X-ray computed tomography (CT), position emission tomography (PET), and single-photon emission computed tomography (SPECT).
Prerequisite: EE 470

EE 473 Introduction to Therapeutic and Prosthetic Devices (3:3, 1)

Concepts of therapy, rehabilitation, prosthesis, orthosis. Therapeutic effects of electrical current. Examples of common devices: pacemakers and defibrillators. Sensory and communication aids. Neuromuscular stimulators. Physical therapy equipment. Electro-surgical equipment.

Medical applications of lasers. Ventilators. Artificial kidney. Neonatal care. Radiation therapy.
Prerequisite: EE 470

EE 474 Safety, Reliability and Maintenance in Health Care Facilities (3:3, 1)

Definition of safety. Electrical, gas, and fire safety and how to make safe environment for patients, medical personnel and attendants. Reliability in health care facilities. Training of operators for proper use of equipment. Generation of a computer database for equipment, suppliers, dealers and manufacturers. Preventive maintenance procedures. Corrective maintenance, repair and amendment of existing equipment. Basic troubleshooting principles. Retrieving information from manufacturer's catalogs and technical libraries.
Prerequisites: EE 370, IE 331

EE 475 Computer Applications in Biomedical Engineering (3:3, 1)

Classification of computer applications in the biomedical field. Available tools and techniques: hardware and software resources in the PC field. Selected application examples: medical record system, lab and pharmacy information system, office practice system, clinical decision support system. Computerized diagnostic and therapeutic equipment.
Prerequisite: EE 465

EE 476 Biomedical Systems Management (3:3, 1)

Responsibilities of biomedical engineers working in health-care facilities. Codes, standards and regulations governing clinical engineering practices. Bids preparation and tender evaluation. Designing and layout of medical facilities. Equipment selection and evaluation. Term project.
Prerequisite: EE 370

EE 480 Modeling and Simulation (3:3, 1)

Elements of modeling discrete systems. Modeling of computer systems. Design of computer simulation. Simulation languages. Validation and analysis using statistical methods.
Prerequisites: EE 364, IE 331, EE 305

EE 481 Computer Graphics (3:3, 1)

Development of computer graphics. Basic interactive graphic programming. Graphics hardware. Implementation of a simple graphics package,, Interactive devices and techniques. Raster algorithms and software. Raster display architecture.

Prerequisites: EE 364, EE 367

EE 482 Introduction to Artificial Intelligence (3:3, 1)

Problem solving methods. Search spaces. Knowledge representation. Reasoning. Natural language understanding. Pattern recognition. Computer vision. Expert systems. AI languages.

Prerequisite: EE 367

EE 483 Advanced Computer Architecture and Modern Peripherals (3:3, 1)

Survey of hardware description languages, Concepts of parallel processing, and super computer architectures. Study of modern peripherals like optical storage, bubble memories and laser printers.

Prerequisite: EE 361

EE 484 VLSI Design (3:3, 1)

Theory and design of computational/computer systems with very large scale integration (VLSI). Flow of data and control signals in processor systems: array systems, systems of systematic structures and systems of hierarchical organization. Algorithms for processor systems. Control units and system controllers. Highly concurrent systems. Layout theory and algorithms. Computer-aided layout (interactive layout).

Prerequisite: EE 460, EE 411

EE 488 Formal Languages and Automata Theory (3:3, 1)

Grammars and languages based on phase structure. Closure properties and decidability. Finite state automata. Linear bounded automata. Push-down automata. Turing machines. Relation between languages and automata. Solvable and unsolvable problems of formal languages.

Prerequisite: EE 305, EE 367

EE 490 Special Topics in Electrical Engineering (3:3, 1)

Selected topic to develop the skills and knowledge in a given field.

Prerequisite: EE 321, EE 331, IE 331

EE 491 Special Topics in Electrical Power Engineering (3:3, 1)

Selected topic to develop the skills and knowledge in a given field.

Prerequisite: EE 451

EE 492 Special Topics in Electrical Machines (3:3, 1)

Selected topic to develop the skills and knowledge in a given field.

Prerequisite: EE 441

EE 493 Special Topics in Electronics (3:3, 1)

Selected topic to develop the skills and knowledge in a given field.

Prerequisite: EE 312

EE 494 Special Topics in Communications (3:3, 1)

Selected topic to develop the skills and knowledge in a given field.

Prerequisite: EE 321

EE 495 Special Topics in Computer Engineering (3:3, 1)

Selected topic to develop the skills and knowledge in a given field.

Prerequisite: EE 361, EE 367, EE 331

EE 496 Special Topics in Automatic Control (3:3, 1)

Selected topic to develop the skills and knowledge in a given field.

Prerequisite: EE 331, IE 331

EE 497 Special Topics in Biomedical Engineering (3:3, 1)

Selected topic to develop the skills and knowledge in a given field.

Prerequisite: EE 470

EE 499 Senior Project (4:2, 4)

Selection of topic: literature review; project design planning, arranging for data collection, and experimental work. Experimental work and data collection or field study (if any). Data processing analysis and results. Preparation of the first draft of final report. Presentation of the project.

Prerequisite: EE 321, EE 331, IE 331

DEPARTMENT OF
INDUSTRIAL ENGINEERING

FACULTY

Chairman:

Al-Darrab, Ibrahim A.

Professors:

Abdul Aal, Reda M.
Alidrisi, Mustafa M.
Al-Jifry, Mohammad S.
Bafail, Abdullah O.
Hassan, Saied A.
Noweir, Madbuli H.
Rizvi, Sayed A.

Associate Professors:

Abed, Seraj Y.
Al-Darrab, Ibrahim A.
Al-Moreb, Ahmed A.
Al-Qasabi, Majid A.
Jomoah, Ibrahim M.
Khan, Md. Rashidur R.
Ulhaque, Muhammad E.

Assistant Professors:

Aburas, Hani M.
Gulzar, Waqar A.
Hashem, Ayman A.
Karuvatt, Shoukath A.

Obaid, Raed R.
Sheikh, Manzoor H.
Taylan, Osman I.
Wazzan, Wajdi A.

Lecturers:

Hassanein, Wael S.
Maqbool, Mohammad R.
Moulvi, Mohammad S.
Ullah, Mohammad S.
Zaytoon, Mohamed A.

INTRODUCTION

Industrial Engineering is a branch of engineering which deals with design, installation, testing, operation and improvement of systems comprising men, machines, methods and materials. It is thus unique as compared to other branches of engineering in the sense that it deals not only with inanimate objects but also with the behavior of human beings in relation to these objects. For this purpose, it draws heavily on mathematical, physical, and social sciences and the other engineering principles of systems analysis and design. Some of the areas of Industrial Engineering, which are now commonly available as options in many colleges are as follows:

- Operations Research
- Information Processes
- Engineering Statistics
- Human Factors Engineering
- Engineering Management

Some of the places where Industrial Engineers now work in technical or managerial positions are manufacturing industries of all types, banks, hospitals, airlines and transportation companies, telephone and communication organizations, and planning departments.

In the context of Saudi Arabia, the scope for Industrial Engineering is unlimited because:

- The Kingdom is short of manpower and every effort is needed to get engineers to design, install, and maintain automated systems.
- Since the pace of development is very fast, there is considerable scope for improvement in different aspects of working in almost every organization.

The program developed for Industrial Engineering Department in the Faculty of Engineering takes care of all the above aspects. In addition, it is conscious of its responsibilities as the first Industrial Engineering Department in the Kingdom. The faculty is actively involved in research and advising services to the University. Some of the problems studied were:

- Scheduling of courses
- Maximum utilization of lecture rooms
- Optimal allocation of support staff
- Car parking and traffic flow inside the campus
- Fire fighting facilities

Some of the areas in which the faculty is involved in active research are:

- Mathematical Programming
- Network Reliability
- Information Systems
- Human Factors Engineering
- Biomedical Engineering
- Systems Analysis and Design
- Technological Forecasting, etc.

VISION

To be a leader in Industrial Engineering education, community services and research.

MISSION

To prepare Industrial Engineering graduates equipped with the world-class professional competencies capable of conducting scientific research and rendering community services allowing for a sustainable development.

OBJECTIVES

Department of Industrial Engineering prepares graduates having ability to design, develop, implement and improve integrated systems comprising of people, equipment, materials, energy and information for serving the community at the local and global levels. These graduates should:

- Be well versed in contemporary tools of industrial engineering and its applications to meet the upcoming challenges of the changing industrial world.
- Have ability to advance their careers by way of demonstrating their professionalism, leadership qualities and effective oral and written communication skills.

- Have ability to function effectively in diverse teams to handle problems pertaining to different managerial and industrial settings.
- Have an understanding of professional and ethical responsibilities towards their profession, society, and the environment.
- Be able to use effectively e-media, computers and software in solving engineering problems.

PROGRAMS OFFERED

The Industrial Engineering Program has been designed to prepare students to work in a wide variety of fields. Industrial Engineering program has a 155 credit hours curriculum which is distributed as follows:

- 14 credit hours as university requirements which are 4 levels of Islamic Culture and 2 levels of Arabic language.
- 61 credit hours as faculty requirements covering general mathematics, physics, chemistry, computer, and statistics science courses. Also they study introduction to other engineering majors and English as a second language.
- 68 credit hours as department requirements through which students gain the knowledge about all areas of industrial engineering that includes operations research, information systems, stochastic systems, human factors, and engineering management.
- 12 credit hours as department requirements covered through electives, to be selected by the students related to their areas of interest in any of the industrial engineering fields.

Also, the student has to spend 10 weeks for summer training at any company or factory to make use of his knowledge and to acquire valuable experience in an industrial environment, and he has to submit a project (IE499 Senior Project) to demonstrate the knowledge he gained through his study.

CAREER OPPORTUNITIES

As it is known, any project is built up by combining at least two of five following components which are manpower, money, material, machines and management which lie in the scope of industrial engineering. Therefore, industrial engineers are essential in companies and factories for:

- Planning: both location planning and strategic planning.
- Production area to carry out the feasibility studies, design and development.
- Production lines to select best production methods.
- Service area (like banks and hospitals) where he can reduce service cost and analyze the queuing system.
- Information systems design.
- Operation and Production areas where he can forecast the future demands, operations planning and inventory control.

The program of Industrial engineering department has been accredited by Accreditation Board of Engineering and Technology (ABET) and is substantially equivalent to accredited Industrial Engineering programs in US.

FACILITIES

The Industrial Engineering Department maintains several laboratories equipped with the latest state-of-the-art instrumentation. The labs are used to complement the course lectures as well as to carry out graduate-level research. The Department has the following five laboratories:

- **Work Study Laboratory**

This laboratory is designed for the study of human work in all its contexts. Specifically, the lab facilitates Method Study and Work Measurement techniques where students can systematically investigate all factors affecting efficiency and work economy in certain setups. Students can also review situations to bring about improvements. The laboratory is used for the IE 341: Work Study course. Its floor space is 960 square feet and can accommodate up to 25 students per session. Equipment includes: Lafayette 16 mm, Bolex 16 mm, Panasonic Video Camera, Stop Watches, and Time Study boards.

- **Human Factors Engineering Laboratory**

This laboratory is designed for the study of task-related stress and strain, and task performance of safety. The laboratory's floor area is 485 square feet and can accommodate up to 25 students per session.

Equipment includes: anthropometrics devices, weight scales, skin fold caliber, human skeleton, grip dynamometer, heart rate monitor, treadmill, ergo-meter, blood pressure monitor, and vision testing sets. This lab supports IE 342 "Human Factors Engineering" IE 441 "Industrial Safety Engineering", and IE 444 "Occupational Biomechanics". The laboratory is currently under development and is expected to get an advanced climatic chamber for heat stress studies.

- **CAD / CAM Laboratory**

This lab supports training, experiments, and research in the field of computer-aided manufacturing and in robotic control applications. It contains two CNC milling machines, one CNC turning machine, and robot-arm. The principles of computer-aided manufacturing of the discrete components are also taught in this lab. This lab supports IE 423 "Computer Aided Manufacturing". The existing PCs are first generations IBM machines and plans are underway to update them. The lab can accommodate up to 10 students per session and is 410 square feet in size. The lab is adequate for instruction.

- **Environmental Factors Engineering Laboratory**

This laboratory is for teaching various principles and techniques of environmental assessments and community environment factors. The laboratory is also equipped for conducting research in environmental engineering. Its floor area is 355 square feet and can accommodate up to 15 students per session. This laboratory supports IE 442 "Industrial Hygiene Engineering" and IE 443 "Industrial Environmental Engineering". Equipment includes: Heat stress monitor and other heat assessment devices, sound level meters (including octave band analyzers), vibration measurement accessories, light meters, illumination assessment sets, air sampling instruments (for particulate, gases, and vapors), air flow calibration instruments, and infra-red ambient air analyzer calibrated for monitoring 100 gases and vapors. The lab is adequate for instruction and is in the process of being upgraded, and plans are on-hand for substantial enhancements.

- **Computer Laboratory**

Two computer labs, which are 540 square feet in area, are mainly used to support student instructions in computer use and computer related subjects. Students use the computer lab facilities to prepare many of their assignments, projects, and presentations for the different Industrial

Engineering classes. Currently, one computer lab can accommodate 40 students and the second can accommodate 30 students at any given time. Equipment includes: Personal Computers, View Graph, Data show, Digital display, etc.

PROGRAM REQUIREMENTS AND CURRICULUM

155 Credit Hours are required for the B.Sc. degree in the Department of Industrial Engineering, which are as follows:

Conventional Program

Requirements	Cr. Hrs.
University Requirements	14
Faculty Requirements	61
Department Requirements	80
Total	**155**

Cooperative Program

Requirements	Cr. Hrs.
University Requirements	14
Faculty Requirements	61
Department Requirements	72
Cooperative Program	8
Total	**155**

Department Requirements: Core Courses (68 Credit Hours)

Course No.	Course Title	Cr. Hrs.	Prerequisite(s)
MATH 241	Linear Algebra I	3	MATH 203
MEP 261	Thermodynamics I	4	MATH 202
MENG 130	Basic Workshop	2	MENG 102
IE 256	Engineering Management	2	IE 202, IE 255
IE 311	Operations Research I	3	MATH 241, MEP 261
IE 321	Fundamentals of Computer Systems	4	EE 201, EE 251
IE 322	Computer Applications in Industrial Engineering I	4	IE 321, IE 331
IE 323	Computer Applications in Industrial Engineering II	4	IE 322
IE 332	Engineering Statistics	3	IE 331
IE 341	Work Study	4	IE 331, MENG 130
IE 342	Human Factors Engineering	4	IE 341
IE 351	Industrial Management	3	IE 256
IE 352	System Analysis and Design	3	IE 321
IE 390	Summer Training	2	Completion of 100 Credit Hours
IE 411	Operations Research II	3	IE 311, IE 332
IE 422	Industrial Systems Simulation	4	IE 323, IE 332, EE 332
IE 431	Industrial Quality Control	3	IE 332
IE 432	Design of Industrial Experiments	3	IE 332
IE 451	Production Planning and Control	3	IE 311, IE 342, IE 351
IE 453	Facilities Planning	3	IE 311
IE 499	Senior Project	4	Completion of 120 Credit Hours
Total		**68**	

Department Requirements: Elective Courses (12 Credit Hours)

A student has to choose any four from the following elective courses:

Course No.	Course Title	Cr. Hrs.	Prerequisite
IE 412	Decision Analysis	3	IE 311, IE 331
IE 413	Network Analysis	3	IE 311, IE 331
IE 421	Industrial Information Systems	3	IE 323
IE 423	Computer Aided Manufacturing Systems	3	MENG 130, IE 321
IE 424	Data Processing Operations	3	IE 323
IE 433	Reliability Engineering	3	IE 332
IE 434	Industrial Stochastic Systems	3	IE 331
IE 435	Queuing Systems	3	IE 331
IE 436	Dynamic Forecasting	3	IE 332
IE 441	Industrial Safety Engineering	3	IE 342
IE 442	Industrial Hygiene Engineering	3	IE 342
IE 443	Industrial Environmental Engineering	3	IE 342
IE 444	Occupational Biomechanics	3	IE 342
IE 452	Maintenance and Replacement Policies	3	IE 332, IE 351
IE 454	Engineering Cost Analysis	3	IE 255
IE 455	Material Handling and Packaging	3	IE 255, IE 331
IE 456	Industrial Engineering Practice	3	IE 451
IE 490	Special Topics in Industrial Engineering	3	Departmental Approval
xx xxx	Any course offered by the Faculty or University		Departmental Approval

Total Credit Hours required for graduation: 155

A TYPICAL STUDY PLAN FOR INDUSTRIAL ENGINEERING STUDENTS

1st Year
Regular & Cooperative

1st semester			2nd semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ARAB 101	Arabic Language I	3	CHEM 201	General Chemistry I	4
ELC 101	English Language I	2	ELC 102	English Language II	2
MATH 101	Calculus I	4	ISLS 101	Islamic Culture I	2
PHYS 101	General Physics I	4	MATH 202	Calculus II	4
			MENG 102	Engineering Graphics (1)	3
Total		**13**	**Total**		**15**

2nd Year
Regular & Cooperative

3rd semester			4th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ARAB 201	Arabic Language II	3	EE 201	Structured Computer Programming	3
CE 201	Engineering Mechanics (Statics)	3	EE 251	Basic Electrical Engineering	4
MATH 203	Calculus III	4	MATH 204	Differential Equations I	3
PHYS 102	General Physics II	4	IE 202	Introduction to Engineering Design (2)	2
IE 201	Introduction to Engineering Design (1)	3	IE 255	Engineering Economy	3
Total		**17**	**Total**		**15**

3rd Year
Regular & Cooperative

5th semester			6th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ISLS 201	Islamic Culture 2	2	EE 332	Computational Methods in Engineering	3
MATH 241	Linear Algebra I	3	ISLS 301	Islamic Culture (3)	2
MEP 261	Thermodynamics I	4	MENG 130	Basic Work Shop	2
IE 256	Engineering Management	2	IE 311	Operations Research I	3
IE 321	Fundamentals of Computer Systems	4	IE 322	Computer Applications in Industrial Eng. I	4
IE 331	Probability and engineering statistics	3	IE 332	Engineering Statistics	3
Total		**18**	**Total**		**17**

4th Year
Regular

7th semester			8th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ISLS 401	Islamic Culture 4Computer	2	IE 342	Human Factors Engineering	4
IE 323	Applications in Industrial Engineering II	4	IE 352	System Analysis and Design	3
IE 341	Work Study	4	IE 422	Industrial Systems Simulation	4
IE 351	Industrial Management	3	IE 432	Design of Industrial Experiments	3
IE 411	Operations Research II	3	IE xxx	Elective Course	3
Total		**16**	**Total**		**17**

Training

IE 390	Summer Training	2 Cr. Hrs

4th Year
Cooperative

7th semester

Course No.	Course Title	Cr. Hrs
IE 323	Computer Applications in Industrial Engineering II	4
IE 341	Work Study	4
IE 351	Industrial Management	3
IE 411	Operations Research II	3
IE 431	Industrial Quality Control	3
Total		**17**

8th semester

Course No.	Course Title	Cr. Hrs
IE 342	Human Factors Engineering	4
IE 352	System Analysis and Design	3
IE 422	Industrial Systems Simulation	4
IE 451	Production Planning and Control	3
IE 499	Senior Project	4
Total		**18**

5th Year
Regular

9th semester

Course No.	Course Title	Cr. Hrs
IE 431	Industrial Quality Control	3
IE 451	Production Planning and Control	3
IE 499	Senior Project	4
IE xxx	Elective Course	3
Total		**13**

10th semester

Course No.	Course Title	Cr. Hrs
XX XXX	Human Science	3
IE 453	Facilities Planning	3
IE xxx	Elective Course	3
IE xxx	Elective Course	3
Total		**12**

5^{th} Year
Cooperative

<table>
<tr><th colspan="3">9th semester</th><th colspan="3">10th semester</th></tr>
<tr><th>Course No.</th><th>Course Title</th><th>Cr. Hrs</th><th>Course No.</th><th>Course Title</th><th>Cr. Hrs</th></tr>
<tr><td rowspan="6">IE 400</td><td rowspan="6">Coop Work Program

(follows the completion of the 4th year courses)</td><td rowspan="6">8</td><td>XX XXX</td><td>Human Science</td><td>3</td></tr>
<tr><td>ISLS 401</td><td>Islamic Culture 4</td><td>2</td></tr>
<tr><td>IE 432</td><td>Design of Industrial Experiments</td><td>3</td></tr>
<tr><td>IE 453</td><td>Facilities Planning</td><td>3</td></tr>
<tr><td>IE xxx</td><td>Elective Course</td><td>3</td></tr>
<tr><td>IE xxx</td><td>Elective Course</td><td>3</td></tr>
<tr><td colspan="2">Total</td><td>8</td><td colspan="2">Total</td><td>17</td></tr>
</table>

COURSE DESCRIPTION

IE 201 Introduction to Engineering Design (1) (3: 3, 1)

Introduction to active learning: team work, team dynamics, team norms and communication, conducting effective meetings and quality assessment. Problem solving procedure: problem definition, generation of solutions, selection methodology, solution implementation, assessment of implementation. Levels of learning and degrees of internalization. Ethical decision. Organization of the work and design notebook. Reverse engineering and design projects.

Prerequisites: ELC 102

IE 202 Introduction to Engineering Design (2) (2: 2, 1)

Engineering design process. Computer modeling and heuristics for solving problems, in teams, in the areas of comparison of strategies, trade-offs, decision making, stochastic processes, optimization and expert systems. Interpretation of results. Preparation of professional technical reports of engineering work and multimedia presentation.

Prerequisite: IE 201, CHEM 201

IE 255 Engineering Economy (3: 3, 1)

Fundamentals of engineering economy. Time value of money. Evaluation of alternatives. Replacement and retention analysis. Break even analysis. Depreciation methods. Basics of inflation.

Prerequisites: IE 201

IE 256 Engineering Management (2: 3, 1)

Role of engineers in management of organizations. Managerial functions related to production, inventory, and human resources. Project planning and control. Case studies pertaining engineering problems.

Prerequisite: IE 202, IE 205

IE 311 Operations Research I (3: 3, 1)

Introduction to Operations Research. Formulation of linear programming problems. Graphical solution. The Simplex algorithm. Duality and sensitivity analysis. Transportation and assignment problems. Integer and Goal programming.

Prerequisite: MATH 241, MEP 261

IE 321 Fundamentals of Computer Systems (3: 3, 1)

Fundamentals of computer: hardware, software and computer systems concepts. Introduction to operating systems and data processing. Overview of programming languages. Internet and computer security. Introduction to software packages for Industrial Engineering applications.

Prerequisite: EE 201, EE 251

IE 322 Computer Applications in Industrial Engineering I (3: 3, 1)

Basics of computer programming languages. Object oriented programming concepts. Development of application and appropriate algorithms for solving Industrial Engineering problems.

Prerequisite: IE 321, IE 331

IE 323 Computer Applications in Industrial Engineering II (3: 3, 1)

Introduction to computer applications, databases and relational database management systems. Design and development of databases. Management of database users and security. Introduction to front-end and its connectivity with the database.

Prerequisite: IE 322

IE 331 Probability and Engineering Statistics (3: 3, 1)

Descriptive statistics with graphical summaries. Basic concepts of probability and its engineering applications. Probability distributions of random variables. Confidence intervals. Introduction to hypothesis testing. Correlation and linear regression.

Prerequisite: MATH 203, CE 201

IE 332 Engineering Statistics (3: 3, 1)

Basic notions of statistics applicable to engineering problems. Moment generating functions. Random samples and sampling distributions. Parameter estimation. Hypothesis testing. Nonparametric tests. Simple and multiple regression.

Prerequisite: IE 331

IE 341 Work Study (3: 3, 1)

Introduction to Work Study (WS). Productivity and WS. WS

approaches. Basic procedure of method study involving job selection, recording facts, critical examination etc. String diagram, Multiple activity chart, Travel chart. Principles of motion economy. Two-handed chart. Fundamental hand motions. Micro-motion and Memo-motion studies. Cyclegraph and Chrono-cyclegraph. Work Measurement (WM). Work sampling. Time study. Computerized WM. PMTS: MTM, Work factor and Standard data. Wage payment and incentive plans.
Prerequisite: IE 331, MENG 130

IE 342 Human Factors Engineering (3: 3, 1)

Introduction to human factors engineering. Muscular work. Nervous control. Work efficiency. Body size and anthropometrics. Work station design. Heavy work. Handling loads. Man-machine systems. Mental activity. Fatigue. Stress and boredom. Vision and lighting. Noise and vibration.
Prerequisite: IE 341

IE 351 Industrial Management (3: 3, 1)

Introduction to industrial management. Economic concepts in industry. Organizational structure and design. Human resource management. Motivating the work force. Managing information technology. Financial management. Engineers in marketing and services. Job analysis, job description, and job specification. Preparation of business plan.
Prerequisite: IE 256

IE 352 System Analysis and Design (3: 3, 1)

System definition, characteristics and concepts. Systems development projects: identification, selection, initiation, planning and managing. System analysis: determining and structuring requirements. System design: overview, forms and reports, interfaces and dialogues, and finalizing design specifications. Designing distributed and internet systems. System implementation and maintenance.
Prerequisite: IE 321

IE 390 Summer Training (2: 0, 3)

On-site industry based training spanning over a period of 10 weeks in a manufacturing or service industry under the supervision of an industry based advisor. Documentation of the training in the form of an Industrial

Training report presenting details of the work undertaken. Multimedia presentation illustrating the achievements of training.
Prerequisite: Completion of 100 credit hours

IE 400 Cooperative Work (8: 0, 8)

Undertaking practical training for 26 weeks under supervision of an academic advisor and a company supervisor in a company performing industrial engineering activities. Submitting, as per schedule, three coop progress reports. Submitting a coop final report containing matters as specified in the cooperative education program document. Multimedia presentation of achieved work.
Prerequisite: Completion of 125 credit hours

IE 411 Operations Research II (3: 3, 1)

Non-linear programming. Dynamic programming. Inventory models. Waiting line models. Markov analysis. Introduction to Game theory. Applications in industrial, service and public systems.
Prerequisites: IE 311, IE 332

IE 412 Decision Analysis (3: 3, 1)

Principles of decision making under uncertainty. Decision models: influence diagram and decision tree. Solution and analysis of decision problems. Value of information. Attitudes towards risk. Utility theory. Multiattribute decision problems.
Prerequisites: IE 311, IE 331

IE 413 Network Analysis (3: 3, 1)

Introduction to network analysis with industrial applications. Systems modeling and analysis using network techniques. CPM with LP formulation, PERT with LP formulation and cost analysis. Other network algorithms: Minimum spanning tree, shortest path and maximal flow problem. Flowgraph theory. GERT: exclusive OR networks.
Prerequisites: IE 311, IE 331

IE 421 Industrial Information Systems (3: 3, 1)

General concepts. Values and attributes of information. Different types of information systems. Concepts of managerial information systems. Emphasis on analysis, design, and development of industrial information systems. Developing information systems by using microcomputers.

Prerequisite: IE 323

IE 422 Industrial Systems Simulation (3: 3, 1)

Basic theory of industrial simulation. Building simulation models. Organization of simulation studies. Simulation modeling and application to medium and large-scale production and service system problems. Output analysis. Variance reduction and optimization. Use of software such as ARENA for discrete and continuous system simulation.
Prerequisites: IE 323, IE 332, EE 332

IE 423 Computer Aided Manufacturing Systems (3: 3, 1)

Foundation of CAD/CAM. Fundamentals of CAM. Computer graphics software and data. Computer aided manufacturing: numerical control, NC part programming, NC, DNC and CNC systems. Industrial robots and applications. Computer Integrated manufacturing systems (CIMS).
Prerequisite: IE 321, MENG 130

IE 424 Data Processing Operations (3: 3, 1)

Concepts of advanced database management system design, principles, and techniques. Entity relationship diagram. Normalization. Object oriented and object relational databases. Data warehousing. Data mining. Web and semi structural data. Data Security.
Prerequisite: IE 323

IE 431 Industrial Quality Control (3: 3, 1)

Introduction to quality systems. Cost of quality. Total quality management. Quality systems and standards: six sigma and ISO. Reengineering. Statistical quality control: control charts for variables and attributes, process capability analysis, acceptance sampling plans. Quality function deployment. Quality circles. Quality loss functions.
Prerequisite: IE 332

IE 432 Design of Industrial Experiments (3: 3, 1)

Principles of experimental design. Randomized complete block designs. Latin square and Graeco-Latin square designs. General factorial designs. 2^k Factorial designs. Response surface methodology and robust design. Planning, performing and analyzing industrial experiments.
Prerequisite: IE 332

IE 433 Reliability Engineering (3: 3, 1)

Introduction to reliability analysis. Reliability measures: reliability function, expected life, hazard function of important distribution functions. Hazard models and product life. Extreme value distribution. Static reliability models. Dynamic reliability models. System effectiveness measures. Reliability allocation and optimization. Introduction to fault tree analysis and human reliability.

Prerequisite: IE 332

IE 434 Industrial Stochastic Systems (3: 3, 1)

Deterministic and stochastic processes. Poisson process and related distributions. Birth and death processes. Markov processes with continuous state space. Renewal process and theory. Markovian decision processes in industry. Markovian and non-Markovian systems. Stochastic models for transportation and maintenance systems. Introduction to simulation modeling of stochastic systems.

Prerequisite: IE 331

IE 435 Queuing Systems (3: 3, 1)

Characteristics of queuing systems. General arrival and service patterns. Poisson process and Erlangian models. Birth and death processes in queuing systems. Markovian and non-Markovian queuing models. Steady state and transient solutions. Optimization in queuing systems. Queuing applications in production, transportation, communication and public service systems.

Prerequisite: IE 331

IE 436 Dynamic Forecasting (3: 3, 1)

Time series and forecasting. Forecasting accuracy. Monitoring and controlling forecasts. Linear and multiple regression with forecasting applications. Box-Jenkins (ARIMA) methodology. Introduction to fundamental and technical analysis with applications in financial markets. Introduction to neural networks. Judgmental forecasting.

Prerequisite: IE 332

IE 441 Industrial Safety Engineering (3: 3, 1)

Accident: causes and costs. Appraising safety performance and risk

assessment. Analysis of accident causes. Accident reports and records. Job safety analysis. Plant inspection. Accident investigation. Plant layout and arrangement. Plant housekeeping. Maintenance and safety. Material handling and safety. Machine guarding. Explosion and fire prevention. Personal protection. First aid. Planning for emergencies.
Prerequisite: IE 342

IE 442 Industrial Hygiene Engineering (3: 3, 1)

Occupational exposure: permissible levels and legal aspects. Hazards' anticipation and recognition. Physical hazards particularly heat, noise and vibration, light, non-ionizing and ionizing radiations: assessment and control. Chemical agents: assessment and control. Industrial ventilation. Design of local exhaust systems.
Prerequisite: IE 342

IE 443 Industrial Environmental Engineering (3: 3, 1)

Basics of natural systems. Industrial environment as part of the ecological system. Water quality management. Waste water treatment. Air pollution. Noise pollution. Solid waste management. Hazardous waste management. Ionizing radiation. Case studies.
Prerequisites: IE 342

IE 444 Occupational Biomechanics (3: 3, 1)

Introduction to Occupational Biomechanics. Review of kinematics and kinetics. Anthropometry. Mechanical work-capacity evaluation. Bio-instrumentation for Occupational Biomechanics. Biomechanical models. Methods of classifying and evaluating manual work. Manual material handling limits. Biomechanical considerations in machine control and workplace design. Hand tool design guidelines. Guidelines for seated work.
Prerequisite: IE 342

IE 451 Production Planning and Control (3: 3, 1)

Basic concepts of Production and Operations Management (POM). Design of products and services. Processes and technologies. E-commerce and operations management. Inventory management. Supply-Chain management. Just-in-time and lean production. Forecasting. Material Requirements Planning (MRP). Introduction to Enterprise

Requirement Planning (ERP). Capacity and Aggregate planning. Scheduling.
Prerequisites: IE 311, IE 351

IE 452 Maintenance and Replacement Policies (3: 3, 1)

Maintenance systems. Maintenance operation and control. Preventive Maintenance: concepts, modeling, and analysis. Maintenance planning and scheduling. Maintenance material control. Computerized Maintenance Management Systems. Replacement studies. Case studies.
Prerequisites: IE 332, IE 351

IE 453 Facilities Planning (3: 3, 1)

Fundamentals of facilities planning. Facilities design. Flow, space, and activity relationships. Material handling systems. Layout planning models. Warehouse operations. Quantitative facilities planning models. Preparing, presenting, implementing and maintaining facilities plan.
Prerequisites: IE 311, IE 342, IE 352

IE 454 Engineering Cost Analysis (3: 3, 1)

Importance of cost analysis in engineering. Cost terms and concepts. Cost estimation for decision making: cost-volume-profit analysis, measuring relevant costs and revenues, cost assignment, and activity-based costing. Cost evaluation of engineering alternatives. Case studies.
Prerequisite: IE255

IE 455 Material Handling and Packaging (3: 3, 1)

Historical development of material handling and packaging. Objectives and principles of material handling. Material handling concepts: unit load, containerization, ASRS. Types of material handling equipment and their economics. Role of packaging in material handling. Areas of special importance to packaging. Package design. Economics of packaging. Package research and testing. Management of the packaging function.
Prerequisites: IE 255, IE 331

IE 456 Industrial Engineering Practice (3: 1, 3)

Overview of all areas of Industrial Engineering (IE). Identification of specific IE tools for industrial and managerial enterprises. Brainstorming sessions of several pre selected industrial and business enterprises. Visiting the sites and conducting walk-through surveys. On-site studies of IE applications and practices. Preparation of visit-reports containing findings, comments and recommendations pertaining to every visit. Multimedia-based presentation of visit-reports.

Prerequisites: IE 451

IE 490 Special Topics in Industrial Engineering (3: 3, 1)

An in-depth study of relevant industrial engineering topics not covered in other courses of the program in order to enhance their knowledge in the field of industrial engineering.

IE 499 Senior Project (4: 1, 3)

Technical writing skills. Project work: a team-based capstone design work involving a practical, open ended, real life unstructured problem having a set of alternative solutions; emphasis on synthesis of knowledge and skills to assimilate and demonstrate a professional attitude and ethics in problem solving with assessment of environmental, cultural and social impacts; final output in the form of written report based on specified standard format, followed by a multimedia presentation of the work undertaken in the project.

Prerequisite: Completion of 120 Credit Hours

DEPARTMENT OF
MINING ENGINEERING

FACULTY

Chairman:

Al-Juhani, Mohammad S.

Professors:

Darwish, Mahmoud Ali
Abu Shouk, Mahmoud

Associate Professors:

Al-Juhani, Mohammad S.
Fadol, Abbas Ahmed
Al-Maghrabi, Mohammed-Noor N.

Assistant Professors:

Ahmed, Hussien A.M.
AbdelHaffez, Gamal S.
Badr, Salah A. E.

Lecturers:

Meriky, Hassan M.

INTRODUCTION

Mining Engineering involves the extraction of mineral matter out of the earth's crust. This includes metallic ores, industrial minerals, precious and ornamental stones, solid fuels and radioactive minerals. Mineral production in the past has contributed to the prosperity or decline of civilizations. Nowadays, one of the measures of the prosperity of a nation is its per capita consumption of minerals. The existence of basic and secondary industries is dependent on available resources. Extraction, processing, and utilization of the mineral resources contribute to the economic development and self-reliance of a nation which may be of strategic importance.

As a result of a massive exploration effort in the past three decades, a large number of mineral deposits of gold, silver, copper, zinc, iron, phosphate, bauxite, silica, magnesite, etc., has been discovered and delineated in the Kingdom of Saudi Arabia. Additionally, a large variety of elegant granites and marbles is being exploited for local consumption and export. In order to diversify its economic base, the Ministry of Petroleum and Mineral Resources is entrusted with the task of promoting the development of these resources. The Department of Mining Engineering at King Abdulaziz University endeavors to produce Saudi mining engineers capable of planning and exploiting projects related to the mining and mineral industry.

VISION

To be a leader in the field of Mining Engineering, Applied Research and Community Services.

MISSION

To prepare motivated and qualified mining engineers and promote research applied to the exploitation of the indigenous mineral resources as a contribution to national wealth.

OBJECTIVES

Mining Engineering Program prepares its graduates to achieve the following career and professional accomplishments:

1. Engage in productive career in the mining industry in Saudi Arabia as well as government and academic settings
2. Demonstrate responsible, professional, and ethical behavior integrated with a commitment to serve the needs of the society.

3. Pursue personal professional development and contribute to the development of the profession
4. Advance in responsibility and leadership in the fields of mining engineering.

PROGRAMS OFFERED

The Department of Mining Engineering offers the degree of Bachelor of Science in Mining Engineering and has recently offered graduate studies in Mining Engineering Sciences. The program is intended to provide the graduating students with a good background in the field of specialization in addition to basic sciences such as physics, chemistry, mathematics and geology. The main objectives of the curriculum of the Mining Engineering program can be summarized as follows:

- To prepare mining engineers capable of working in the field of mining and minerals engineering.
- To prepare the program of study so as to include essential courses of the specialization in addition to the essential basic physical sciences.
- To offer elective courses covering various fields of mining engineering such as Tunneling Engineering, Mineral Processing, Experimental Rock Mechanics, Mine Environment, and Mine Data Analysis, so as to assist students to gain additional knowledge in various aspects of the specialization.
- To cover relevant experimental work for all the essential courses of the program.

CAREER OPPORTUNITIES

The Department of Mining Engineering offers degree of Bachelor of Science in Mining Engineering. This program has been accredited as Substantially Equivalent to the accredited programs in the USA by the Accreditation Board for Engineering and Technology Inc. (ABET). It offers opportunities for graduates of the program to work as engineers in surface and underground mining operations and related fields such as tunneling and quarrying, covering the technologies of mineral exploration, mining economics, rock fragmentation, minerals extraction, stability of rock structures, minerals and rock processing, mine ventilation, safety, environment and management..

FACILITIES

The Department has the following laboratories:

Mineral Processing Laboratory: The functions of this laboratory include crushing and grinding of raw ores, and separation of useful minerals from worthless (gangue) minerals associated with them.
Rock Mechanics Laboratory: This laboratory has equipment and instruments for testing strength and other mechanical properties of rocks in compression, tension and other modes of loading. This is needed for the evaluation of deformation behavior of rocks and assessment of the means of rock support in the ground excavations.
Mine Ventilation Laboratory: This laboratory is specifically used for the evaluation of the (conventionally) adequate quantities of air required for the ventilation of mine openings and stops underground. This laboratory is equipped with devices related to the analysis of gases and soil, determination of moisture content, heat and air flow rate.
Mine Analysis Laboratory: This lab is equipped with an XRF and XRD instruments for analyzing specimens to determine metal contents.

PROGRAM REQUIREMENTS AND CURRICULUM

Requirements for the B.Sc. degree from Mining Engineering Department.

Conventional Program

Requirements	Cr. Hrs
University Requirements	14
Faculty Requirements	61
Departmental Requirements	80
Total	**155**

Cooperative Program

Requirements	Cr. Hrs
University Requirements	14
Faculty Requirements	61
Departmental Requirements	72
Coop Program	8
Total	**155**

Departmental Requirements Core Courses (74 hr)

Course No.	Course Title	Cr. Hr.	Prerequisite
MENG 262	Dynamics	3	CE 201
IE 256	Engineering Management	2	IE 202
MEP 261	Thermodynamics (I)	4	MATH 102
MEP 290	Fluid Mechanics	4	MATH 202, PHYS 101
CE 202	Strength of materials	4	PHYS 101
CE 371	Surveying	3	MATH 202
IE 311	Operations Research (I)	3	MATH 202
EMR 101	General Geology (1)	4	
EMR 102	General Geology (2)	3	EMR 101
MinE 301	Principles of Mining Eng.	3	EMR 101
MinE 311	Rock Mechanics (I)	3	MinE 301, CE 202
MinE 312	Rock Blasting	3	
MinE 321	Mine Planning	3	MinE 301
MinE 322	Surface Mining	3	MinE 301
MinE 323	Mining Methods	3	MinE 301
MinE 331	Mine Plant Design (I)	3	MinE 301
MinE 342	Mineral Processing (I)	4	MinE 301
MinE 390	Summer Training	2	MinE 323, MinE 301
MinE 401	Mine Surveying	3	MinE 301, CE 371
MinE 402	Mining Economics	3	MinE 301, IE 255
MinE 403	Mine laws & Management	3	MinE 301, IE 256
MinE 443	Mine Ventilation & Safety	4	MinE 323, MEP 290
MinE 499	Senior Project	4	MinE 331 MinE 403
Total		**74**	

Departmental Requirements Elective Courses (6 Cr.hr)

The student has to choose two out of ten courses.

Course No.	Course Title	Cr. Hr.	Prerequisite
MinE 432	Mine plant Design (II)	3	MinE 301
MinE 404	Mine Data Analysis	3	MinE 301, IE 331, EMR102
MinE 411	Rock Mechanics (II)	3	MinE 311
MinE 412	Experimental Rock Mechanics	3	MinE 311
MinE 421	Tunneling Engineering	3	MinE 311, MinE 312
MinE 441	Mineral Processing (II)	3	MinE 342
MinE 442	Mine Environment Eng.	3	MinE 322, MinE 323, MinE 342
MinE 444	Principles of Metallurgy	3	MinE 342
MinE 470	Special Topics in Mining	3	MinE 301
xx xxx	Out of Department course	3	Advisor Approval

Total credit hours required for graduation is 155.

A TYPICAL PROGRAM FOR MINING ENGINEERING STUDENTS

1st Year
Regular & Cooperative

1st semester			2nd semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ELC 101	English Language I	2	ISLS 101	Islamic Culture I	2
CHEM 101 / PHYS 101	General Chemistry I / General Physics I	4	PHYS 101 / CHEM 101	General Physics I / General Chemistry I	4
MATH 101	Calculus I	4	MATH 202	Calculus II	4
ARAB 101	Arabic Language I	3	ELC 102	English Language II	2
			MENG 102	Engineering Graphics	3
Total		**13**	**Total**		**15**

2nd Year
Regular & Cooperative

3rd semester			4th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
PHYS 102	General Physics II	4	IE 202	Introduction to Engineering Design (2)	2
IE 201	Introduction to Engineering Design (1)	3	EE 201	Structured Computer Programming	3
ARAB 201	Arabic Language II	3	MATH 204	Differential Equations I	3
CE 201	Engineering Mechanics (Statics)	3	EE 251	Basic Electrical Engineering	4
MATH 203	Calculus III	4	IE 255	Engineering Economy	3
Total		**17**	**Total**		**15**

3rd Year
Regular & Cooperative

5th semester			6th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ISLS 201	Islamic Culture 2	2	MENG 262	Engg. Mech.. (Dynamics)	3
IE 331	Probability & Eng. Stats.	3	CE 202	Strength of Material	4
MEP 261	Thermodynamics	4	IE 256	Engineering Management	2
CE 371	Surveying	3	EMR 102	General Geology (2)	3
EMR 101	General Geology (1)	4	MinE 301	Principles of Mining Engg.	3
Total		**16**	**Total**		**15**

4th Year
Regular

7th semester			8th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
EE 332	Comp. Methods	3	ISLS 301	Islamic Culture 3	2
MinE 321	Mine Planning	3	IE 311	Operations Research (1)	3
MinE 323	Mining Methods	3	MEP 290	Fluid Mechanics	4
MinE 331	Mine Plant Design (I)	3	MinE 311	Rock Mechanics (I)	3
MinE xxx	Elective (1)	3	MinE 499	Senior Project	4
Total		**15**	**Total**		**16**

Training

MinE 390	Summer Training	2 Cr. Hrs

4th Year
Cooperative

7th semester

Course No.	Course Title	Cr. Hrs
MinE 321	Mine Planning	3
MinE 323	Mining Methods	3
MinE 331	Mine Plant Design (I)	3
MinE 402	Mining Economics	3
MinE 342	Mineral Processing (I)	4
MinE 403	Mine Laws & Management	3
Total		**19**

8th semester

Course No.	Course Title	Cr. Hrs
ISLS 301	Islamic Culture 3	2
IE 311	Operation Research (I)	3
MEP 290	Fluid Mechanics	4
MinE 311	Rock Mechanics (I)	3
EE 332	Comp. Methods	3
MinE 499	Senior Project	4
Total		**19**

5th Year
Regular

9th semester

Course No.	Course Title	Cr. Hrs
ISLS 401	Islamic Culture 4	2
MinE 342	Mineral Processing (I)	4
MinE 402	Mining Economics	3
MinE 403	Mine Laws & Management	3
xx xxx	A Course in Humanities	3
Total		**15**

10th semester

Course No.	Course Title	Cr. Hrs
MinE 312	Rock Blasting	3
MinE 322	Surface Mining	3
MinE 401	Mine Surveying	3
MinE 443	Mine Ventilation and Safety	4
xx xxx	Elective (2)	3
Total		**16**

5^{th} Year
Cooperative

<table>
<tr><th colspan="3">9th semester</th><th colspan="3">10th semester</th></tr>
<tr><th>Course No.</th><th>Course Title</th><th>Cr. Hrs</th><th>Course No.</th><th>Course Title</th><th>Cr. Hrs</th></tr>
<tr><td rowspan="6">MinE 400</td><td rowspan="6">Coop Work Program

(follows the completion of the 4th year courses)</td><td rowspan="6"></td><td>ISLS 401</td><td>Islamic Culture 4</td><td>2</td></tr>
<tr><td>MinE 312</td><td>Rock Blasting</td><td>3</td></tr>
<tr><td>MinE 322</td><td>Surface Mining</td><td>3</td></tr>
<tr><td>MinE 401</td><td>Mine Surveying</td><td>3</td></tr>
<tr><td>MinE 443</td><td>Mine Ventilation</td><td>4</td></tr>
<tr><td>xx xxx</td><td>A Course in Humanities</td><td>3</td></tr>
<tr><td colspan="2">Total</td><td>8</td><td colspan="2">Total</td><td>18</td></tr>
</table>

COURSE DESCRIPTION

MinE 301 Principles of Mining Engineering (3:3,0)

General introduction: Importance of minerals, occurrences, ore reserves and grades. Past mining activities and developed mining techniques. Ore deposits in Saudi Arabia and contributions to development. Role of Deputy Ministry of Mineral Resources. An overview of mineral prospecting, ore exploration, and orebody delineation. Mine project planning, and development. Mine operation: drilling, ore extraction, haulage and mine equipment. Nature of mining industry. Mine environment, safety and reclamation.
Prerequisite: EMR 101

MinE 311 Rock Mechanics (I) (3:2,3)

Engineering characteristics of rocks and discontinuities in them. Fundamentals of stress and strain analyses. Deformation behavior of rocks. Criteria of failure of isotropic and non-isotropic rocks. Strain energy concept and rock bursts. Stresses and strains around underground openings. Design of underground excavations. Pillar design and safe extraction ratio. Use of computer methods for analysis and design.
Prerequisites: MinE 301, CE 202

MinE 312 Rock Blasting (3:3,0)

Fragmentation principles. Strength characteristics of rock. Properties of explosives. High explosives. Blasting agent. Initiation devices safety fuse, electric shot firing and detonating cords. Primers and boosters. Sequential firing. Practical usage of explosives. Blast-hole drilling. Blasting theory. Types of cuts. Application of computer programs in designing drill patterns for blasting in tunnels and other main headings. Blasting in stope operations. Blasting in coal mines.
Prerequisite: PHYS 101

MinE 321 Mine Planning (3:3,0)

Design and planning of mine operations with emphasis on design and planning of surface lay-outs. Main access entries and secondary development openings. Underground layouts, etc. Long and short-term planning. Project planning to extract minerals. Project scheduling and systems analysis.

Application of computer methods to mine planning and scheduling.
Prerequisite: MinE 301

MinE 322 Surface Mining (3:3,0)

Current and future status of surface mining. Prospecting and exploration. Land and water acquisitions: Preliminary evaluation. Planning and engineering design of open-pits, quarries, and alluvial mining operations applying computer programs: Exploitation unit operations drilling, blasting, excavation. Loading, haulage & transportation, etc. Auxiliary operations. Organization, management and economics.
Prerequisite: MinE 301

MinE 323 Mining Methods (3:3,0)

Classical mining techniques for narrow veins, wide lodes, massive and stratified deposits associated with corresponding methods of mine development. Classification of underground mining methods: configuration of the deposit, depth below surface, physical characteristics, applicability, flexibility, development, recovery, dilution, rate of extraction, unit costs, and safety. Methods of mine support. Stope mechanization. Coal mining methods. Application of computer methods.
Prerequisite: MinE 301

MinE 331 Mine Plant Design (I) (3:2,2)

A review of applied mechanics principles. Classification of mine plant and equipment. Design parameters and selection of drills, excavators, loaders, scrapers, LHD machines and other miscellaneous underground equipment. Design of hoisting and rope haulage systems, including monorails and aerial ropeways. Applying computer-aided design programs.
Prerequisite: MinE 301

MinE 342 Mineral Processing (I) (4:3,2)

Introduction to mineral processing. Efficiency of operations. Liberation. Concentration and Metallurgical Balances. Comminution and Classification. Sampling. Sizing. Gravity concentration. Heavy medium separation. Magnetic and electrostatic separation. Dewatering and tailings disposal. Examples of flowsheets, and computer applications in

mineral processing. Brief introduction to flotation.
Prerequisite: MinE 301

MinE 390 Summer Training (10 Weeks) (2:0,0)

Training in industry under the supervision of a staff member. Student has to submit a report about his achievements during training in addition to any other requirements as assigned by the department.
Prerequisites: MinE 301

MinE 400 Cooperative Work (26 Weeks) (8:0,0)

Training in industry under the supervision of a staff member. Students should submit a final report about their training in addition to any other requirements as assigned by the department.
Prerequisites : MinE 301, IE 201

MinE 401 Mine Surveying (3:2,3)

Surface and underground surveying, involving methods of transferring the meridian underground. The Geotheodolite. Tunnel Surveying. Laser methods. Stope surveying. Preparation and plotting of mine maps applying computer programs. Computation of earthworks. Application of geodesy and triangulation to mining problems.
Prerequisites :MinE 301, CE 371

MinE 402 Principles of Mining Engineering (3:3,0)

General introduction: Contributions of a national mining industry to Saudi Arabia. Economic minerals: resources. reserves and grades. Concept of ore recovery, dilution, and upgrade. Mine products sales revenues, concentrate grades, metal recovery, and prices. Production rate and cost estimation. Concept of time value of money; an overview of cashflow, taxes, and deductions. Finance and economic analysis using spreadsheets. Introduction to sensitivity and statistical analysis.
Prerequisite: MinE 301, IE 255

MinE 403 Mine Laws and Management (3:3,0)

The Mining Code of Saudi Arabia and its comparison with the mining laws of industrialized countries. Mineral concession and conservation laws. Mine labour and safety laws. Management structure. The structure of a modern mining industry . Organization. Co-ordination and control.

Human relations. Management techniques: Principles of Operations Research and its application in mining using computer software. Project scheduling. Gantt charts , PERT , CPM, and other deterministic methods.

Prerequisites: MinE 301, IE 256

MinE 404 Mine Data Analysis (3:3,0)

Introduction to principles of statistics-random variables. Sampling & distributions. Statistical analysis. Principles of geostatistics, Krigging method. Geostatistical simulation for mineral prospecting, Ore grade and ore reserve estimation. Geostatistical applications in Mining Engineering. Utilizing computer program.

Prerequisites: MinE 301

MinE 411 Rock Mechanics (II) (3:3,1)

Design of support and reinforcement of underground openings. Subsidence and caving. Stability analyses. Design and monitoring of open pit slopes: Slope failures: preventive and corrective measures. Stability of waste rock dumps and tailings dams. Wave propagation in rocks and its application to mining problems. Application of computer methods in relation to slope stability .

Prerequisite: MinE 311

MinE 412 Experimental Rock Mechanics (3:2,2)

Problems of rock engineering: Surface and underground instrumentation: In-situ tests on rocks. Measurement of static and dynamic properties, their co-relationship. Instruments for measurement of physical and mechanical properties. Determination of static and dynamic modulii and their application in design of underground openings. Application of computer programs .

Prerequisite: MinE 311

MinE 421 Tunneling Engineering (3:3,0)

Classification of tunnels. Preliminary studies including economic, geological and geo-technical parameters and their influence on tunnelling. Route survey and alignment of tunnels. Stress distribution around tunnels. Methods and techniques employed in tunnelling in hard and medium rocks as well as in weak rock and soils. Tunnelling under

water. Application of computer programs.
Prerequisites: MinE 311, MinE 312

MinE 432 Mine Plant Design (II) (3:2,2)

Design parameters and selection criteria of such open-pit equipment as blast-hole drills, bulldozers, shovels, front-end loaders, draglines, bucket-wheel excavators, power scrapers and dredges. Design of haulage systems: locomotives, conveyors, elevators, trucks and fluid transport. Mine drainage and pumping. Application of computer programs.
Prerequisites: MinE 301, MinE 331

MinE 441 Mineral Processing (II) (3:2,2)

Introduction to the theory of flotation. Reagents in flotation. Contact angle at solid/liquid/air interface. Gibbs adsorption equation as applied to flotation. Adsorption of collectors on minerals. The importance of pH in flotation. Activation and depression in flotation . Theories of the electrical double layer at mineral-water interfaces. Flotation circuits and machines. Concentration of iron, phosphates, copper, lead, zinc, and other ores, by flotation. Application of computer programs in concentration of some ores by flotation and other mineral processing techniques.
Prerequisite: MinE 342

MinE 442 Mine Environmental Engineering (3:3,0)

Impact of mining on environment. Mine surface vegetation control. Air, water and noise pollution and control. Planning, methods, and costs. Legislative regulations and implementation. Public relations. Mine land. Reclamation and regional restoration
Prerequisites: MinE 322, MinE 323, MinE 342

MinE 443 Mine Ventilation and Safety (4:3,2)

Introduction to mine ventilation and its control. Sources of heat and humidity in mines. Physiological effects and permissible limits. Sources of dust, and its suppression. Mine fires and explosions. Ventilation flow and its principles utilizing computer methods. Main fans and boosters. Occupational diseases of miners. Mine accidents. Mine safety. Personal Protective equipments. Mine health and safety laws. Mine rescue and recovery procedures.

Prerequisites: MinE 323, MEP 290

MinE 444 Principles of Metallurgy (3:3,0)

Introduction to Metallurgy. The metallurgy of Pig iron. The iron blast furnace. The manufacture of steel. Production of copper by hydrometallurgical processes. Production of alumina from bauxite ores. The aluminium reduction cell. Recovery of gold and silver by amalgamation and cyanidation. Brief account on the metallurgy of lead and zinc. Examples of flowsheets, and computer application in metallurgy.

Prerequisite: MinE 342

MinE 470 Special Topics in Mining (3:3,0)

Selected topics in major to specialize in one of the Mining Engineering areas.

Prerequisite: MinE 301

MinE 499 Senior Project (4:4,6)

Final preparations for the review and/or experimental work. Procurement of available information and data and/or conducting experimental work. Data processing, Analysis of results, Preparation of the project report.

Prerequisites: MinE 331, MinE 403

DEPARTMENT OF
NUCLEAR ENGINEERING

FACULTY

Chairman:

Aljohani, Mohammed S.

Professors:

Abulfaraj, Waleed H.
Alzaidi Samir A.
Kutbi, Ibrahim I.

Associate Professors:

Aljohani, Mohammed S.
Farid, Syed M.
Kinsara, Abdul Raheem R.
Melaibari, Abdulghani M.
Shatilla, Youssef

Assist. Professors:

Abulfaraj, Tareq G.
Al-Othmany, Dheya S.
Almasoumi, Abdullah S.
Djouider, Farthi
Enani, Mohammed A.
Shahata, Ashraf H.
Tayyeb, Zuhair A.

Lecturers:

Elgohary, Mahmoud E.
Ghandourah, Emad Ismat

INTRODUCTION

The Department of Nuclear Engineering was established in the year 1397H (1977G) to meet the demands of the Kingdom for graduates in the fields of Radioisotope Applications and Health Physics. To date, students who have graduated from the department are working in diverse governmental agencies and private sectors, such as quality control laboratories, hospitals, civil defense, industries and research centers. The department has recently launched two programs, Engineering Medical Physics and Engineering Radiation Protection, in addition to the existing track, to cope with the ever increasing need for specialists in these two areas.

VISION

To be on the leading edge of technology, teaching and research in the fields of Nuclear Engineering, Engineering Medical Physics and Engineering Radiation Protection.

MISSION

To prepare eminent Nuclear Engineers, Medical Physicists, Health Physicists and faculty who are capable of serving the community and the government of Saudi Arabia to a level that meet international standards and the demands of the century.

OBJECTIVES

The graduates of Nuclear Engineering program will:

1. Take up careers as nuclear engineers and work efficiently in industries, health sectors, nuclear power facilities, environmental protection agencies and research centers, or excel in higher studies, to meet the requirements of Saudi Arabia.
1. Engage professionally, update effectively, demonstrate quality to earn the recognition of their employers and/or professional societies; and advance in their positions in all related hierarchies
2. Contribute to the service of the society as professional members and enable it to reap the benefits of modern technologies and values as and when needed.

PROGRAMS OFFERED

The department offers Bachelor of Science (B.Sc) and Master of Science (M.Sc) degrees in Nuclear Engineering, both programs being tailored to meet the objectives in general. The B.Sc program comprises three tracks, Nuclear Engineering, Engineering Medical Physics and Engineering Radiation Protection. As for the M.Sc program, the tracks of Engineering Medical Physics and Engineering Radiation Protection are soon to be incorporated into it. The Bachelor of Science program has been recognized by ABET (Accreditation Board for Engineering and Technology, USA) in the year 2003.

CAREER OPPORTUNITIES

The graduates from this discipline generally get employed in different industries that concern non-destructive testing, analysis by radiation, material and equipment quality control, gauging and their radiation safety. Health facilities employ nuclear engineers with specialization in Engineering Medical Physics and Engineering Radiation Protection in the fields of Radiation Diagnostics, Radiation Therapy, Imaging, radiation machines quality control and Radiation Protection. As for other opportunities, the Ministry of Commerce, Ministry of Aviation and Ministry of Defense also seek the services of nuclear engineers.

FACILITIES

The facilities of the department include eight laboratories and a library.

- **Laboratory**

  The laboratories of the department are:

  - Radiation Safety Laboratory
  - Radiation Protection & Health Physics Laboratory
  - Low Counting Laboratory
  - Non-Destructive testing Laboratory
  - Radioisotope Application Laboratory
  - Nuclear Computation & Reactor Simulation Laboratory
  - Radio analysis Laboratory
  - Nuclear Electronics Laboratory

A brief description of each laboratory is given in the following sections:

Radiation Detection Laboratory

The Radiation Detection Laboratory provides a background to the students in the various processes and techniques used to detect, identify and measure the different types of nuclear radiation. Equipment includes various types of radiation detectors like GM tubes, scintillation detectors, BF3 neutron detectors, high resolution high purity Ge detectors for gamma ray spectroscopy, surface barrier detectors and other types of detectors.

Radiation Protection & Health Physics Laboratory

Health physics laboratory deals with all aspects of radiation protection and safety. This laboratory enables students to study and apply the principles of radiation protection, radiation shielding, decontamination and proper uses and handling of radiation sources.

Low Counting Laboratory

The laboratory provides experiments and equipments for measuring low concentration of radioactivity in soil, water, food samples, etc. The laboratory is equipped with a whole body counter, a liquid scintillation counter, a low counting (alpha/beta) set-up, and a high purity germinium detector system for gamma spectroscopy. This laboratory is also equipped with a radon assay system, an alpha counting system, and an air supplying system.

Non-Destructive Testing Laboratory

The objective of the Non-Destructive Testing Laboratory is to make the students familiar with different non-destructive methods of testing of materials. Gamma radiography, neutron radiography, eddy current and ultrasonic methods of material testing are used.

Radioisotope Application Laboratory

The main purpose of the Isotope Application laboratory is to familiarize the students with the uses of radioisotopes in various fields. Experiments on activation analysis, neutron capture gamma-ray for mineral exploration, thickness and level gauges etc. are demonstrated.

Nuclear Computation & Reactor Simulation Laboratory

The Nuclear Computation & Reactor Simulation Laboratory is equipped with IBM and Macintosh microcomputer systems interfaced with a 6-color plotter and a laser printer. Moreover, a collection of software including computer codes for nuclear reactor neutronics, thermal-hydraulics, safety, shielding and simulation is available. The laboratory serves as a tool for practical instructions in nuclear power plant design and safe operation of nuclear reactors. The laboratory provides facilities for research to the teaching staff and to the students. The Department also provides internet access for students and faculty.

Radioanalysis Laboratory

Analytical techniques based on atomic and nuclear principles such as neutron activation, X ray fluorescence, atomic absorption and others offer the utmost sensitivity and accuracy. Two such excellent elemental analysis facilities existing in the Radio Analysis Laboratory are:

- A tube excited X-ray fluorescence analyzer (TEFA).
- An electro thermal atomic absorption spectrometer (ET-AAS).

Nuclear Electronics Laboratory

This lab covers the practical part of the Nuclear Electronics course NE440. Electronics experiments are performed in this lab in addition to some electronics experiments oriented for the Nuclear Engineering field.

- ### Library

The departmental library serves the needs of the students and the faculty for text books, references and scientific journals. The text books are updated for new editions from time to time and new collections of reference books added periodically. All major scientific journals related to Nuclear Engineering as well as Radiological Sciences are made available in the library

PROGRAM REQUIREMENTS AND CURRICULUM

Units Required for the B.Sc. degree in the Department of Nuclear Engineering .

Requirements	Cr. Hrs
University Requirements	14
Faculty Requirements	61
Departmental Requirements	80
Total	**155**

Departmental Requirements Core Courses (All Programs (25 hrs))

Course No.	Course Title	Cr. Hr.	Prerequisite
IE 256	Engineering Management	2	IE 202
EE 202	Object-Oriented Computer Programming	3	EE 201, PHYS 101
NE 302	Nuclear Engineering Fundamentals	3	NE 301
NE 340	Nuclear Radiation Measurements	4	NE 302
NE 351	Radiation protection I	3	NE 302
NE 390	Summer Training	2	NE 340, NE 451
NE 451	Radiation protection II	4	NE 351
NE 499	Senior Project	4	NE 340, NE 451
Total		**25**	

Specialization of Nuclear Engineering Requirements

- **Compulsory (37 Cr. Hrs.)**

Course No.	Course Title	Cr. Hr.	Prerequisite
ChE 210	Material Science	4	CHEM 101
MEP 261	Thermodynamics	4	MATH 202
MEP 290	Fluid Mechanics	4	MATH 202
NE 300	Fundamentals of Nuclear Engineering Calculations	3	MATH 204
NE 301	Atomic and Nuclear Principles for Engineers	3	PHYS 102
NE 304	Introduction to Nuclear Engineering	2	NE 302
NE 311	Nuclear Reactor Analysis	3	NE 300, NE 302
NE 321	Nuclear Heat Transport	3	NE 311, MEP261
NE 330	Nuclear Materials	3	NE 311, ChE 210
NE 360	Radioisotope Applications I	3	NE 302
NE 411	Thermal Reactor Dynamics and Kinetics	2	NE 311
NE 450	Radiation Shielding Design	3	NE 311, NE 351
Total		**37**	

Specialization of Nuclear Engineering Requirements

- **Elective (18 Cr. Hrs.)**

The student has to choose six out of following:

Course No.	Course Title	Cr. Hr.	Prerequisite
NE 303	Energy and The Environment	3	PHYS 102
NE 350	Non-Ionizing Radiations	3	NE 302
NE 402	Computational Methods in Nuclear Engineering	3	EE 332 NE 321
NE 421	Nuclear Energy Conversion	3	NE 321
NE 422	Nuclear Power Planning and Project Implementation	3	NE 311
NE 423	Nuclear Reactor Safety	3	NE 321, NE 411
NE 424	Thermo-Nuclear Fusion Technology and Engineering	3	MEP 261, NE 302
NE 425	Nuclear Power Plant Operation	3	NE 321, NE 411
NE 427	Nuclear Reactor Design	3	NE 411, NE 421
NE 429	Nuclear Power Plant Instrumentation and Control	3	NE 340, NE 411
NE 440	Nuclear Electronics	3	NE 340
NE 452	Technology of Radiation Equipments	3	EE 251, NE 302
NE 454	Environmental Radioactivity	3	EE 351
NE 455	Principles of Diagnostic MRI and Ultrasound	3	NE 340, NE 452
NE 456	Operational Radiation Protection	3	NE 351
NE 460	Radioisotope Applications II	3	NE 360
NE 461	Industrial Radiography	3	NE 351
NE 462	Nuclear Techniques in NDT	3	NE 351, ChE 210
NE 463	Radioanalytical Techniques	3	NE 301, NE 340
NE 496	Special Topics in Nuclear Engineering I	2	NE 340
NE 497	Special Topics in Nuclear Engineering II	3	NE 340
xx xxx	University or College Course	2/3/4	Consent of Department

Total credit hours required for graduation is 155.

Specialization of Engineering Medical Physics Requirements

- **Compulsory (46 Cr. Hrs.)**

Course No.	Course Title	Cr. Hr.	Prerequisite
EE 253	Electrical and Electronic Meas.	4	EE 250, IE 331
EE 300	Analytical Methods in Engineering	3	MATH 203
EE 301	Electrical Circuits and Systems	3	EE 250, MATH 204
EE 311	Electronics 1	4	EE 301
BIO 321	Biology for Biomedical Eng. Students	3	CHEM 101
BIO 322 OR PHY 372	Physiology for Biomedical Engineers	3	BIO 321
NE 370	Introduction to Medical Physics	3	PHYS 102, EE 300
NE 372	Radiobiology	3	CHEM 101
NE 389	Practical Applications	2	NE 340, NE 451
NE 470	Radiotherapy	4	NE 370, PHY 372, NE 372
NE 471	Medical Imaging I	4	EE 253, EE 311, NE 370
NE 472	Nuclear Medicine	3	NE 370, PHY 372
NE 473	Dosimetry	3	NE 351, NE 470
NE 474	Medical Imaging II	4	NE 471
Total		**46**	

Specialization of Engineering Medical Physics Requirements

- **Elective (9 Cr. Hrs.)**

The student has to choose Three out of following:

Course No.	Course Title	Cr. Hr.	Prerequisite
EE 312	Electronics 2	4	EE 311
EE 331	Principles of Automatic Control	4	MATH 204, EE 300, EE 301
EE 360	Digital Design 1	4	EE 311
EE 370	Biomedical Engineering Primer	4	PHYS 102, BIO 321
EE 465	Microcomputers for Electrical Engineers	4	EE 360
EE 470	Biomedical Signals and Systems	4	EE 253, EE 301, EE 370
EE 471	Biomedical Instrumentation	3	EE 312, PHY 372
NE 307	Experimental Data Analysis	2	IE 331
NE 350	NON-IONIZING RADIATIONS	3	NE 302
NE 450	Radiation Shielding Design	3	NE 311, NE 350
NE 456	Operational Radiation Protection	3	NE 351
NE 459	Radiation Dosimetry Using MCNP	3	NE 451
NE 475	Oncology	3	NE 470
NE 476	Neutron Therapy	3	NE 470
NE 477	Advanced Medical Imaging	3	NE 471
NE 478	Quality Assurance Of Medical Equipments	3	NE 340, NE 451
NE 479	Brachytherapy	3	NE 470
NE 481	Diagnostic Radiations	3	NE 340
NE 482	Principles of Diagnostic Mri and Ultrasound	3	NE 471
NE 494	Special Topics in Medical Physics Engineering (I)	3	NE 340
NE 495	Special Topics in Medical Physics Engineering (II)		NE 340
xx xxx	University or College Course	2/3/4	Consent of Department

Total credit hours required for graduation is 155.

Specialization of Engineering Radiation Protection Requirements

- **Compulsory (39 Cr. Hrs.)**

Course No.	Course Title	Cr. Hr.	Prerequisite
EE 253	Electrical and Electronic Meas.	4	EE 250, IE 331
NE 300	Fundamentals of Nuclear Engineering Calculation	3	MATH 204
NE 307	Experimental Data Analysis	2	IE 331
NE 352	Rules and Regulation of Nuclear Radiation	2	NE 351
NE 360	Radioisotope Applications I	3	NE 351
NE 372	Radiobiology	3	CHEM 101
NE 441	Advanced Nuclear Radiation Measurements	4	NE 340, EE 311
NE 450	Radiation Shielding Design	3	NE 311,NE 350
NE 452	Technology of Radiation Equipment	2	NE 253, NE 351, NE 340
NE 456	Operational Radiation Protection	3	NE 351
NE 468	Radiation Protection Calculation	3	NE 451
Total		**39**	

- **Elective (16 Cr. Hrs.)**

The student has to choose Five out of following:

Course No.	Course Title	Cr. Hr.	Prerequisite
BIO 321	Biology for Biomedical Engineers	3	CHEM 101
BIO 322 OR PHY 372	Physiology for Biomedical Engineers	3	BIO 321
NE 350	Non-Ionizing Radiations	3	NE 302
NE 360	Radioisotope Applications I	3	NE 351
NE 370	Introduction to Medical Physics	3	PHYS 102, EE 300
NE 454	Environmental Radioactivity	3	NE 351
NE 457	Low Level Radioactive Waste Management	3	PHYS 102, BIO 321
NE 458	Radiation Emergency Planning	3	NE 451
NE 460	Radioisotope Applications II	3	NE 360
NE 461	Industrial Radiography	3	NE 351
NE 462	Nuclear Techniques in NDT	3	NE 351, ChE 210
NE 464	Prompt Gamma Applications in Well-logging	3	NE 340
NE 466	Principles of Radiation Activation	3	NE 340
NE 467	Radiochemistry	3	NE 351
NE 470	Radiotherapy	4	NE 370, PHY 372, NE 372
NE 471	Medical Imaging I	4	EE 253, EE 311, NE 370
NE 472	Nuclear Medicine	3	NE 370, PHY 372
NE 473	Dosimetry	3	NE 351, NE 470
NE 474	Medical Imaging II	4	NE 471
NE 492	Special Topics in Radiation Protection Engineering (I)	3	NE 340
NE 493	Special Topics in Radiation Protection Engineering (II)		NE 340
xx xxx	University or College Course	2/3/4	Consent of Department

Total credit hours required for graduation is 155.

A TYPICAL PROGRAM FOR NUCLEAR ENGINEERING STUDENTS

- **(Nuclear Engineering Program)**

1st Year
Regular & Cooperative

1st semester / 2nd semester

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
ELC 101	English Language I	2	ISLS 101	Islamic Culture 1	2
CHEM 101 / PHYS 101	General Chemistry I / General Physics I	4	PHYS 101 / CHEM 101	General Physics I / General Chemistry I	4
MATH 101	Calculus I	4	MATH 202	Calculus II	4
ARAB 101	Arabic Language I	3	ELC 102	English Language II	2
			MENG 102	Engineering Graphics	3
Total		**13**	**Total**		**15**

2nd Year
Regular & Cooperative

3rd semester / 4th semester

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
PHYS 102	General Physics II	4	IE 202	Introduction to Engineering Design (2)	2
IE 201	Introduction to Engineering Design (1)	3	EE 201	Structured Computer Programming	3
ARAB 201	Arabic Language II	3	MATH 204	Differential Equations I	3
CE 201	Engineering Mechanics (Statics)	3	EE 251	Basic Electrical Engineering	4
MATH 203	Calculus 3	4	IE 255	Engineering Economy	3
Total		**17**	**Total**		**15**

3rd Year

5th semester			6th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
MEP 261	Themodynamics	4	MEP 290	Fluid Mechanics	4
IE 331	Probability and Statics	3	ChE 210	Material Science	4
EE 202	Object-oriented Computer Programming	3	EE 332	Computational Methods in Engineering	3
NE 300	Fundamental of Nuclear Engineering Calculations	3	NE 302	Nuclear Engineering Fundamentals	3
NE 301	Atomic and Nuclear Principle for Engineers	3	ISLS 201	Islamic Culture 2	2
IE 256	Engineering Management	2			
Total		**18**	**Total**		**16**

4th Year

7th semester			8th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
NE 304	Introduction to Nuclear Engineering	2	NE 321	Nuclear Heat Transport	3
NE 311	Nuclear Reactor Analysis	3	NE 360	Radioisotope Applications I	3
NE 351	Radiation Protection I	3	NE 451	Radiation Protection II	4
NE 340	Nuclear Radiation Measurements	4	NE 411	Thermal Reactor Dynamics and Kinetics	2
NE 330	Nuclear Materials	3	NE xxx	Elective Course I	3
Total		**15**	**Total**		**15**

Training

NE 390	Summer Training	2 Cr. Hrs

5^{th} Year

9^{th} semester / 10^{th} semester

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
NE xxx	Elective Course II	3	NE xxx	Elective Course V	3
NE xxx	Elective Course 3	3	NE xxx	Elective Course VI	3
NE xxx	Elective Course IV	3	xx xxx	Humanities	3
ISLS 301	Islamic Culture 3	2	NE 450	Radiation Shielding Design	3
NE 499	Senior Project	4	ISLS 401	Islamic Culture 4	2
Total		**15**	**Total**		**14**

A TYPICAL PROGRAM FOR NUCLEAR ENGINEERING STUDENTS

- **(Engineering Medical Physics Program)**

1st Year
Regular & Cooperative

1st semester Course No.	Course Title	Cr. Hrs	2nd semester Course No.	Course Title	Cr. Hrs
ELC 101	English Language I	2	ISLS 101	Islamic Culture 1	2
CHEM 101 / PHYS 101	General Chemistry I / General Physics I	4	PHYS 101 / CHEM 101	General Physics I / General Chemistry I	4
MATH 101	Calculus I	4	MATH 202	Calculus II	4
ARAB 101	Arabic Language I	3	ELC 102	English Language II	2
			MENG 102	Engineering Graphics	3
Total		**13**	**Total**		**15**

2nd Year
Regular & Cooperative

3rd semester Course No.	Course Title	Cr. Hrs	4th semester Course No.	Course Title	Cr. Hrs
PHYS 102	General Physics II	4	IE 202	Introduction to Engineering Design (2)	2
IE 201	Introduction to Engineering Design (1)	3	EE 201	Structured Computer Programming	3
ARAB 201	Arabic Language II	3	MATH 204	Differential Equations I	3
CE 201	Engineering Mechanics (Statics)	3	EE 251	Basic Electrical Engineering	4
MATH 203	Calculus III	4	IE 255	Engineering Economy	3
Total		**17**	**Total**		**15**

3rd Year

5th semester			6th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ISLS 201	Islamic Culture 2	2	EE 332	Computational Methods in Engineering	3
EE 202	Object-Oriented Computer Programming	3	NE 370	Introduction of Medical Phys	3
EE 300	Analytical Methods in Engineering	3	NE 372	Radiobiology	3
EE 301	Electrical Circuits and Systems	3	BIO 322 or PHY 372	Physiology for Biomedical Engineers	3
BIO 321	Biology for Biomedical Engineers	3	ISLS 301	Islamic Culture 3	2
NE 302	Nuclear Engineering Fund.	3	IE 331	Probability and Statistics	3
Total		**17**	**Total**		**17**

4th Year

7th semester			8th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
EE 253	Electrical and Electronic Measurements	4	Xx xxx	Humanities Elective (one of 4 courses)	3
EE 311	Electronics I	4	NE xxx	Elective (I)	3
NE 340	Nuclear Radiation Meas.	4	NE 470	Radiotherapy	4
NE 389	Practical Applications	2	NE 471	Medical Imaging (I)	4
NE 351	Radiation Protection I	3	NE 451	Radiation Protection (II)	4
Total		**17**	**Total**		**18**

Training

NE 390	Summer Training	2 Cr. Hrs

5th Year

9th semester			10th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
IE 256	Engineering Management	2	ISLS 401	Islamic Culture 4	2
NE xxx	Elective (II)	3	NE 474	Medical Imaging (II)	4
NE 473	Dosimetry	3	NE 472	Nuclear Medicine	3
NE 499	Senior Project	4	NE xxx	Elective (3)	3
Total		**12**	**Total**		**12**

A TYPICAL PROGRAM FOR NUCLEAR ENGINEERING STUDENTS

- **(Engineering Radiation Protection Program)**

1st Year
Regular & Cooperative

1st semester			2nd semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ELC 101	English Language I	2	ISLS 101	Islamic Culture I	2
CHEM 101 / PHYS 101	General Chemistry I / General Physics I	4	PHYS 101 / CHEM 101	General Physics I / General Chemistry I	4
MATH 101	Calculus I	4	MATH 202	Calculus II	4
ARAB 101	Arabic Language I	3	ELC 102	English Language II	2
			MENG 102	Engineering Graphics	3
Total		**13**	**Total**		**15**

2nd Year
Regular & Cooperative

3rd semester			4th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
PHYS 102	General Physics II	4	IE 202	Introduction to Engineering Design (2)	2
IE 201	Introduction to Engineering Design (1)	3	EE 201	Structured Computer Programming	3
ARAB 201	Arabic Language II	3	MATH 204	Differential Equations I	3
CE 201	Engineering Mechanics (Statics)	3	EE 251	Basic Electrical Engineering	4
MATH 203	Calculus III	4	IE 255	Engineering Economy	3
Total		**17**	**Total**		**15**

3rd Year

5th semester			6th semester		
Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
IE 331	Probability and Statistics	3	EE 253	Electrical and Electronic Measurements	4
EE 202	Object-Oriented Computer Programming	3	NE 372	Radiobiology	3
NE 300	Fundamentals of Nuclear Engineering Calculation	3	NE 302	Nuclear Engineering Fundamentals	3
NE 301	Atomic and Nuclear Principles for Engineers	3	EE 311	Electronics (I)	4
ISLS 201	Islamic Culture 2	2	EE 332	Computational Methods in Engineering	3
IE 256	Engineering Management	2			
Total		**16**	**Total**		**17**

4th Year

7th semester			8th semester		
Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
NE xxx	Elective (I)	3	ISLS 301	Islamic Culture 3	2
NE 340	Nuclear Radiation Meas.	4	NE 352	Nuclear Radiation Rules and Regulations	2
NE 307	Experimental Data Analysis	2	NE 441	Advanced Radiation Meas.	4
NE 351	Radiation Protection I	3	NE 451	Radiation Protection II	4
Xx xxx	Humanities	3	NE 452	Radiation Experimental Design	2
Total		**15**	**Total**		**14**

Training

NE 390	Summer Training	2 Cr. Hrs

5th Year

9th semester			10th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
NE 456	Operational Radiation Protection	3	ISLS 401	Islamic Culture 4	2
NE 360	Radioisotope Applications I	3	NE 468	Radiation Protection Calculations	3
NE xxx	Elective (II)	3	NE xxx	Elective (IV)	3
NE xxx	Elective (3)	3	NE 450	Radiation Shielding Design	3
NE 499	Senior Project	4	NE xxx	Elective (V)	4
Total		**16**	**Total**		**15**

COURSE DESCRIPTION

- **Compulsory Courses (All Programs):**

NE 302 Nuclear Engineering Fundamentals (3:3,0)

Elementary particles, properties of nuclei. Binding energy. Nuclear stability. Radioactive decay. Natural and artificial radioactivity. Alpha, beta, and gamma rays. Interaction of radiation with matter. Nuclear reactions, nuclear forces and nuclear models, neutron physics, nuclear fission, and nuclear fusion. Cosmic rays.
Prerequisite: PHYS 102

NE 340 Nuclear Radiation Measurement (4:3,3)

Counting statistics. Properties of ionization chambers. Proportional counters. Geiger-Muller counter. Scintillation detectors. Solid-state and other types of detectors. Radiation monitoring equipment. Quantitative and qualitative analysis of radiation. Experiments on alpha, beta, gamma, and neutrons measurements.
Prerequisite: NE 302

NE 351 Radiation Protection I (3:3,0)

Radioactivity, half-life, average life, serial transformation, interaction of radiation with matter. Radiation dosimetry: exposure measurements, absorbed dose measurements, exposure-dose relationship, specific gamma ray emission, internal dose calculations, dose commitment. Biological effects of radiation, dose limits, relative biological effectiveness (RBE), quality factor (QF) and dose equivalent.
Prerequisite: NE 302

NE 451 Radiation Protection II (4:3,3)

Radiation protection guides such as ICRP, NCRP etc. Radiation safety criteria, Allowable Limit on Intake (ALI), Derived Air Concentration (DAC), Maximum Permissible Concentration (MPC). Health Physics instruments, diagnostic and therapeutic x-ray shielding, basic principles for external and internal radiation protection and radioactive waste management.
Prerequisite: NE 351

NE 499 Senior Project **(4:3,3)**

Application of engineering principles to a significant nuclear or radiation design project including team-work, written and oral communications. The project should also consider realistic technical, economic and safety requirements. The design project progresses step-by-step from the stages of problem definition, analysis and synthesis to design and tests. Students will deliver a final report and an oral presentation. This design project will involve a multi-disciplinary approach to the problem. Consultation from a business/industrial counterpart is highly recommended.

Prerequisite: NE 340, NE 451

Nuclear Engineering Program

- **Compulsory Courses:**

NE 300 Fundamentals of Nuclear Engineering Calculation (3:3,0)

Ordinary differential equations of the first and second order applicable to nuclear engineering calculations. Power series solutions of differential equations. Laplace transformations. Use of Laplace transformations to solve ordinary differential equations. Fourier series and integrals. Partial differential equations and divergence theorem of Gauss. Legendre polynomials and Bessel functions.

Prerequisite: MATH 204

NE 301 Atomic and Nuclear Principles for Nuclear Engineers (3:3,0)

Special theory of relativity. Electromagnetic waves. Quantum theory of light. Uncertainty principles. Atomic models. Atomic spectra. Spectrum of hydrogen atom. X-rays. Bohr's theory. Periodic table. Conductors, insulators, semiconductors, and Transistors.

Prerequisite: PHYS 102

NE 304 Introduction to Nuclear Engineering (2:2,0)

Application of radioactive decay equations, energy from fission and fuel burnup, radiation shielding, selection of nuclear materials for reactor cooling, moderation, and cladding, multiplication factor (k), neutron diffusion, criticality equation, rate of heat production and types of reactors.

Prerequisite: NE 302

NE 311 Nuclear Reactor Analysis (3:3,1)

The fission chain reaction. Nuclear fuels. Nuclear reactors and their components. Neutron flux. Diffusion equation. Neutron moderation. One group diffusion equation and criticality calculations. Reflected reactors. Multi-group calculations and heterogeneous reactors.

Prerequisites: NE 300, NE 302

NE 321 Nuclear Heat Transport (3:3,1)

Heat generation in homogeneous and heterogeneous reactors, reactor shutdown heat generation, temperature distributions in fuel, cladding and coolant, core heat transfer coefficients. Two-phase flow, critical heat flux and burnout, boiling channel hydraulics. Boiling water reactors and pressurized water reactors.

Prerequisites: NE 311, MEP 261

NE 330 Nuclear Materials (3:3,0)

The role of materials in reactors. Components of a nuclear reactor: fuel, reflector, coolant, structure, shielding, moderator, cladding and control rod materials. Fuel materials including uranium, plutonium and thorium. Radiation effects theory. Radiation effects on different reactor materials including structural metals, ceramics and organics.

Prerequisites: NE 311, ChE 210

NE 360 Radioisotope Applications I (3:3,1)

Natural and artificial radioisotope production of radioisotopes, radiotracing. Selection of radiosotopes. Radiotracing applications. Radiographying application with alpha and beta particles. Radiography applications with gamma rays.

Prerequisite: NE 302

NE 390 Summer Training (10 weeks) (2:0,0)

Training is usually arranged at an industrial establishment under the supervision of a faculty member. Students have to submit a report regarding their achievements in addition to any other requirements as assigned by the department.

Prerequisites: NE 340, NE 451

NE 411 Thermal Reactor Dynamics and Kinetics (2:2,1)

Reactor kinetics, effect of delayed neutrons, reactor control by control rods and chemical shim methods, temperature effects on reactivity and fission products poisoning.

Prerequisite: NE 311

NE 450 Radiation Shielding Design (3:3,1)

Principles of radiation shielding design, attenuation of nuclear radiation, shield layout analysis and design, gamma ray, x-ray and neutron shielding, principles of reactor shielding and use of computers to solve shielding problems.

Prerequisites: NE 311, NE 351

- **Elective Courses:**

NE 303 Energy and the Environment (3:3,0)

Renewable and non-renewable energy resources including oil, coal, nuclear, hydro, solar, wind, and geothermal. Utilization, reserves, production, consumption and geographical distribution of energy sources. Environmental and economic implications of energy production and utilization. Energy conservation and policies.
Prerequisite: PHYS 102

NE 350 Non-Ionizing Radiations (3:3,0)

Fundamentals of electromagnetic waves and their frequency spectrum. Ionizing and non-ionizing radiations. Types of waves. Wave properties. Wave generation and detection, microwaves. Infrared, laser and ultraviolet radiation, and their applications in medicine, industry and research. Health hazards of non-ionizing radiation.
Prerequisite: NE 302

NE 402 Computational Methods in Nuclear Engineering (3:3,1)

Introduction to numerical methods commonly encountered in nuclear engineering calculations, finite differencing, explicit and implicit techniques, convergence and stability criteria. Application of the above techniques to one group diffusion equation, multigroup diffusion equation, coupled diffusion equation with delayed neutrons, heat conduction and convection, criticality search method. Generation of heterogeneous cross-sections.
Prerequisites: EE 332, NE 321

NE 421 Nuclear Energy Conversion (3:3,1)

Reactor coolant properties and core thermal design. Heavy water reactors and advanced reactor concepts. Emphasis is placed on the use of available computer codes.
Prerequisite: NE 321

NE 422 Nuclear Power Planning & Project Implementation (3:3,0)

Methods of long-range forecasting of power demand, calculations of cost of generation of electricity from nuclear and conventional power plants, selection of an optimum system expansion program, preparation

of feasibility studies, bid documents and evaluation of bids, type of contracts and introduction to project management and use of available nuclear power planning computer codes.
Prerequisite: NE 311

NE 423 Nuclear Reactor Safety (3:3,0)

Safety criteria, probabilistic risk assessment, reactor accidents, engineering safety features, release and dispersal of radioactive materials and reactor licensing.
Prerequisites: NE 321, NE 411

NE 424 Thermo Nuclear Fusion Technology and Engineering (3:3,0)

Fusion requirements, current fusion engineering and concepts. Plasma confinement and heating, materials, reactor control, plant construction and maintenance, fusion fuel production. Fusion-fission hybrid reactor, radiation sources in fusion plants and safety of nuclear fusion.
Prerequisites: MEP 261, NE 302

NE 425 Nuclear Power Plant Operation (3:2,3)

A PC based nuclear power plant simulator is used to elucidate the basic principles behind the operation of nuclear power plants. Simulations include introduction to reactor start-up, shutdown, abnormal conditions and reactor accident scenarios.
Prerequisites: NE 321, NE 411

NE 427 Nuclear Reactor Design (3:3,0)

Specifications of the principal parameters in reactor design. Use of computer codes to solve realistic design problems involving, criticality, fuel management, thermal hydraulics and shielding. Design and subsequent optimization of an entire system.
Prerequisites: NE 411, NE 421

NE 429 Nuclear Power Plant Instrumentation and Control (3:3,0)

Elementary servomechanism, open and closed loop systems, automatic control of a reactor, reactor control mechanism, control rod drive mechanism, chemical shim control, nuclear power plant control. Current design of nuclear power plant protection systems. Instrumentations used in operating power plants, in-core instrumentations such as neutron flux

measuring devices, temperature sensors, pressure measuring devices and flow meters.
Prerequisites: NE 340, NE 411

NE 440 Nuclear Electronics (3:2,3)

Conduction in solids. Semi-conductor devices, pulse amplifiers, pulse height discriminators, digital storage and counting circuits, timing circuits, multi-channel Pulse height analysis.
Prerequisite: NE 340

NE 453 Radiation for Diagnosis (3:2,3)

Use of radionuclides in diagnostic imaging, computer tomography, positron emission tomography, fluoroscopy, and other advanced imaging techniques and quality of radiological images.
Prerequisite: NE 340

NE 454 Environnemental Radioactivity (3:2,3)

Natural radioactivity: radionuclides in the earth, cosmogeonic radioactivity, cosmic radiation, external and internal doses from natural radioactivity, sources of man-made radioactivity contamination covering fallout, radiation accidents, and radioactive waste. Pathways of radionuclides from environment to man.
Prerequisite: NE 351

NE 455 Principles of Diagnostic Mri and Ultrasound (3:3,1)

Physical Principles of Magnetic Resonance Imaging: Nuclear spin, spin lattice relaxation time, partial saturation recovery sequence, spin-echo sequence, types of magnets. Ultrasound: Wave and sound, attenuation, reflection and scattering, transducers and sound-beam, imaging instruments, imaging performance, biological effects and safety.
Prerequisites: NE 340, NE 452

NE 456 Operational Radiation Protection (3:2,3)

Laboratory operation and good work practice, use of radiation survey meters, calibration, frequency of calibration. Radiation dose limits, limits of radionuclides in water in unrestricted areas, limits in sewerage, leakage and surface contamination limits, accessibility control, labeling, use of protection equipments, emergency procedures, low and intermediate waste managements.

Prerequisite: NE 451

NE 460 Radioisotope Application II (3:3,1)

Advanced applications of radioisotopes in medicine, agriculture and industry. Irradiation technology, radiography with neutrons, x-ray fluorescence. Sterilization of medical equipment, food irradiation, irradiation of polymers to improve their characteristics.

Prerequisite: NE 360

NE 461 Industrial Radiography (3:2,3)

Radiation and sources used in radiography such as x-rays, gamma-rays and neutrons. Principles of radiography. X-ray films and intensifying screens. Structure of x-rays films and types. Intensifying screen types and structure and sensitometric properties of X-ray films. Radiographic Techniques. Other non- destructive methods as liquid penetrant, eddy current and ultrasound.

Prerequisite: NE 340, NE 451

NE 462 Nuclear Techniques in NDT (3:2,3)

Nuclear techniques in Radiography, neutron capture gamma-rays, neutron diffusion methods, transmitted gamma-ray and backscattering methods. Ultrasonic testing techniques: basic principles, generation of ultrasonic waves, properties of ultrasonic waves, methods and instruments for ultrasonic testing. Electrical techniques: Magnetography, Eddy current and potential drop. Other techniques: penetrating dye and acoustic emission methods.

Prerequisites: NE 351, ChE 210

NE 463 Radioanalytical Techniques (3:2,3)

Theory of Atomic Absorption Spectrometry (AAS) and its instrumentation. Principles of atomization and background correction, calibration procedures and their applications. Theory of X-ray Fluorescence (XRF) as an analytical tool. Qualitative and quantitative analyses, computer applications in quantitative spectral analysis and their applications. General principles of Neutron Activation Analysis

(NAA). Treatment of experimental data, use of some available computer software.
Prerequisites: NE 301, NE 340

NE 496 Special Topics in Nuclear Engineering I (2:2,0)

Focused or specialized advanced subjects of current nuclear engineering interest not available in regularly scheduled courses. Topics will be determined by the department.
Prerequisite: NE 340

NE 497 Special Topics in Nuclear Engineering II (3:3,0)

Focused or specialized advanced subjects of current nuclear engineering interest not available in regularly scheduled courses. Topics will be determined by the department.
Prerequisite: NE 340

Engineering Medical Physics Program

- **Compulsory Courses:**

NE 370 Introduction to Medical Physics (3:2,3)

The course focuses on medical imaging and therapy. The content will cover the Radiation Imaging by ionizing radiation such as X-Ray, Nuclear Medicine and non-ionizing radiation like Ultrasound Imaging and Magnetic Resonance Imaging (MRI). Radiation Therapy. Planning, treatment by linear accelerator, treatment by sealed and unsealed sources. Radiation Protection.

Prerequisite: PHYS 102, EE 300

NE 372 Radiobiology (3:2,3)

Physico-chemical aspects of interaction of ionizing radiation with the cell, Radiation effects on macromolecules, cellular radiation biology, radiobiology of tissues and organs, radiation biology as applied to radiation therapy, effects of radiation on the environment and man.

Prerequisite: CHEM 101

NE 389 Practical Applications (2:1,3)

Practical clinical rotation in hospitals to prepare the student to be competent in his field.

Prerequisite: NE 340, NE 451

NE 390 Summer Training (10 weeks) (2:0,0)

Training is usually arranged at an industrial establishment under the supervision of a faculty member. Students have to submit a report regarding their achievements in addition to any other requirements as assigned by the department.

Prerequisites: NE 340, NE 451

NE 470 Radiotherapy (4:3,3)

Dose and exposure calculations, patient dose calculation, treatment plans and use of computer in radiotherapy, treatment by linear accelerator and sealed and open sources.

Prerequisite: NE 370, Physiology 372, NE 372

NE 471 Medical Imaging (4:3,3)

Introduction to Mathematical and Physical principles for medical imaging systems, CT scan principles, ultrasound imaging, nuclear medicine imaging, MRI, linear systems theory and Fourier transforms, famous visualization methods, cutting, analyzing medical imaging information, medical imaging application, guided images overlapping.

Prerequisite: EE 253, EE 311, NE370

NE 472 Nuclear Medicine (3:2,3)

Theory and application of Nuclear Medicine, radiochemistry, radiopharmacy, single Photon Emission Tomography (SPET), Positron Emission Tomography (PET).

Prerequisite: NE370, Physiologies 372

NE 473 Dosimetry (3:2,3)

Properties of charged particles and neutrons. Radiation exposure, kinetic energy absorbed in unit mass, dose equivalent, Bragg-gray theory, measurement methods and detection by ionization chambers, proportional detectors and solid state detectors Geiger tubes, TLD, calorimetric method, scintillation detectors.

Prerequisite: NE 351, NE 470

NE 474 Medical Imaging II (4:3,3)

MRI technique with focus on methods used in diagnostic medical imaging, continuous vibration, imaging methods, centered spectrum, ultrasound imaging , fundamentals of ultrasound measurements and imaging equipment, biological effects of ultrasound.

Prerequisite: NE 471

- **Elective courses:**

NE 307 Experimental Data Analysis (2:1,3)

Binomial distribution, Poisson distribution, normal distribution, linear and non-linear fitting, error distribution, Chi square test, F test, Statistical data processing. Application to radiation Protection and Medical Physics

Prerequisite: IE 331

NE 350 Non-Ionizing Radiations **(3:3,0)**

Fundamentals of electromagnetic waves and their frequency spectrum. Ionizing and non-ionizing radiations. Types of waves. Wave properties. Wave generation and detection, microwaves. Infrared, laser and ultraviolet radiation, and their applications in medicine, industry and research. Health hazards of non-ionizing radiation.

Prerequisite: NE 302

NE 450 Radiation Shielding Design **(3:3,1)**

Principles of radiation shielding design, attenuation of nuclear radiation, shield layout analysis and design, gamma ray, x-ray and neutron shielding, principles of reactor shielding and use of computers to solve shielding problems.

Prerequisites: NE 351

NE 456 Operational Radiation Protection **(3:2,3)**

Laboratory operation and good work practice, use of radiation survey meters, calibration, frequency of calibration. Radiation dose limits, limits of radionuclides in water in unrestricted areas, limits in sewerage, leakage and surface contamination limits, accessibility control, labeling, use of protection equipments, emergency procedures, low and intermediate waste managements.

Prerequisite: NE 451

NE 459 Radiation Dosimetry Using MCNP **(3:2,3)**

Modelling and characterizing TLDs, ionization chambers, scintillation detectors and advanced radiotherapy detectors using MCNP. Comparison with experimental results.

Prerequisites: NE 451

NE 475 Oncology **(3:2,3)**

Tumor treatment with high energy X-ray and electrons from linear accelerators, neutron therapy through neutron capture, ionizing radiation treatment of tumor by means of directed beam, treatment by radioactive sources, measurement of dose, treatment plan.

Prerequisite: NE 470

NE 476 Neutron Therapy (3:2,3)

New technologies in neutron radiotherapy, boron neutron capture therapy (BNCT) and Gadolinium neutron capture therapy (GNCT).

Prerequisite: NE 470

NE 477 Advanced Medical Imaging (3:2,3)

New technologies in neutron radiotherapy, boron neutron capture therapy (BNCT) and Gadolinium neutron capture therapy (GNCT).

Prerequisite: NE 471

NE 478 Quality Assurance Of Medical Equipments (3:2,3)

New technologies in neutron radiotherapy, boron neutron capture therapy (BNCT) and Gadolinium neutron capture therapy (GNCT).

Prerequisite: NE 340, NE 451

NE 479 Brachytherapy (3:2,3)

Use of radiation sources in radiotherapy, materials used, dose measurement theory, preparation of sources and their applications, positioning, fast and slow dose rate.

Prerequisite: NE 470

NE 481 Diagnostic Radiations (3:2,3)

Use of radionuclides in diagnostic imaging, computer tomography, positron emission tomography, fluoroscopy, and other advanced imaging techniques and quality of radiological images.

Prerequisite: NE 370

NE 482 Principles of Diagnostic Mri and Ultrasound (3:2,3)

Physical Principles of Magnetic Resonance Imaging: Nuclear spin, spin lattice relaxation time, partial saturation recovery sequence, spin-echo sequence, types of magnets. Ultrasound: Wave and sound, attenuation, reflection and scattering, transducers and sound-beam, imaging instruments, imaging performance, biological effects and safety.

Prerequisites: NE 471

NE 494 Special Topics in Medical Physics Engineering (I) (3:0,0)

Focused or specialized advanced subjects of current Medical Physics

Engineering interest not available in regularly scheduled courses. Topics will be determined by the department.
Prerequisite: NE 340

NE 495 Special Topics in Medical Physics Engineering (II) (3:0,0)

Focused or specialized advanced subjects of current Medical Physics Engineering interest not available in regularly scheduled courses. Topics will be determined by the department.
Prerequisite: NE 340

Engineering Radiation Protection Program

- **Compulsory Courses:**

NE 300 Fundamentals of Nuclear Engineering Calculation (3:3,0)

Ordinary differential equations of the first and second order applicable to nuclear engineering calculations. Power series solutions of differential equations. Laplace transformations. Use of Laplace transformations to solve ordinary differential equations. Fourier series and integrals. Partial differential equations and divergence theorem of Gauss. Legendre polynomials and Bessel functions.
Prerequisite: MATH 204

NE 301 Atomic and Nuclear Principles for Nuclear Engineers (3:3,0)

Special theory of relativity. Electromagnetic waves. Quantum theory of light. Uncertainty principles. Atomic models. Atomic spectra. Spectrum of hydrogen atom. X-rays. Bohr's theory. Periodic table. Conductors, insulators, semiconductors, and Transistors.
Prerequisite: PHYS 102

NE 307 Experimental Data Analysis (2:1,3)

Binomial distribution, Poisson distribution, normal distribution, linear and non-linear fitting, error distribution, Chi square test, F test, Statistical data processing. Application to radiation Protection and Medical Physics.
Prerequisite: IE 331

NE 352 Rules and Regulation of Nuclear Radiation (2:2,0)

In this course the student will know rules and regulations of Nuclear radiation (local & international), recommendations of International Atomic Energy Agency (IAEA), International Commission of Radiation Protection (ICRP), and other international recommendations. He will also learn how to compare between those recommendations and their application in medical, industrial and environmental fields.
Prerequisite: NE 351

NE 360 Radioisotope Applications I (3:3,1)

Natural and artificial radioisotope production of radioisotopes,

radiotracing. Selection of radiosotopes. Radiotracing applications. Radiographying application with alpha and beta particles. Radiography applications with gamma rays.
Prerequisite: NE 351

NE 372 Radiobiology (3:2,3)

Physico-chemical aspects of interaction of ionizing radiation with the cell, Radiation effects on macromolecules, cellular radiation biology, radiobiology of tissues and organs, radiation biology as applied to radiation therapy, effects of radiation on the environment and man.
Prerequisite: CHEM 201

NE 390 Summer Training (10 weeks) (2:0,0)

Training is usually arranged at an industrial establishment under the supervision of a faculty member. Students have to submit a report regarding their achievements in addition to any other requirements as assigned by the department.
Prerequisites: NE 340, NE 451

NE 441 Advanced Nuclear Radiation Measurements (4:3,3)

Advanced radiation measurements, measuring radioactive distribution, Two dimensional radiation measurements used in diagnostic medicine and dosimetry in radiotherapy. Advanced radiation measurement equipment, solid state equipments used in X-rays and gamma rays, neutron spectrometry, advanced scintillation equipments.
Prerequisite: NE 340, EE 311

NE 450 Radiation Shielding Design (3:3,1)

Principles of radiation shielding design, attenuation of nuclear radiation, shield layout analysis and design, gamma ray, x-ray and neutron shielding, principles of reactor shielding and use of computers to solve shielding problems.
Prerequisites: NE 351

NE 452 Technology of Radiation Equipment (3:3,1)

Production and characteristics of x-rays, diagnostic radiology, quality of an image, special radiographic techniques in diagnostic radiography.

High energy machines in medical applications: linear accelerators, cyclotrons, neutron generators and betatrons.

Prerequisites: EE 253, NE 340, NE 351

NE 456 Operational Radiation Protection (3:2,3)

Laboratory operation and good work practice, use of radiation survey meters, calibration, frequency of calibration. Radiation dose limits, limits of radionuclides in water in unrestricted areas, limits in sewerage, leakage and surface contamination limits, accessibility control, labeling, use of protection equipments, emergency procedures, low and intermediate waste managements.

Prerequisite: NE 451

NE 468 Radiation Protection Calculation (3:2,3)

Concepts for treatment of internal and external radiation hazards. Precautions against internal contamination and shielding against external radiation hazard. Critical organ and organ burden. Dose fractions to different organs from sources inside it as well as from other organs. Advanced concepts of dosimetry and dose fractions.

Prerequisite: NE 451

- **Elective Courses:**

NE 350 Non-Ionizing Radiations (3:3,0)

Fundamentals of electromagnetic waves and their frequency spectrum. Ionizing and non-ionizing radiations. Types of waves. Wave properties. Wave generation and detection, microwaves. Infrared, laser and ultraviolet radiation, and their applications in medicine, industry and research. Health hazards of non-ionizing radiation.

Prerequisite: NE 302

NE 360 Radioisotope Applications I (3:3,1)

Natural and artificial radioisotope production of radioisotopes, radiotracing. Selection of radiosotopes. Radiotracing applications. Radiographying application with alpha and beta particles. Radiography applications with gamma rays.

Prerequisite: NE 351

NE 370 Introduction to Medical Physics (3:2,3)

The course focuses on medical imaging and therapy. The content will cover the Radiation Imaging by ionizing radiation such as X-Ray, Nuclear Medicine and non-ionizing radiation like Ultrasound Imaging and Magnetic Resonance Imaging (MRI). Radiation Therapy. Planning, treatment by linear accelerator, treatment by sealed and unsealed sources. Radiation Protection.

Prerequisite: PHYS 102, EE 300

NE 454 Environmenttal Radioactivity (3:2,3)

Natural radioactivity: radionuclides in the earth, cosmogeonic radioactivity, cosmic radiation, external and internal doses from natural radioactivity, sources of man-made radioactivity contamination covering fallout, radiation accidents, and radioactive waste. Pathways of radionuclides from environment to man.

Prerequisite: NE 351

NE 457 Low Level Radioactive Waste Management (3:2,3)

Radioactive waste classification, Radiation toxicity of Radiation sources, medical radioactive waste, industrial Radioactive waste. Sorting. Storage and transportation of radioactive waste. Radiation protection in treatment of radioactive waste.

Prerequisite: PHYS 102, BIO 321

NE 458 Radiation Emergency Planning (3:2,3)

Plans and simulations of a real emergency case, spilling of open sources, losing radioactive sources, safety of sources during fire, spreading of radioactive sources, use and calibration of Radiation Protection related equipment. Visits to radiation facilities and reviewing their radiation protection rules and regulations and emergency plans. Calculation and assessment of doses following an accident, dealing with workers and public in emergency, reasonability of the workers in emergency, treating highly exposed people, emergency records.

Prerequisite: NE 451

NE 460 Radioisotope Application II (3:2,3)

Advanced applications of radioisotopes in medicine, agriculture and industry. Irradiation technology, radiography with neutrons, x-ray

fluorescence. Sterilization of medical equipment, food irradiation, irradiation of polymers to improve their characteristics.
Prerequisite: NE 360

NE 461 Industrial Radiography (3:2,3)

Radiation and sources used in radiography such as x-rays, gamma-rays and neutrons. Principles of radiography. X-ray films and intensifying screens. Structure of x-rays films and types. Intensifying screen types and structure and sensitometric properties of X-ray films. Radiographic Techniques. Other non- destructive methods as liquid penetrant, eddy current and ultrasound.
Prerequisite: NE 340, NE 451

NE 462 Nuclear Techniques in NDT (3:2,3)

Nuclear techniques in Radiography, neutron capture gamma-rays, neutron diffusion methods, transmitted gamma-ray and backscattering methods. Ultrasonic testing techniques: basic principles, generation of ultrasonic waves, properties of ultrasonic waves, methods and instruments for ultrasonic testing. Electrical techniques: Magnetography, Eddy current and potential drop. Other techniques: penetrating dye and acoustic emission methods.
Prerequisites: NE 351, ChE 210

NE 464 Prompt Gamma Applications in Well-logging (3:2,3)

Principles of interaction of neutrons with matter, neutron and prompt gamma application in well-logging.
Prerequisites: NE 340

NE 466 Principles of Radiation Activation (3:2,3)

The student will learn the principles of radiation starting from interaction of radiation with matter, Prompt and delayed gamma, how to differentiate mathematical equations controlling rdio activation. Some laboratory experiments.
Prerequisites: NE 340

NE 467 Radiochemistry (3:2,3)

Chemical phenomenon in reactions and reactors, Chemical separation methods, Chemical aspect of nuclear energy, isotope exchanges and

tracer's application.
Prerequisites: NE 351

NE 470 Radiotherapy (4:3,3)

Dose and exposure calculations, patient dose calculation, treatment plans and use of computer in radiotherapy, treatment by linear accelerator and sealed and open sources.
Prerequisite: NE 370, Physiology 372, NE 372

NE 471 Medical Imaging (4:3,3)

Introduction to Mathematical and Physical principles for medical imaging systems, CT scan principles, ultrasound imaging, nuclear medicine imaging, MRI, linear systems theory and Fourier transforms, famous visualization methods, cutting, analyzing medical imaging information, medical imaging application, guided images overlapping.
Prerequisite: EE 253, EE 311, NE 370

NE 472 Nuclear Medicine (3:2,3)

Theory and application of Nuclear Medicine, radiochemistry, radiopharmacy, single Photon Emission Tomography (SPET), Positron Emission Tomography (PET).
Prerequisite: NE 370, Physiology 372

NE 473 Dosimetry (3:2,3)

Properties of charged particles and neutrons. Radiation exposure, kinetic energy absorbed in unit mass, dose equivalent, Bragg-gray theory, measurement methods and detection by ionization chambers, proportional detectors and solid state detectors Geiger tubes, TLD, calorimetric method, scintillation detectors.
Prerequisite: NE 351, NE 470

NE 474 Medical Imaging II (4:3,3)

MRI technique with focus on methods used in diagnostic medical imaging, continuous vibration, imaging methods, centered spectrum, ultrasound imaging , fundamentals of ultrasound measurements and imaging equipment, biological effects of ultrasound.
Prerequisite: NE 471

NE 492 Special Topics in Radiation Protection Engineering (I) (3:0,0)

Focused or specialized advanced subjects of current Radiation Protection Engineering interest not available in regularly scheduled courses. Topics will be determined by the department.
Prerequisite: NE 340

NE 493 Special Topics in Radiation Protection Engineering (II) (3:0,0)

Focused or specialized advanced subjects of current Radiation Protection Engineering interest not available in regularly scheduled courses. Topics will be determined by the department.
Prerequisite: NE 340

DEPARTMENT OF PRODUCTION ENGINEERING AND MECHANICAL SYSTEMS DESIGN

FACULTY

Chairman:

Aldousari, Saad M.

Professors:

Abd El-Latif, Ahmed K.
Abd Rabou, Mahmoud M.
Abou Khashaba, Abdulmalik A.
Akyurt, Mehmet M.
Aljinaidi, Abdulmalik A.
Diken, Hamza S.
Hamed, Mostafa A.
Hedia, Hassan

Associate Professors:

Abu-Mansour, Talal M.
Aljawi, Abdulghaffar A.
Mohammed, Abdel Salaam

Assistant Professors:

Albassyiouni, Mostafa
Aldousari, Saad
Alnefaie, Khaled A.
Alqasemi, Redwan
Asiri, Saeed A.
Bogis, Haitham A.
Najjar, Ismail M.

Lecturers:

Abd El-Wahed, Mohamed

INTRODUCTION

The specialization of the Department of Production Engineering and Mechanical Systems Design encompasses wide fields of Mechanical Engineering activities. These include design, manufacturing and control of mechanical systems, as well as their subsystems and components. In addition to teaching, the Department is naturally engaged in research and development in these areas. The Department encompasses three main scientific fields:

- Machine Design,
- Manufacturing Engineering,
- Applied Mechanics.

The Mechanical Engineer who graduates from the Department is potential candidate to become one of the pillars of any design, development or manufacturing activity in the industry and society.

The Department is involved in teaching engineering courses to both undergraduate and graduate students. It offers a variety of opportunities for the acquisition of mental and technical skills. These prepare the student for the exciting challenges of a mechanical engineering career. In addition to striving to keep high standards in analytic capabilities, the Department attaches ample importance to the hands-on training of students by undertaking experimental work in the various areas of study.

The Department also actively participates in research activities that are relevant to the requirements of the country and the region. Continuous efforts are being made to boost the cooperation with the local industry. This is accomplished by offering consultations and organizing seminars, courses, meetings and visits with the objective of knowledge transfer between university and industry.

VISION

Innovation and leadership in education of mechanical and production engineering, applied research and community service.

MISSION

To educate, train and produce highly qualified mechanical engineering personnel inspired with ethical and Islamic values and to conduct scientific research and studies, which collectively allow for a sustainable development of the society.

EDUCATIONAL OBJECTIVES

Production Engineering and Mechanical Systems Design Department is preparing its graduates to:

1. Practice mechanical and production engineering in the general areas of mechanical systems design, materials and manufacturing.
2. Engage in successful careers and leadership positions in industry, government, and academia.
3. Practice engineering in a responsible, professional and ethical manner in global and societal context.

To the Vision word “innovation” is added. Mission statement is not changed. Old first educational objective became second, first and third educational objectives are newly stated. New ABET criteria for mechanical engineering program curriculum is;

"The program must demonstrate that graduates have the ability to: apply principles of engineering, basic science, and mathematics (including multivariate calculus and differential equations) to model, analyze, design, and realize physical systems, components or processes; and work professionally in both thermal and mechanical systems areas.”

“to apply principles of engineering, basic science, and mathematics (including multivariate calculus and differential equations)” is matching with the Program Outcome “a”.

“to model, analyze, design, and realize physical systems, components or processes” is matching with the Program Outcome “c”.

Old Program Outcomes “1, m, n” are removed “o” is restated as

“Ability to work professionally in both thermal and mechanical systems areas including, modeling, analyzing, design and realization of such systems.”

New Program Outcomes of the Department are:

a) Ability to apply knowledge of mathematics, science and engineering.
b) Design and conduct experiments, as well as to analyze and interpret data.
c) Design a system, component, or process to meet desired needs.
d) Ability to function on multi-disciplinary teams.
e) Ability to identify, formulate, and solve engineering problems.
I) Understanding of professional and ethical responsibility.
g) Ability to communicate effectively.
h) Understand the impact of engineering solutions in a global and societal context.

PROGRAMS OFFERED

The Department confers Bachelors as well as Master's Degrees in Mechanical Engineering – Production Engineering and Mechanical Systems Design. The specialization encompasses wide fields of mechanical engineering activities. These include design, manufacturing, control and applied mechanics of mechanical systems, as well as their subsystems.

The Department courses offer a variety of opportunities for the acquisition of mental and technical skills, high standards in analytical capabilities and practical experimental work. Also, the courses address economical, ethical and social aspects of the engineering profession.
The Department actively participates in research activities, consultations, seminars, short courses and meetings with the local industry with the objective of knowledge transfer between department and industry.

CAREER OPPORTUNITIES

The Mechanical Engineering graduate is a potential candidate to become one of the pillars of any design, development or manufacturing activity in the industry and society.

Graduates of the Department find good opportunities in the industrial sector to work in the following:

- Analysis and design of machinery, equipments and material handling systems.
- Automatic control systems including hydraulic and pneumatic.

- Production, manufacturing techniques and automations.
- Testing, measurements, inspections and quality control of products.
- Maintenance, failure analysis and fault diagnosis of mechanical systems.

FACILITIES

The Department has a variety of well-established facilities to support educational and research activities such as:

- Basic workshop, equipped with :
  - Filing, sawing, and hand working facilities
  - Sheet metalwork
  - Drilling machines
  - Turning machines
  - Shaping and milling machines
  - Grinding machines
  - Rolling and wire drawing
  - Metal forming
  - Casting
  - Welding
  - Wood working
- Computer Aided Drafting
- Computer Aided Design
- Metrology and Quality Control
- Engineering Mechanics and Dynamics
- Automatic Control
- Tribology
- Mechanics of Materials
- Scanning Electron Microscope
- Photo – Elasticity
- Laser - Assisted Measurement
- Mechanical Vibrations
- Fault Diagnosis
- Computer - Aided Machining
- Ion Plating
- Mechanics Of Metal Cutting

- Parallel Processing
- Non Traditional Machining

PROGRAM REQUIREMENTS AND CURRICULUM

Units required for the B.Sc. degree in the Department of Production Engineering and Mechanical Systems Design.

Conventional Program

Requirements	Cr. Hrs
University Requirements	14
Faculty Requirements	61
Departmental Requirements	80
Total	**155**

Cooperative Program

Requirements	Cr. Hrs
University Requirements	14
Faculty Requirements	61
Departmental Requirements	72
Coop Program	8
Total	**155**

Departmental Requirements Core Courses (74 Cr. hrs)

Course No.	Course Title	Cr. Hr.	Prerequisite
MENG 130	Basic Work Shop	2	MENG 102
MENG 204	Computer Aided Graphics	3	MENG 102
ChE 210	Material Science	4	CHEM 101
IE 256	Engineering Management	2	IE 201, IE 202, ELC 101
MEP 261	Thermodynamics	4	MATH 202
MENG 262	Dynamics	3	CE 201
MENG 270	Mechanics of Materials	4	CE 201
MEP 290	Fluid Mechanics	4	MATH 202 PHYS 101
EE 300	Analytical Methods in Eng.	3	MATH 203
MENG 310	Machine Elements Design	3	MENG 204 MENG 270
MENG 332	Manufacturing Technology	3	MENG 130 CHEM 210
MEP 360	Heat Transfer	4	MEP 290
MENG 364	Machine Dynamics	3	MENG 262
MENG 366	Automatic Control	3	MENG 262
MENG 390	Summer Training	2	MENG 310
MENG 410	Mechanical Design	3	MENG 310 MENG 364
MENG 412	Computer Aided Design	3	MENG 410
MENG 434	Material Removal Processes	3	MENG 332
MENG 436	Metrology & Quality Control	3	IE 331, MENG 434
MEP 451	Air Conditioning & Ref. I	3	MEP 360
MENG 468	Plasticity and Metal Forming	3	MENG 270 MENG 332
MENG 470	Mechanical Vibrations	3	MENG 204 MENG 262
MENG 472	Fault Diagnosis of Mechanical Systems	2	MENG 410 MENG 470
MENG 499	Senior Project	4	MENG 410
Total		**74**	

Departmental Requirements Elective Courses (6 Cr. hrs)

The student has to choose two out of nineteen courses.

Course No.	Course Title	Cr. Hr.	Prerequisite
MENG 416	Material Selection in Design & Manufacturing	3	MENG 270 MENG 332
MENG 418	Machine Tool Design	3	MENG 410 MENG 436
MENG 420	Introduction to Finite Element Methods	3	MENG 204 MENG 270
MENG 422	Tribology	3	MENG 410
MENG 424	Design of Production Facilities	3	MENG 410 MENG 434
MENG 428	Special Topics in Mechanical Systems Design	3	MENG 310
MENG 446	Advanced Manufacturing Technology	3	MENG 434
MENG 448	Composite Materials	3	MENG 270 MENG 332
MENG 450	Computer Aided Manufacturing	3	MENG 204 MENG 436
MENG 452	Manufacture Planning & Shop Loading	3	MENG 434
MENG 454	Welding Technology	3	MENG 332
MENG 458	Special Topics in Production Engineering	3	MENG 332
MENG 476	Mechanical Systems Modeling & Simulation	3	EE 332 MENG 366
MENG 478	Mechanisms	3	MENG 364
MENG 480	Introduction to Robotics	3	MENG 364
MENG 482	Mechatronics	3	MENG 366
MENG 488	Special Topics in Applied Mechanics	3	MENG 364
xx xxx	Any College Course	3	Departmental Approval
xx xxx	Any University Course	3	Departmental Approval

Total credit hours required for graduation is 155.

A TYPICAL PROGRAM FOR PRODUCTION ENGINEERING AND MECHANICAL SYSTEMS DESIGN STUDENTS

1st Year
Regular & Cooperative

1st semester | **2nd semester**

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
ELC 101	English Language I	2	ISLS 101	Islamic Culture I	2
CHEM 101 / PHYS 101	General Chemistry I / General Physics I	4	PHYS 101 / CHEM 101	General Physics I / General Chemistry I	4
MATH 101	Calculus I	4	MATH 202	Calculus II	4
ARAB 101	Arabic Language I	3	ELC 102	English Language II	2
			MENG 102	Engineering Graphics	3
Total		**13**	**Total**		**15**

2nd Year
Regular & Cooperative

3rd semester | **4th semester**

Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
PHYS 102	General Physics II	4	IE 202	Introduction to Engineering Design (2)	2
IE 201	Introduction to Engineering Design (1)	3	EE 201	Structured Computer Programming	3
ARAB 201	Arabic Language II	3	MATH 204	Differential Equations I	3
CE 201	Engineering Mechanics (Statics)	3	EE 251	Basic Electrical Engineering	4
MATH 203	Calculus III	4	IE 255	Engineering Economy	3
Total		**17**	**Total**		**15**

3rd Year
Regular & Cooperative

5th semester			6th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
MENG 130	Basic Workshop	2	MEP 261	Thermodynamics	4
ISLS 201	Islamic Culture 2	2	MENG 270	Mechanics of Materials	4
MENG 204	Computer Aided Graphics	3	EE 300	Analytical Methods in Eng.	3
CHEM 210	Material Science	4	MENG 332	Manufacturing Technology	3
IE 256	Eng. Management	2	MENG 364	Machine Dynamics	3
MENG 262	Eng. Mechanics	3			
Total		**16**	**Total**		**17**

4th Year
Regular

7th semester			8th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
MEP 290	Fluid Mechanics	4	ACCT 101	Principle of Accounting I	3
MENG 310	Machine Elements Design	3	EE 332	Computational Methods in Eng.	3
IE 331	Probability & Eng Statistics	3	MEP 360	Heat Transfer	4
MENG 366	Automatic Control	3	MENG 410	Mechanical Design	3
MENG 434	Material Removal Procedures	3	MENG 436	Metrology & Quality Control	3
Total		**16**	**Total**		**16**

Training

MENG 390	Summer Training	2 Cr. Hrs

4th Year
Cooperative

7th semester			8th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
MEP 290	Fluid Mechanics	4	EE 332	Computational Methods in Eng.	3
ISLS 301	Islamic Culture 3	2	MEP 360	Heat Transfer	4
MENG 310	Machine Elements Design	3	ISLS 401	Islamic Culture 4	2
IE 331	Probability & Eng. Statistics	3	MENG 410	Mechanical Design	3
MENG 366	Automatic Control	3	MENG 470	Mechanical Vibrations	3
MENG 434	Material Removal Processes	3	MENG 468	Plasticity & Metal Forming	3
Total		**18**	**Total**		**18**

5th Year
Regular

9th semester			10th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ISLS 301	Islamic Culture 3	2	ISLS 401	Islamic Culture 4	2
MENG 412	Computer Aided Design	3	MENG 468	Plasticity & Metal Forming	3
MEP 451	Air Conditioning	3	MENG 472	Fault Diagnosis of Mechanical Systems	2
MENG 470	Mechanical Vibrations	3	MENG 499	Senior Project	4
xx xxx	Elective Course (1)	3	xx xxx	Elective Course (2)	3
Total		**14**	**Total**		**14**

5th Year
Cooperative

9th semester			10th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
MENG 400	Coop Work Program (follows the completion of the 4th year courses)	8	ACCT 101	Principle of Accounting I	3
			MENG 412	Computer Aided Design	3
			MENG 438	Metrology & Quality Control	3
			MEP 451	Air Conditioning	3
			MENG 472	Fault Diagnosis of Mechanical Systems	2
			MENG 499	Senior Project	4
Total		**8**	**Total**		**18**

COURSE DESCRIPTION

MENG 102 Engineering Graphics (3:2,4)

Introduction: Skills of freehand sketching. Methods of projection: orthographic, isometric. Dimensioning of views. Third view prediction. Primary and successive auxiliary views. Intersections of surfaces and bodies. Development of surfaces. Sectioning. Introduction to assembly drawings. Steel sections. Pipe connections. Standards and conventions.

MENG 130 Basic Workshop (2:1,3)

Introduction to principles of production. Engineering materials, Metal forming; foundry and pattern making, forging processes, rolling, extrusion, sheet metal work, bench work and fitting. Metal machining, drilling, turning, shaping, milling, grinding, joining of materials (fastening. riveting. welding), industrial safety. Measurements, interchangeability and standards, specifications. Quality control, production planning, and management.

Prerequisite: MENG 102

MENG 204 Computer Aided Graphics (3:2,3)

Introduction to CAG. Skills of using a drafting package. Geometrical and dimensional tolerances. Applications on mechanical elements (bolted, welded and riveted joints, shafts and keys, springs, gears). Applications on assembly and working drawings (valves, presses etc.)

Prerequisite: MENG 102

MENG 262 Engineering Mechanics, Dynamics (3:3,1)

Review of particle motion. Rotation and translation of a rigid body in the plane. General motion. Displacement, velocity, and acceleration of rigid bodies, including Coriolis motion. Motion about a fixed point. Equations of motion for a rigid body. Constrained plane motion. Work and energy. Impulse and momentum. Gyroscopic motion. Introduction to mechanical vibrations.

Prerequisite: CE 201

MENG 270 Mechanics of Materials (4:3.3)

Types of loads and stresses. Mechanical behavior of materials. Shearing forces and bending moment diagrams. Shearing stresses in beams.

Stresses in compound bars. Bending stresses and deflection. Torsion of bars. Principal stresses, and Mohr's circle. 3-Dimensional stresses. Principal strains and Mohr's circles of strain. Stress-strain relations. Strain energy. Yield criteria. Thin and thick cylinders, fatigue analysis. Lab work. (tension, bending, hardness, fatigue, creep.)
Prerequisite: CE 201

MENG 310 Machine Elements Design (3:2,3)

Review of stress analysis (combined stress, bending). Buckling, failure theories, fatigue failure. Materials in mechanical design and safety factors. Design of fasteners: riveted, welded, bolted and fitted joints. Power screws, springs, ball bearing, sliding bearings, power transmission gears, shafts, couplings, clutches, brakes, belts, chains and ropes.
Prerequisites: MENG 204, MENG 270

MENG 332 Manufacturing Technology (3:2,3)

Introduction, Casting processes (solidification and melting, furnaces, expendable and permanent mold casting). Bulk deformation processes (hot and cold forming processes, workability and limits of forming).Sheet metal processes (formability of sheets and sheet forming processes, processing of polymers). Metal powders and ceramics, welding processes. Heat treatment of metals, Principles of metal cutting (machining processes, types of chips, process sheet).
Prerequisites: MENG 130, ChE 210

MENG 364 Machine Dynamics (3:2,3)

Design of ordinary gear trains and analysis of epicyclic gear trains. Analytical design of disk cams. Grashof rules. Design of mechanisms in terms of transmission angle and time ratio. Kinematic and force analysis of linkages and machinery with the aid of computers. Flywheel design. Balancing. Lab work includes applications on gear trains and linkages.
Prerequisites: EE 202, MENG 262

MENG 366 Automatic Control (3:2,3)

Introduction. Laplace transforms. Transfer function. Block diagrams. State space equations of control systems. Mathematical modeling of dynamic systems: Mechanical, electrical, electro-mechanical, liquid-level, thermal and pressure systems. Industrial automatic controllers:

basic control actions. Pneumatic and hydraulic controllers. Transient response analysis: First and second order systems. Root locus analysis. Frequency response. Application of computer programs
Prerequisite: MENG 262

MENG 390 Summer Training (10 weeks) (2:0,0)

Training in industry under the supervision of a faculty member. Each student must submit a report about his achievements during the training in addition to fulfilling any other requirements as assigned by the department.
Prerequisites: MENG 310

MENG 400 Cooperative Work (26 weeks) (8:0,0)

Training in industry under the supervision of a faculty member. Each student must submit a report about his achievements during the training in addition to fulfilling any other requirements as assigned by the department.
Prerequisites: MENG 310

MENG 410 Mechanical Design (3:2,3)

Introduction. Design methodology (concept, alternatives, and considerations, skills of teamwork, reports, and construction and detail drawings of machines). Comprehensive design projects include: fixed and moveable joints, shafts, sliding and rolling bearings, gears, couplings, clutches and brakes, belt drivers. Use of standards and technical manuals. Application of computer programs.
Prerequisites: MENG 310, MENG 364

MENG 412 Computer Aided Design (3:2,3)

Introduction to computer aided engineering environment. Solid modeling. Introduction to Finite Element Method. CAD packages. Static linear analysis in one, two, and three dimensions. Thermal analysis, introduction to non linear analysis. Optimum design. Computer applications in mechanical design.
Prerequisites: MENG 410

MENG 416 Materials Selection in Design & Manufacturing (3:2,3)

Product life cycle. Performance of materials in service (failure of materials under mechanical loading, environmental degradation, selection of materials), effect of shape and manufacturing processes.

Cost-per-unit-property method. Weighed properties method. Limits-on-properties method. Selection charts, computer-aided material and process selection (material databases). Case studies.
Prerequisite: MENG 270, MENG 332

MENG 418 Machine Tool Design (3:2,3)

Design and working principles of machine tool elements (Speed and feed of gear boxes. spindle and spindle bearings, rigidity and strengthening of structures- frames, beds and design of slideways against wear). Power sources and types of drives. Mechanisms design, motion control and transmission systems in machine tools. Safety devices. Static and dynamic acceptance tests for machine tools.
Prerequisites: MENG 410, MENG 436

MENG 420 Introduction to Finite Element Methods (3:2,3)

Virtual formulation. Finite element analysis: shape formation, equilibrium conditions, element classification, assembly of elements, modeling methodology. Structures and elements: trusses, beams, 2-D solids, 3-D solids, axisymmetric solids, thin-walled structures. Dynamic analysis. Heat transfer and thermal analysis.
Prerequisites: MENG 204, MENG 270

MENG 422 Tribology (3:2,3)

Nature of solid surfaces. Interaction of solid surfaces. Friction of metals and non-metals (mechanisms, theories, applications). Wear of metals and non-metals (types, mechanisms, theories, applications). Lubrication (methods, types, theories, applications). Lubricants (types, utilization) Selection of materials for tribological applications. Surface Engineering.
Prerequisite: MENG 410

MENG 424 Design of Production Facilities (3:2,3)

Hoisting machinery: crane chains, sprockets, pulleys, drums, ropes, sheaves and hooks. Gain in force and gain in speed systems. Wheels, rails, and drives. Jigs and fixtures: specifications of jigs and fixtures, conventions in fixture design. Degrees of freedom, location points, fixation point. Clamping devices, fool-proofing, Rigidity and wear considerations.
Prerequisites: MENG 410, MENG 434

MENG 428 Special Topics in Mechanical Systems Design (3:2,3)

Topics relevant to specialization of Mechanical Systems Design to strengthen student's knowledge in this field.

Prerequisite: MENG 310

MENG 434 Material Removal Processes (3:2,3)

Fundamentals of cutting. Mechanics of chip formation. Cutting forces and power. Effect of temperature on cutting. Tool life. Machinability: Metal removal rate, Cutting tool materials and fluids. Machining processes: turning, thread cutting, boring, drilling, reaming, milling, shaping and planing, broaching, gear cutting. Abrasives, grinding wheels, grinding processes. Super finishing process: Lapping, honing. blasting and peening. Non-conventional machining. Numerical control of machine tools.

Prerequisite: MENG 332

MENG 436 Metrology and Quality Control (3:2,3)

Quality. Standardization and standards. Accuracy and precision. Sensitivity and magnification systems. Errors, geometric tolerances. Surface texture. Interferometry and laser applications. Inspection and limit gauging. Quality control and sampling techniques, lot-acceptance, sampling plans, statistical control charts, quality assurance systems, total quality management.

Prerequisites: IE 331, MENG 434

MENG 446 Advanced Manufacturing Technology (3:2,3)

Non-conventional machining: Principles, Ultrasonic machining, Electromechanical Machining, Electro-discharge Machining, Plasma Arc Machining, Laser Beam Machining, Electron Beam Machining. Numerical Control of Machine Tools: Automation of Manufacturing Processes, Numerical Control, Coordinate systems, Types and components of CNC systems, Programming for CNC, Adaptive control, Computer Integrated Manufacturing.

Prerequisites: MENG 332

MENG 448 Composite Materials (3:2,3)

Classification. Applications. Processing and fabrication of composites (metal-matrix, ceramic-matrix, reinforced plastics, honeycomb materials, forming structural shapes). Design Considerations. Laminate

structures. Stress-strain characteristics of fiber-reinforced materials. Lamination theory. Failure theories of fiber-reinforced materials. Environmentally induced stresses in laminates.
Prerequisite: MENG 270, MENG 332

MENG 450 Computer Aided Manufacturing (3:2,3)

Automation strategies. Production economics. High volume production systems. Automated flow lines. Assembly and line balancing. Numerical control. NC part programming. DNC, CNC, and adaptive control. Industrial robots. Material handling and storage. Group technology and flexible manufacturing. Quality control and automated inspection. Control systems. Programmable controllers. Computer networks.
Prerequisites: MENG 204, MENG 436

MENG 452 Manufacture Planning and Shop Loading (3:2,3)

Productivity: Methods of measurement. Production methods and machine capacities. Planning of manufacturing process. Flow and handling of materials. Factory location decisions. Plant layout. Scheduling, loading and project planning. Group technology. Cost estimation. Forecasting and pre-planning for production. Computer-aided process planning. Computer-integrated manufacturing systems.
Prerequisites: MENG 434

MENG 454 Welding Technology (3:2,3)

Fusion welding. Weldability. Selection of welding electrodes. Hot cracking. Cold cracking. Welding metallurgy, heat affected zone. Welding of heat-treatable alloys. Welding of dissimilar alloys. Destructive and nondestructive testing of welds. Weld thermal cycles and residual stresses. Welding in manufacturing: pressure vessels, boilers and ship building industries; welding in automotive maintenance. Welding codes.
Prerequisite: MENG 332

MENG 458 Special Topics in Production Engineering (3:2,3)

Topics relevant to specialization of Production Engineering to strengthen student's knowledge in this field.
Prerequisite: MENG 332

MENG 468 Plasticity and Metal Forming (3:2,3)

Yield criteria, plastic stress-strain relations. Plane stress, plane strain. Determination of flow stress. Applications in beam bending, instability in thin shells. Classification of metal forming processes. Bulk deformation processes. Techniques of analysis: slab method, upper bound method. Slip-line fields, application to indentation problem. Forging, rolling, extrusion. Rod and wire drawing equipment and dies.

Prerequisites: MENG 270, MENG 332

MENG 470 Mechanical Vibrations (3:2,3)

Free and damped vibration of single degree of freedom systems. Viscous damping. Forced vibration. Resonance. Harmonic excitation. Rotating unbalance. Base motion. Vibration isolation. Fourier analysis. Vibration measuring. General excitation. Step and impulse response. Two degree of freedom systems. Frequencies and mode shapes. Modal analysis. Undamped vibration absorber. Multidegree of freedom systems. Matrix methods. Raleigh and Raleigh-Ritz methods. Continuous systems, axial, torsional and bending vibrations. Finite element method. Applications with computer programs.

Prerequisite: Math 204, MENG 262

MENG 472 Fault Diagnosis of Mechanical Systems (2:1.3)

Review of vibration: Free Vibration, Harmonically Excited Vibration, Fourier Analysis. Instruments: Transducers, FFT Analyzer, Sampling and Aliasing. Vibration problems: Imbalance, Misalignment, Bearings, Gears, Fans, Belts. Techniques and Maintenance Management. Sound; Basic Properties of Waves, Intensity, Power Level. Balancing: Static Unbalance, Dynamic Unbalance, Field Balancing.

Prerequisites: MENG 410, MENG 470

MENG 476 Mechanical Systems Modeling and Simulation (3:2,3)

Modeling of mechanical, thermal, hydraulic and pneumatic systems. Setups involving ordinary derivatives and partial derivatives. Application examples. Numerical simulations. Numerical simulations with finite elements. Numerical optimum-seeking models.

Prerequisites: EE 332, MENG 366

MENG 478 Mechanisms **(3:2,3)**

Analytical and computer techniques for kinematic and dynamic analysis of linkages. Virtual links. Method of kinematic coefficients. Inversion. Geared linkages. Mechanisms with actuators. System response to dynamic inputs.

Prerequisites: MENG 364

MENG 480 Introduction to Robotics **(3:2,3)**

Classifications. Forward kinematics: Orientation coordinate transformations. Configuration coordinate transformations. Denavit-Hartenberg coordinate transformations. Inverse kinematics for a planar robot, revolute robot, spherical robot. The 3-D case. Force and torque relations. Trajectory planning. Coordinated motion. Lagrange equations. Inverse dynamics.

Prerequisites: MENG 364

MENG 482 Mechatronics **(3:2,3)**

Introduction, Modeling and Simulations: Simulation and Block Diagrams. Ana1ogies. Electrical and Mechanical Systems. Electro-Mechanical Coupling. Fluid Systems. Sensors and Transducers. Actuating Devices. DC, Stepper and Servomotors. Fluid Power Actuation. Piezo Electric Actuators. Hardware Components. Number Systems. Binary Logic Systems and Control. Real Time Interfacing. Data Acquisition and Control Systems. The I/O Process.

Prerequisite: EE 251

MENG 488 Special Topics in Applied Mechanics **(3:2,3)**

Topics relevant to specialization of applied Mechanics to strengthen the student’s knowledge in this field.

Prerequisite: MENG 364

MENG 499 Senior Project **(4:2.6)**

Project formulation and team work. Searching for alternative solutions. Evaluation and comparisons. Decision making for the most suitable solution. Detailed analysis and design. Manufacture and testing of a prototype. Conclusions and recommendations. Oral project presentation and submission of a formal report.

Prerequisite: MENG 412

DEPARTMENT OF THERMAL ENGINEERING AND DESALINATION TECHNOLOGY

FACULTY

Chairman:

Bokhary, Ahmad Y.

Professors:

Aly, Samir E.
Al-Rabghi, Omar M.
Al-Turki, Abdullah M.
Radhwan, Abdulhaiy M.
Zaki, Galal M.

Associate Professors:

Abdulhafiz, Nazrul-Islam
Ahmad, Nafis A.
Al-Beirutty, Mohammed. H.
Al-Hazmy, Majed M.
Bogasha, Saleh A.
Fatani, Abdulhadi
Habeeballah, Badr A.
Madani, Anas A.
Siddiqui, Mansoor M.

Assistant Professors:

Bokhary, Ahmad Y.
Gari, Abdullateef A.
Khalid, Abdulrahim, A.
Turkmen, Nedim H.

INTRODUCTION

The Department of Thermal Engineering and Desalination Technology (ThED) is a division of the Mechanical Engineering Department at King Abdulaziz University. The program started on 23/3/1982 G (28/5/1402 H) to meet the Kingdom's growing needs for mechanical engineers with broad background in the fields of power generation, sea water desalination, air-conditioning, heat exchangers and other thermo-mechanical systems. These areas have been emphasized in appreciation to their importance for the fast growing development of the Kingdom and the neighboring Gulf States.

The department of Thermal Engineering and Desalination Technology offers a Bachelor of Science degree (B.Sc.) in Mechanical Engineering with Thermal Sciences Major. The program provides graduates with the professional skills, engineering knowledge, effective communication proficiency, ability to work in teams and appreciation of the ethical, societal and global issues required for the engineer of the future.

The five-year program of Thermal Engineering and Desalination Technology provides the theoretical knowledge, skills and proficiency that enable graduates to commence their career as competent mechanical engineers. The Department offers a strong mechanical engineering program with special emphasis on thermal engineering applications such as refrigeration and air-conditioning, saline water conversion, energy conversion systems as well as internal and external combustion systems.

The department prepares the graduates to contribute effectively as professional engineers in a diverse and multidisciplinary work environment. They can also upgrade their profession by enrolling in the Master of Science programs provided by the Department or elsewhere. The master’s program covers areas of power generation and conversion, refrigeration and air conditioning, and desalination technologies.

VISION

To acquire and maintain a position of excellence in Mechanical Engineering Education.

MISSION

Prepare distinctive quality students in mechanical engineering, able to apply the acquired knowledge successfully with engineering professional ethics based on Islamic values to serve the society, and pursue advanced studies.

OBJECTIVES AND OUTCOMES

The program of the Thermal Engineering and Desalination Technology Department (ThED) focuses on the following three main areas:

- Energy aspects (e.g. generation, conversion, conservation, etc.) with concerns about the theory, design aspects and systems performance.
- Seawater desalination as an important source of domestic water for the Kingdom of Saudi Arabia and the Gulf States. The program focuses on conventional and non conventional desalination technologies. This includes the theoretical and technical features, water chemical treatment and plants' performance analysis.
- Thermo-fluids and heat transfer, which are widely encountered in many engineering fields, such as refrigeration and air conditioning and refinery industrial processes.

The B.Sc. Program qualifies the graduates to fit into a wide range of job opportunities such as working in steam and gas turbine power plants, internal combustion engines, desalination industries, refrigeration and air conditioning, alternative energy sources, thermal industrial units (e.g. furnaces, boilers, and combustion equipment).

In general, the program objectives are designed to prepare the graduates to effectively join the industry at the B.Sc. level and have *productive careers in the mechanical engineering profession* or other related fields. The necessary fundamentals are given to the students by a rigorous instruction in the engineering sciences and extensive laboratory and design experience together with appreciation of *team work*, *communications* skills, *ethics*, and *environmental awareness*. Objectives also include *preparing students for graduate studies* at the M.Sc. and/or Ph.D. level in Mechanical Engineering or related fields. In order to provide students with the opportunity to *deepen their technical understanding* in a particular subject, the number of elective courses has been increased; thus a broader education in Mechanical-Thermal systems is provided through flexible choice from a larger number of technical and non-technical elective courses.

The expected accomplishments of graduates during the first few years after graduation termed as the program educational objectives (PEO) are stated below.

The program educational objectives are:

1. Engage in productive careers in Mechanical Engineering with emphasis on thermal and water desalination systems, or pursue postgraduate studies

2. Advance in their careers through effective modeling, analysis, and design of mechanical-thermal systems, responding to continuous developments in the field and the needs of the society

3. Practice professional engineering and contribute to the profession and to the society through team work, effective communication and appreciation of ethical, societal, environmental and economical issues.

The objectives were first drafted by the faculty in 2004 and revised after consultation with the constituents (Alumni and preliminary evaluation consultants). The three PEO are related to the fifteen outcomes as follows:

PEO	ABET Program outcomes											ME			
	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*	*m*	*n*	*o*
1- Engage in productive careers ……	X				X							X	X	X	
2- Advance in their careers through effective …		X	X						X	X	X				X
3- Practice professional engineering and contribute …				X		X	X	X							

The ThED **program outcomes** (*what the students are expected to know and be able to do by the time of graduation*) are stated in the following:

Criteria 3	Graduates will have
a	An ability to apply knowledge of mathematics, science, and engineering
b	An ability to design and conduct experiments, as well as to analyze and interpret data.
c	An ability to design a system, component, or process to meet desired needs
d	An ability to function on multi-disciplinary teams
e	An Ability to identify, formulate, and solve engineering problems
f	An understanding of professional and ethical responsibility
g	An ability to communicate effectively
h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
i	A recognition of the need for, and an ability to engage in life-long learning
j	Knowledge of Contemporary Issues
k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
l	An ability to apply knowledge of chemistry and calculus-based physics [ME criteria]
m	An ability to apply advanced mathematics through multivariate calculus and differential equations. [ME criteria]
n	Familiarity with statistics and linear algebra. [ME criteria]
o	An ability to work professionally in thermal and mechanical engineering systems, including the design and realization of such systems. [ME criteria]

PROGRAMS OFFERED

The Department of Thermal Engineering and Desalination Technology offers a five years Bachelor of Science degree (B.Sc.) in Mechanical Engineering with a major in thermal sciences and water desalination disciplines. *This program is accredited as substantially equivalent to similar programs in US universities by the Accreditation Board for Engineering and Technology (ABET).* The program involves a Coop option for which students spend two semesters of practical training. In addition, the Department offers a graduate program leading to Master of Science degree (M.Sc.) in Mechanical Engineering.

CAREER OPPORTUNITIES

Career opportunities for the Thermal Engineering and Desalination graduates vary. Graduates work for both the government or private sectors. The graduates are generally employed by the following corporations and companies:

- ARAMCO (Arabian-American Company)
- SABIC
- Saudi Arabian Airlines
- Governmental Agencies, such as the Ministry of Petroleum and Minerals, Ministry of Agriculture, Ministry of Industry and Ministry of Electricity and Water, etc.
- Chemical and Petroleum Industry
- Automotive Industry
- Power and Electricity Company
- SWCC (Saline Water Conversion Corporation)
- Land and Sea Transport and Shipping Companies
- Foreign Companies in the Kingdom of Saudi Arabia (ABB, GE, Unilever)
- Other Industrial and Private Sectors

FACILITIES

The Department has two types of facilities;

- Educational labs. serving the undergraduate program,
- Research and support facilities for graduate programs and faculty research.

- **Educational Laboratories**
  - **Thermodynamics Laboratory**
    This lab serves the basic thermodynamic course MEP 261.
  - **Fluid Mechanics Laboratory**
    The lab serves the basic Fluid Mechanics course MEP 290.
  - **Heat Transfer Laboratory**
    The Lab is equipped with several experimental units that cover and verify the basic concepts such as heat conduction, natural and forced convection, parallel and cross flow heat exchangers and boiling and condensation. The Lab serves the relevant courses as MEP 360 and MEP 460.
  - **Air Conditioning and Refrigeration Laboratory**
    The equipment and instrumentation available in the laboratory meet the needs of relevant courses, i.e., MEP 451 and MEP 452.

- **Internal Combustion Engines Laboratory**

  The Lab is equipped with instrumentation and a modern 4 stroke SI test engine. The Lab Covers the needs of the undergraduate level courses, MEP 370 and MEP 471
- **Gas Turbine Engine Laboratory**

  The lab contains two small engines suitable for illustration of Turbomachines and Gas Turbines relevant course MEP 474
- **Thermal Engineering Measurements**

  The laboratory is a special one where the students assemble the experimental rig. The lab is equipped mainly with constant temperature baths (-10 to 100 °C), dead weight pressure calibration units, water circulation loop for calibration of different flow meters. The laboratory with the present facilities is sufficient for hands-on student experience and illustration of calibration importance. The Lab serves the relevant course MEP 365.
- **Solar Energy Laboratory**

  The laboratory is equipped with Eppley radiometers for global and diffuse radiation measurement. Students measure the solar intensity on planes of different tilt angles, orientation and solar hour. The radiation properties for different opaque and semitransparent surfaces are also measured. This Lab serves the relevant course MEP 478.
- **Desalination Laboratory**

  This Lab includes two desalination units. One operates on the basis of Multi Stage Flash (MSF) technology. The second operates on Reverse Osmosis (RO) technology. These units are used to show students the main components of each desalination technology. The Lab serves the relevant courses: MEP 481 and MEP 482.

- **Research and Support Facilities**
  - **Advanced Fluid Facility**

    The lab is well equipped for research in the area of turbulent flow measurement. The lab is equipped with measuring instruments as hot wire anemometer and data acquisition system. The lab serves senior and graduate level projects.

- **Thermal Comfort facility**
  The Thermal Comfort Facility is designed to study the physiological and psychological influences of thermal environment on human subjects. The laboratory contains a controlled environment chamber. The laboratory is a unique facility that could contribute to the research and development of thermal comfort.
- **Steam Supply Station**
  The station is equipped with three fully automated steam generators capable of producing a total of 4,000 kg/h of steam flow rate. Besides the steam generators, the station has a separate superheater, steam turbine, steam calorimeter, steam nozzle apparatus, steam condenser and two cooling towers.
- **Desalination Station**
  The station is equipped with a multi-stage flash (MSF) desalination unit coupled to steam generators and cooling towers of the steam supply station.

PROGRAM REQUIREMENTS AND CURRICULUM

Total credit hours required for graduation is 155 Cr. Hrs. The credit units required for the B.Sc. degree in the Department of Thermal Engineering and Desalination Technology are distributed as follows:

Conventional Program

Requirements	Cr. Hrs
University Requirements	14
Faculty Requirements	61
Departmental Requirements	80
Total	**155**

Cooperative Program

Requirements	Cr. Hrs
University Requirements	14
Faculty Requirements	61
Departmental Requirements	72
Coop Program	8
Total	**155**

Departmental Requirements Core Courses (73 Cr. Hrs)

Course No.	Course Title	Cr. Hr.	Prerequisite
MATH 241	Linear Algebra I	3	MATH 101
MENG 130	Basic workshop	2	MENG 102
MENG 204	Comp. Aided Graphics	3	MENG 102
MENG 262	Engineering Dynamics	3	CE 201
MENG 270	Mechanics of Materials	4	CE 201
MENG 310	Machine Elements Design	3	MENG 204, MENG 270
MENG 364	Machine Dynamics	3	MENG 262, EE 201
MENG 410	Mechanical Design	3	MENG 310, MENG 364
ChE 210	Material Science	4	CHEM 101,
MEP 261	Thermodynamics I	4	MATH 102, PHYS 101
MEP 290	Fluid Mechanics	4	MATH 102, PHYS 101
MEP 360	Heat Transfer	4	MEP 261, MEP 290, MATH 241, IE 202
MEP 361	Thermodynamics II	3	MEP 261, MEP 290
MEP 365	Thermal Eng. Measurements	3	MEP 261, MEP 290, IE 255, EE 251
MEP 370	Internal Comb. Engines	3	MEP 261, MEP 290, ChE 210
MEP 390	Summer Training	2	MEP 360, MEP 361
MEP 451	Aircond. and Refrig. I	3	MEP 360,
MEP 460	Applied Heat Transfer	3	MEP 360, MEP 361
MEP 473	Power Plant	3	MEP 360, MEP 361, IE 255
MEP 474	Turbomachines and Gas Turb.	3	MEP 360, MEP 361, MEP 370
MEP 481	Thermal Desal. Processes	3	MEP 360, MEP 361
MEP 482	Membrane Desal. Processes	3	MEP 360, MEP 361
MEP 499	Senior Project	4	MEP 360, MEP 361, MEP 365, MEP 332, MEP331
Total		**73**	

Departmental Requirements Elective Courses (7 Cr. Hrs)

The student has to choose two or three courses from the following list:

Course No.	Course Title	Cr. Hr.	Prerequisite
ChE 311	Corrosion Engineering.	3	MEP 261 or CHEM 240, ChE 210
IE 256	Engineering Management	2	IE 202
MENG 332	Manufacturing Technology	3	MENG 130, ChE 210
MENG 470	Mechanical Vibrations	3	MENG 262, MATH 204
MENG 482	Mechatronics	3	EE 251
EE 202	Object-oriented Computer programming	3	EE 201
EE 352	Electrical Machines and Electronics	4	EE 251
MEP 452	Refrigeration and A/C II	3	MEP 451
MEP 463	Modeling and Simulation of Thermal Systems.	3	EE 201, MEP 360
MEP 466	Control System Engineering	3	MEP 360, MEP 460
MEP 471	Combustion and Pollution	3	MEP 361, MEP 370
MEP 472	Energy Conversion	3	MEP 361
MEP 476	Automotive Engineering	3	MEP 370
MEP 478	Renewable Energy	3	MEP 360
MEP 483	Desalination Plants	3	MEP 482
MEP 490	Applied Fluid Mechanics	3	MEP 290
MEP 496	Applications in Thermal Eng.	2	MEP 360, MEP 361
MEP 497	Selected Topics in Mech. Eng.	3	MEP 360, MEP 361
xx xxx	Any course from other engineering departments.	-	MEP 360, MEP 361

A TYPICAL PROGRAM FOR THERMAL ENGINEERING AND DESALINATION TECHNOLOGY STUDENTS

1st Year
Regular & Cooperative

1st semester			2nd semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
ELC 101	English Language I	2	ISLS 201	Islamic Culture 2	2
CHEM 101 / PHYS 101	General Chemistry I / General Physics I	4	PHYS 101 / CHEM 101	General Physics I / General Chemistry I	4
MATH 101	Calculus I	4	MATH 202	Calculus II	4
ARAB 101	Arabic Language I	3	ELC 102	English Language II	2
ISLS 101	Islamic Culture I	2	MENG 102	Engineering Graphics	3
Total		**15**	**Total**		**15**

2nd Year
Regular & Cooperative

3rd semester			4th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
PHYS 102	General Physics II	4	IE 202	Introduction to Engineering Design (2)	2
IE 201	Intro Eng Design (1)	3	EE 201	Structured Computer Programming	3
ARAB 201	Arabic Language II	3	MATH 204	Differential Equations I	3
MENG 130	Basic workshop	2	MEP 261	Thermodynamics I	4
MATH 203	Calc & Vec. Analysis	4	CE 201	Eng Mech (Statics)	3
Total		**16**	**Total**		**15**

3rd Year
Regular & Cooperative

5th semester			6th semester		
Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
ChE 210	Material Science	4	MEP 360	Heat Transfer	4
MEP 290	Fluid Mechanics	4	MEP 361	Thermodynamics II	3
MATH 241	Linear Algebra I	3	EE 251	Basic Elec. Eng.	4
EE 332	Comput Meth in Eng.	3	MENG 204	Comp. Aided Graphics	3
MENG 262	Eng Mech. Dynamics	3	MENG 270	Mechanics of Materials	4
Total		**17**	**Total**		**18**

4th Year
Regular

7th semester			8th semester		
Course No.	Course Title	Cr. Hrs	Course No.	Course Title	Cr. Hrs
MEP 481	Thermal Desal. Processes	3	MEP 451	Refrigeration & A/C I	3
MENG 364	Machine Dynamics	3	MEP 370	Internal C E.	3
IE 255	Eng. Economics	3	IE 331	Probability & Statistics	3
MENG 310	Mach. Elements Design	3	ISLS 301	Islamic Culture 3	2
MEP 460	Applied Heat Transfer	3	MEP 365	Thermal Eng. Measurements	3
Total		**15**	**Total**		**14**

Training

MEP 390	Summer Training	2 Cr. Hrs

4th Year
Cooperative

7th semester			8th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
MEP 481	Thermal Desal. Processes	3	MEP 451	Refrigeration & A/C I	3
MENG 364	Machine Dynamics	3	MEP 370	Internal CI	3
ISLS 301	Islamic Culture 3	2	IE 331	Probability and Statistics	3
MENG 310	Mach. Elements Design	3	ISLS 401	Islamic Culture 4	2
IE 255	Eng. Economics	3	MENG 410	Mechanical Design	3
MEP 460	Applied Heat Transfer	3	MEP 365	Thermal Eng. Measurements	3
Total		**17**	**Total**		**17**

5th Year
Regular

9th semester			10th semester		
Course No.	**Course Title**	**Cr. Hrs**	**Course No.**	**Course Title**	**Cr. Hrs**
MEP 482	Membrane Desal. Processes	3	MEP 499	Senior Project	4
MENG 410	Mechanical Design	3	MEP 474	Turbo machines and Gas Turbines	3
xx xxx	Elective of Social Sciences	3	MEP 473	Power Plants	3
xx xxx	Eng. Elective (1)	3	ISLS 401	Islamic Culture 4	2
xx xxx	Eng. Elective (2)	2	xx xxx	Eng. Elective (3)	2
Total		**14**	**Total**		**14**

5^{th} Year
Cooperative

9^{th} semester

Course No.	Course Title	Cr. Hrs
MEP 400	Coop Work Program (follows the completion of the 4^{th} year courses)	8
Total		**8**

10^{th} semester

Course No.	Course Title	Cr. Hrs
MEP 498	Senior Project	3
MEP 473	Power Plants	3
MEP 482	Membrane Desal. Processes	3
MEP 474	Turbo machines and Gas Turbines	3
xx xxx	Elective of Social Sciences	3
xx xxx	Eng. Elective (2)	2
Total		**17**

COURSE DESCRIPTION

MEP 261 Thermodynamics I (4:3,2)

Concepts and definitions, Properties of pure substances, Different forms of energy, Concepts of Heat and work. First law of thermodynamics. Applications of first law on closed system and control volume. Second law of thermodynamics. Entropy, isentropic efficiency. Some power and refrigeration cycles (including Rankine Cycle, vapor compression cycle, Otto cycle, Diesel cycle, Brayton cycle).
Prerequisite: MATH 102, PHYS 101.

MEP 290 Fluid Mechanics (4:3,2)

Concepts and definitions, Fluid statics. Forces on submerged surfaces and bodies. Non-viscous flow, conservation of mass, momentum and energy. Bernoulli equation. Dimensional analysis. The PI-Theorem, similarity. Viscous flow, pipe flow, losses in conduit flow . laminar and turbulent flow.
Prerequisites: MATH 102, PHYS 101.

MEP 360 Heat Transfer (4:3,2)

Principles of Heat Transfer, steady state and transient conduction in different co-ordinates, extended surfaces. Convective heat transfer. Analysis and empirical relations for forced and natural convection. Radiation heat transfer, radiation exchange between black and gray surfaces. Heat transfer applications (Heat Exchangers). Numerical methods in heat transfer with computer applications.
Prerequisites: MEP 261, MEP 290, MATH 241, IE 202.

MEP 361 Thermodynamics II (3:3,1)

Irreversibility and availability. Thermodynamic relations. Mixtures and solutions. Chemical reactions and combustion. Phase and Chemical equilibrium. Thermodynamics of compressible flow.
Prerequisites: MEP 261, MEP 290.

MEP 365 Thermal Engineering Measurements (3:2,3)

Introduction on the use of computers in the Lab Error analysis. Temperature measurement. Pressure measurement. Flow measurement (mass flow rate, velocity, flow visualization). Torque. Speed, power measurements. Introduction to Data Acquisition Systems. Experiments for basic and comparative calibration of different instruments and their applications

Prerequisites: MEP 261, MEP 290, IE 255, EE 251.

MEP 370 Internal Combustion Engines (3:3,1)

Spark ignition and compression ignition engine types, design and operating parameters; thermo chemistry of fuel-air mixture and thermodynamic models of working fluids and engine cycles. Gas exchange processes and volumetric efficiency. Carburetors and electronic fuel injection. Performance parameters. Combustion chamber design, and octane number. Diesel fuel injection, supercharging of 4-stroke and 2-stroke S.I. and C.I.engines.

Prerequisites: MEP 261, MEP 290, ChE 210.

MEP 379 Power Plants For Elec. Eng. (3:3,1)

Steam power plants: plant components and subsystems. Plant efficiency calculations, Diesel and gas turbine power plant auxiliary systems. Load curves. Economy of power generation. Experiments on power plants.

Prerequisite: MEP 261.

MEP 390 Summer Training (10 weeks) (2:0,0)

Training in industry under the supervision of a faculty member. Students have to submit a report about his achievements during training in addition to any other requirements as assigned by the department.

Prerequisite: MEP 360, MEP 361.

MEP 392 Bio Fluid Mechanics (3:3,1)

Introduction to thermodynamics: Concepts of heat and work, specific heat and enthalpy, Fluid statics and hydrostatic pressure. Viscous and non-viscous, laminar and turbulent flows, Circulatory biofluid mechanics, Properties of flowing blood, Models of biofluid flows, non-Newtonian fluids. Heat generation by metabolism, modeling of heat transfer in human bodies

Prerequisite: PHYS 102.

MEP 400 Cooperative Work (26 weeks) (8:0,0)

Training in industry under the supervision of a faculty member. Students have to submit a report about his achievements during training in addition to any other requirements as assigned by the department.

Prerequisite: MEP 360, MEP 361.

MEP 451 Refrigeration & Air Conditioning I (3:3,1)

Review of basic thermodynamics, vapor compression cycles, multi-stage and cascade vapor compression refrigeration. Refrigerants and their characteristics. Basic vapor compression equipment, Introduction to absorption refrigeration. Psychrometry and psychrometric processes. Human comfort. Heat gain-through walls and fenestrations. Cooling load calculations. Calculation using software packages.

Prerequisite: MEP 360.

MEP 452 Refrigeration & Air Conditioning II (3:3,1)

Cascade V.C. cycle, Gaseous air refrigeration cycles. Absorption refrigeration systems. Thermoelectric cooling. Cold storage and applications. Refrigeration control systems, Air distribution systems (duct design).Air conditioning systems and their representation on psychometric chart. Air conditioning control. Air conditioning equipment

Prerequisite: MEP 364.

MEP 460 Applied Heat Transfer (3:3,1)

Classification of Heat Exchangers, Design Correlations and Fouling, Basic Thermal Design Methods and Iterative Techniques, Double-Pipe Heat Exchangers, Shell-and-tube Heat Exchangers, Compact Heat Exchangers, Other Heat Exchangers, Correlations for Two-Phase Flow, Condensers and Evaporators

Prerequisite: MEP 360, MEP 361.

MEP 463 Modeling and Simulation of Thermal Systems (3:3,1)

Basic considerations and types of modeling, Numerical modeling and simulation of thermal systems, Optimization and search techniques, Examples and applications using computer.

Prerequisite: EE 201, MEP 360

MEP 466 Control System Engineering (3:3,1)

Control and dynamic system. Laplace transforms and transfer function. Basic control systems. Dynamic thermal systems. Control system components, System simulation, Simulation error analysis, Stability analysis, Transient and frequency domain methods, Control system design by the root locus method, Application for thermal system control, computer applications.

Prerequisites: MEP 360, MEP 460.

MEP 471 Combustion and Pollution (3:3,1)

Liquid fuels: chemical composition and reaction, properties and tests. Combustion theory. Laminar and turbulent flames. Combustion in C.I. and S.I. engines. Combustion in furnace. Furnaces design. Pollutant formation and control for NOx. CO and VHC; and particulate emissions.

Prerequisite: MEP 361, MEP 370.

MEP 472 Energy Conversion (3:3,1)

Review of indirect energy conversion systems, (ICE, gas turbine engines, steam pp): energy storage; thermoelectric; photovoltaic; magneto hydrodynamic gen.; fuel cells; other energy conversion systems.

Prerequisite: MEP 361.

MEP 473 Power Plants (3:3,1)

Energy demand and power generation systems. Steam and gas power cycles. Fuels and combustion. Basic and auxiliary systems of a steam p.p. Steam generator analysis. Steam turbines and their controls. Diesel engine and gas turbine power plants. Overall plant performance. Economics of power plants.

Prerequisites: MEP 360, MEP 361, IE 255.

MEP 474 Turbo Machines and Gas Turbines (3:3,1)

Fluid mechanics and energy transfer in turbo – machines, Centrifugal and axial compressors. Centrifugal and axial flow turbines. Applications, including industrial gas turbine engines and aircraft engines.

Prerequisites: MEP 360, MEP 361, MEP 370

MEP 476 Automotive Engineering (3:3,1)

Alternative prime movers and electric vehicles; Spark ignition engine and Diesel engine fuel economy. Transmission system; Vehicle aerodynamics; Vehicle design; case studies.

Prerequisite: MEP 370.

MEP 478 Renewable Energy (3:3,1)

Review of heat transfer, solar angles, and solar radiation on earth's surface. Solar radiation on tilted surfaces. Radiation measurements. Solar collectors and concentrators, storage, photovoltaic, wind energy, geothermal energy. Other renewable energy sources.

Prerequisite: MEP 360

MEP 481 Thermal Desalination Processes (3:3,1)

Electrolytic solutions, collegative properties, chemical treatment, venting. Multiple effect systems (MED), Multistage-flashing systems (MSF), Vapor compression systems VC, Dual-purpose plants (DPP), introduction to corrosion, Computer applications.

Prerequisite: MEP 360

MEP 482 Membrane Desalination Processes (3:3,1)

Intake, pumping, Filtration, ion exchange, pretreatment, Membranes, Membrane technology, Reverse Osmosis systems (RO), principles, system design, RO membranes characteristics. Electrodialysis (ED), Other membrane processes, introduction to fouling, Computer applications

Prerequisites: MEP 360, MEP 481

MEP 483 Desalination Plants (3:3,1)

Comparison of different desalination systems. Development of desalination processes, characteristics of varies systems. System design and selection, intake and disposal, water pretreatment, post treatment processes, corrosion and material selection. Desalination system economy.

Prerequisite: MEP 482

MEP 490 Applied Fluid Mechanics (3:3,1)

Differential forms of the governing equations for fluid flow. Inviscide flow, compressible flow, boundary layer flow. Flow machines, Flow in pipe networks with applications using computer codes.

Prerequisite: MEP 290

MEP 496 Applications in Thermal Eng. (2:1,2)

The contents are directed to a particular application in the field of thermal engineering and prepared by the department.

Prerequisite: MEP 360, MEP 361.

MEP 497 Selected Topics in Mech. Eng. (3:3,1)

The content of this course will be prepared each year by the Thermal Eng. and Desalination. Tech. Dept.

Prerequisite: MEP 360, MEP 361.

MEP 498 Senior Project (Coop Program) (3:1,4)

Selection of topic; literature review; project design planning arranging for data collection and experimental work, Intrim report, Experimental work and data collection or field study (if any) Data processing Analysis and results. Preparation of the first draft of final report. Presentation of the project, Final report.

Prerequisite: MEP 360, MEP 361.

MEP 499 Senior Project (4:2,6)

Selection of topic; literature review; project design planning arranging for data collection and experimental work, Intrim report, Experimental work and data collection or field study (if any) Data processing Analysis and results. Preparation of the first draft of final report. Presentation of the project, Final report.

Prerequisite: MEP 360, MEP 361, MEP 365, MEP 332, MEP331.

COURSES OFFERED BY OTHER FACULTIES

Description of Courses Specially Offered to Engineering Students from other Faculties

ACCT 101 Principles of Accounting 1 (3:3,0)

The aim of this course is to teach students fundamentals of accounting. The emphasis is on financial accounting. A brief history of accounting; the users of accounting information, accounting assumptions and principles, the accounting cycle, basic accounting equation, double-entry system, recording process, trial balance, and financial statements.

ARAB 101 Arabic Language I (3:3,0)

This course aims at providing students with basic Arabic skills such as grammar, morphology, and orthography through selected readings.

ARAB 201 Arabic Language II (3:3,0)

This course aims at providing students with intermediate Arabic language skills such as reading, speaking, and writing through selected readings.

BIO 321 Biology for Biomedical Eng. Students (3:3,1)

Introduction to biology, tissues, cells and chemistry of line, skeleton, joints, muscles. Nervous system, it's organization, division and functions, sense organs. Processing of food. Basic anatomy and physiology of cardiovascular, lymphatic, respiratory, and urinary systems.

Prerequisite: CHEM 101

BIO 322 Physiology for Biomedical Eng. Students (3:3,1)

Body environment, fluids and compartments, digestive systems. Respiratory system and artificial respiration. Cardiovascular system and its regulatory mechanism, hemodynamics, metabolism and body temperature regulation. Endocrinology reproductive system, renal physiology.

Prerequisite: BIO 321

BIOC 370 Biochemistry of Medical Engineers (4:3,1)

Structure and functions of biomelecules: carbohydrates, lipids, amino acids, proteins and nucleic acids-Enzymes and coenzymes-Metabolism and energy - Respiration - body fluid - Role of biochemistry in some medical areas.

Prerequisite: CHEM 101

CHEM 101 General Chemistry I (4:3,3)

Significant figures and units, stoichiometry, atomic structure & periodic table, chemical bonding and molecular geometry, hybridization, molecular orbital theory of diatomic molecules, chemical and ionic equilibria, basic principles of organic chemistry, types of organic compounds and their IUPAC nomenclature.

CHEM 102 General Chemistry II (4:3,3)

Thermo chemistry, gases, liquids, solutions, chemical kinetics, oxidation-reduction reactions, chemical thermodynamics, electrochemistry, colloids, nuclear chemistry, environmental effects.

Prerequisite: CHEM 101

CHEM 231 Principles of Organic Chemistry I (4:3,3)

Classification and nomenclature of organic compounds, Bonding, Isomerism, Reactions of mono-functional organic compounds.

Prerequisite: CHEM 101

CHEM 232 Principles of Organic Chemistry II (4:3,3)

Polyunsaturated hydrocarbons and Dines - (X, 3-unsaturated carbonyl compounds - dicarbonyl compounds - dicarboxylic acids and their esters - halogen and hydroxyl acids - stereochemistry and carbohydrates - polynuclear aromatic hydrocarbons - Alicyclic compounds.

Prerequisite: CHEM 231

CHEM 240 Physical Chem. For Non-Chem. Majors (4:3,3)

Thermodynamic systems; first, second and third law of thermodynamics; free energy functions and their applications, chemical equilibria, phase equilibria, electrochemical cells, surface phenomena, kinetics, theory of gases, chemical kinetics and reaction rates.

Prerequisites: CHEM 102, MATH 102

ECON 101 Principles of Microeconomics (3:3,0)

The objective of this course is to familiarize the student with economic methodology, ways of thinking and essentials of the economic phenomena. It includes the following topics: basic tools of economic analysis, consumer behavior theory, producer behavior theory, distribution theory, determinants of production factors′ prices.

ELC 101 English Language I (2:15,0)

Interchange 1: Listening and communication. Writing 1: Academic Writing. Reading: Password 1: Vocabulary & Comprehension. Technical English Program: Bridging Gap between General and Technical English. Computer Assisted Language Learning (CALL): English Grammar Express Basic, Learn to Speak English Level 1, Side by Side 1-4. Oral Presentation Skills, Reading Aloud Techniques. PowerPoint Presentation. Portfolio Keeping.

ELC 102 English Language II (2:15, 0)

Interchange 2: Listening and communication. Writing 2: Academic & Applied Writing for Business and Technical Purposes. Reading: Password 2: Vocabulary & Comprehension. Computer Assisted Language Learning (CALL): Understanding and Using English Grammar, Learn to Speak English Level 2 & 3, English Interactive (US) 4. Oral Presentation Skills. Reading Aloud Techniques. PowerPoint Presentation. Portfolio Keeping.

Prerequisite: ELC 101

EMR 101 General Geology (1) (3:3,2)

Introduction to earth science and its different branches. Origin of the earth. Introduction to crystallography. Introduction to mineralogy-study of rock forming minerals, their properties and classification. Occurrence, properties and classification of igneous sedimentary and metamorphic rocks. Agents and factors of alteration on earth crust. Laboratory study of Crystals, minerals and rocks in hand specimens. Field trip for one day around Jeddah during Official working hours.

EMR 102 General Geology (2) (4:3,2)

Composition of primary and secondary structures of the earth and its layers. Relief of continents and oceans. Mountains building. Continental drifts. Seafloor spreading. Plate tectonics. Earthquakes. Volcanoes. Laboratory study of geological (Contour, topographic) maps. Field trip for one day around Jeddah during official working hours.

Prerequisite: EMR 101

ISLS 101 Islamic Culture 1 (2:2,0)

This course comprises two sections: 1-Culture and its source 2- Aqidah.

ISLS 201 Islamic Culture 2 (2:2,0)

This course focuses on Islamic jurisprudence: its branches, sources and purposes. Students will have the chance to study and memorize certain Quranic Suras and Hadiths.

ISLS 301 Islamic Culture 3 (2:2,0)

This course demonstrates the comprehensive-ness of Islam and all aspects of individual as well as group life style. It focuses on family system, from an economic. social and legal point of view.

ISLS 401 Islamic Culture 4 (2:2,0)

This course presents a study of two Islamic societies: the ideal society where all Islamic values are practiced and the deviant current in contemporary society; negative powers that intentionally target Islam with malignant intentions.

MATH 101 Calculus I (4:4,1)

Review of functions. Trigonometric functions: definitions, graphs, inverse trigonometric functions, identities, laws of sine and cosine. Limits: limit of a function, limit laws, continuity. Derivatives: Derivative of a function, differentiation formulas, derivatives of trigonometric functions, the chain rule, implicit differentiation, higher derivatives. Applications. Applications of differentiation: Maximum and minimum values. Rolle's Theorem and the Mean Value Theorem. Concavity and inflection points, asymptotes. Curve sketching of elementary functions.

MATH 202 Calculus II (4:4,1)

The hyperbolic functions, differentiation and integration. Indeterminate forms and L'Hospital's rule. Techniques of integration: Review of integration by substitution, integration by parts, trigonometric integrals and substitutions, integration of rational functions by partial fractions, rationalizing substitutions, and improper integrals. Infinite sequences and series: Sequences and series, tests for convergence and divergence of series, power series, representation of function functions by power series, Taylor and Maclaurin series. Applications of integration: Volumes, arc length, and surface area.

Prerequisite: MATH 101

MATH 203 Calculus III (4:4,1)

Introduction to the three dimensional geometry. Vector- valued functions. Functions of several variables: Functions, limit and continuity, partial derivatives, chain rule, directional derivatives, gradient vectors, tangent planes and normal lines, the maximum and minimum values, Lagrange multipliers. Multiple integrals: Double integrals in rectangles and polar coordinates and applications, triple integrals in rectangular, cylindrical and spherical coordinates and applications, change of variables. Vector Calculus: Vector fields, curl and divergence, line integrals, Green's Theorem, surface integral, Stoke's Theorem, and the Divergence Theorem.

Prerequisite: MATH 102

MATH 204 Differential Equations I (3:3,1)

Basic concepts and terminology. Solutions of ordinary differential equations, some mathematical models and existence and uniqueness theorem. Methods of solution for various kinds of first degree and first order differential equations, applications. Differential operators and higher order linear ordinary differential equations with constants coefficients, methods of solution. Cauchy-Euler equation. Laplace transform and its applications to linear ordinary differential equations.

Prerequisite: MATH 102

MATH 241 Linear Algebra I (3:3,1)

Introduction to system of linear equations, Gaussian elimination and Gauss-Jordan elimination. Matrices, Operations on matrices, properties of matrix operations, inverse of a matrix, elementary matrices. Determinants, Determinants of a matrix, elementary row operations, properties of determinants, Cramer′s rule. Vector spaces and subspaces, linear combinations and linear independence, bases and dimensions. Rank of a matrix, the coordinates, change of bases. Definition of a linear transformation, kernel, range, nullity, and matrix associated with a linear transformation and vice-versa, dimension theorem. Eigenvalues, eigenvectors, and eigenspaces.

Prerequisite: MATH 101

PHY 372 Physiology for Biomedical Eng. Students (3:3,1)

Body environment, fluids and compartments, digestive systems. Respiratory system and artificial respiration. Cardiovascular system and its regulatory mechanism, hemodynamics, metabolism and body temperature regulation. Endocrinology reproductive system, renal physiology.

Prerequisite: BIO 321

PHYS 101 General Physics 1 (4:3,3)

Physical quantities and dimensional analysis, vectors, motion in one dimension, motion in a plane, Newton's laws, friction, work and energy, impulse, momentum, collisions, and rotational motion.

Prerequisite: MATH 101

PHYS 102 General Physics II (4:3,3)

Charge and electric force, electric field, Gauss' law, electric potential, capacitance, current and resistance, DC circuits, magnetic force, magnetic field, induction and inductance, magnetism of matter and Maxwell's equations.

Prerequisite: PHYS 101, MATH 101

PSY 422 Occupational Psychology (3:3,0)

Definition, work and performance analysis, employment, work incentives, professional satisfaction, work stress management, leadership, work conditions and safety.

FACULTY MEMBERS

List of Faculty Members, Degrees, Graduation Years and Specialization

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Abd El Latif, Ahmed K. Professor Ext.: 68307 akabdellatif@hotmail.com	MENG	1962 Cairo University, Egypt	1965 UMIST, UK	1967 UMIST, UK	Design Fatigue Graphics
Abd El-Wahed, Mohamed Lecturer Ext.: 68287 Ms-wahed@yahoo.com	MENG	1997 Zagazig University Egypt	2006 Mansoura University Egypt		Industrial Engineering
Abdel Haffez, Gamal Saad Assistant Professor gamalhaffez@yahoo.com	MINE	1990 Assiut University Egypt	1999 AlAzhar University Egypt	2005 Assiut University Egypt	Mining Engineering Mineral Processing Mine Survey
Abdrabou, Mahmoud Associate Professor Ext.: 68252 mabd_rabou@yahoo.com	MENG	1987 Cairo University, Egypt	1990 Cairo University, Egypt	1995 Cairo Univ. + TH Aachen, Germany	Design Railway Eng.
Abdul Aal, Reda M Professor Ext.: 68338 redawithyou@yahoo.com	IE	1979 Helwan Univ. Egypt	1982 Helwan Univ. Egypt	1986 Bradford Univ. England	O.R. System Analysis & Design
Abdulhafiz, Nazrul-Islam Associate Professor Ext. 66357 nabdulhafiz@kau.edu.sa nazrul.amu@gmail.com	MEP	1988 Aligrah Muslim University, India	1990 Aligrah Muslim University, India	1997 Indian Institute of Technology, Bombay, India	Heat Transfer , Computational Fluid Dynamics
Abdulsalam, Mohammed I. Professor Ext.: 68245 miabdul@hotmail.com	ChE	1985 KAU S.A.	1987 Univ. of Southern California U.S.A.	1991 Arizona Stat Univ. U.S.A.	Corrosion Physical Metallurgy Materials Engineering Surface Oxidation
Abdulwhab, A.S. Assistant Professor Ext.: 68156 aabdulwha@hotmail.com	EE	1996 K.A.A.U K.S.A	1998 Univ. of Sagkatchewan Canada	2003 Univ. of Sagkatchewan Canada	Power systems reliability

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Abed, Seraj Y. Associate Professor Ext.: 68020 sabed@kau.edu.sa	IE	1974 K. Fahad Univ. of Petroleum S.A.	1977 Westren Michigan Univ. USA	1982 Iowa state Univ. USA	Sys. Simulation & Info. Sys.
Aboukhashaba, Abdulmalik A. Professor Ext.: 68492	MENG	1971 KSU, KSA	1975 UMIST, UK	1978 Salford University, UK	Production Engineering
Aboushook, Mahmoud Professor Ext. 52273 profdraboushook@gmail.com	MINE	1947 Cairo University Egypt	1978 Al- Azahr University Cairo	1984 Polytechnique France	Rock Mechanics Rock & Soil Engineering Engineering Geology
Abu Mansour, Talal M.N. Associate Professor Ext.: 68045 tabumansour@hotmail.com	MENG	1977 KFUPM, KSA	1981 UMIST, UK	1988 UMIST, UK	Plasticity Applied Mechanics
Abulfaraj, Tareq G. Assistant Professor Ext.: 52185 tareq@royah.com	NE	1981 KAU, Saudi Arabia	1984 Michigan State University, USA	1989 Michigan State University, USA	Nuclear Reactor Physics and Kinetics, Numerical Analysis, Radiation Shielding
Abulfaraj, Waleed H. Professor Ext. 52037 Eng-dean@kau.edu.sa	NE	1976 KSU, Saudi Arabia	1980 Iowa State University, USA	1983 Iowa State University, USA	Reactor Analysis, Heat Transport, Nuclear Safety, Decision Theory
Aburas, Hani M Assistant Professor Ext.: 68470 haburas@kau.edu.sa	IE	1995 KAU S.A.	1999 Univ. of Central Florida, USA	2002 Univ. of Central Florida, USA	Simulation Modeling & Analysis
Abu-Rizaiza, Omar. S. Professor Ext.: 52499	CE	1975 King Saud University KSA	1979 Oklahoma University USA	1982 Oklahoma University USA	Water Resources Engineering, Planning and Management
Adas, Aahmed A. Associate Professor Ext.: 68151 alaadas@kau.edu.sa	EE	1973 King Saod Univ. K.S.A	1976 Brmingham Univ. U.K	1982 Colorado B. Univ. U.S.A	Computer Eng.

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Affandi, Adnan M. Professor Ext.: 68159 aaffandi@kau.edu.sa	EE	1976 Kent Univ. U.K	1978 Kent Univ. U.K	1982 Kent Univ. U.K	Electronics & Communications. Local Area Networks.
Ahmad, Nafis Associate Professor Ext.68405 drnafis_ahmad@yahoo.com	MEP	1978 Aligrah Muslim University, India	1982 Aligrah Muslim University, India	2001 Indian Institute of Technology, New Delhi, India	Internal Combustion Engines Thermodynamics Automotive Engineering
Ahmed, Hussin A..M.. Assistant Professor Ext. 66474 Hussien135@hotmail.com	MINE	1991 Assiut University Egypt	1998 Cairo University, Egypt	2005 Wroclaw Univ. Poland	Mining Engineering Mineral Processing Economics
Akyurt, Mehmet M. Professor Ext.: 68298 makyurt@kau.edu.sa	MENG	1963 Middle East Tech. Univ., Turkey	1964 Middle East Tech. Univ., Turkey	1969 Purdue Univ., USA	Applied Mechanics Mechanisms
AL-Abdulaziz, Abdulaziz U. Associate professor Ext.: 68023 authman@kau.edu.sa	EE	1976 KFUPM K.S.A	1980 CSU, Sacramento U.S.A	1985 UMIST, Manchester U.K	Electrical Power Systems
Alama, Mohammed S. Assistant Professor Ext.: 68302 Sohaib_alama@hotmail.com	CE	1982 King AbdulAziz Univ. KSA	1985 University of Michigan USA	1991 University of Michigan USA	Structures Seismic Engineering
Al-angari, Haitham M. Assistant Professor Ext.: 66315 hangari@kau.edu.sa	EE	1980 KAU KSA	2001 Northwestern University	2005 Northwestern University	EE, Biomedical
Al-Bahi, Ali M. Professor Ext.: 68429 abahi@kau.edu.sa	AE	1975 Cairo Univ. Egypt	1980 ENSAE Toulouse France	1983 ENSAE Toulouse France	Experimental Aerodynamics Flight Mechanics CFD,Aircraft Maintenance
Albar, Hamed O. Associate Professor Ext.: 68092 albarho@yahoo.com	CE	1976 King Fahd U.P.M. KSA	1979 California State University USA	1985 Michigan State University USA	Traffic Engineering Highway Safety Public Transportation

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Al-Beirutty, Mohammed H. Associate Professor Ext.: 68268 / 52219 mbeirutty@kau.edu.sa	MEP	1980 Univ. of Wisconsin USA	1982 Univ. of Wisconsin USA	1987 Univ. of Washington USA	Heat Transfer Turbulent flows Refrig. And Air Conditioning
Al-Darrab, Ibrahim A. Associate Professor Ext.: 68330 idarab@kau.edu.sa	IE	1974 K. Fahad Univ. of Petroleum S.A.	1976, 79 Stanford Univ. USA	1987 Stanford Univ. USA	Eng. Econ. Sys. O.R. & Statistics
Al-Dhaheri, Rabah W. Professor Ext.: 68161 rdhaheri@kau.edu.sa	EE	1975 King Saud Univ. K.S.A	1981 Ohio Univ. U.S.A	1988 Michigan State Univ. U.S.A	Digital Communication & Digital Signal Processing
Aldousari, Saad M. R. Assistant Professor Ext.: 68174 saadaldousari@hotmail.com	MENG	1980 KAU, KSA	1987 Sheffield Polytech., UK	1993 Bradford Univ., UK	Production Eng. Manufacturing Tech.
Al-Fahied, Mohammad S. Associate professor Ext.: 68072	EE	1980 Univ. of California, Irvine U.S.A	1982 CSU, Fullerton U.S.A	1988 Color. State Univ., Fort Collins, U.S.A	Control Systems
Al-Ghamdi, Abdullah S. Associate Professor Ext.: 68311 alghamdi@kau.edu.sa	CE	1985 King AbdulAziz Univ. KSA	1991 Colorodo State Univ. USA 1987, Univ. of Iowa, USA	1993 Colorodo State University. USA	Hydraulic Engineering & Fluid Mechanics
Alhamed, Yahia A. S. Associate Professor Ext.: 68244 yasalhamed@hotmail.com	ChE	1981 King Saud Univ. S.A.	1985 Univ. of Waterloo Canada	1990 Univ. of Waterloo Canada	Catalysis Reaction Eng. Pollution Control
Al-Hazmy, Majed M. Associate Professor Ext.: 68259 mhazmy@kau.edu.sa	MEP	1990 King Abdulaziz University SA	1994 Univ. of Maryland, USA	1998 Oregon State Univ. USA	Applied Thermodynamcis Modeling & Analysis of Thermofluid Systems

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Ali, Maher S. Lecturer Ext.: 68172 Mali_yy@hotmail.com	AE	1966 Cairo Univ. Egypt	1979 Cranfield Inst. of technology. U.K.	1987 Cairo Univ. Egypt	Aerodynamics Aircraft Performance Flight Safety
Alidrisi, Mustafa M. Professor Ext.: 68577 malidrisi@kau.edu.sa	IE	1974 K. Fahad Univ. of Petroleum S.A.	1976 Michigan Univ. USA	1981 Michigan Univ. USA	Sys. Opt. Solutions Stochastic Systems O.R.
Aljawi, Abdulghaffar A. Associate Professor Ext.: 68242 a_aljawi@hotmail.com	MENG	1984 KFUPM, KSA	1989 Univ. of Michigan, USA	1993 Univ. of Michigan, USA	Vibrations FEM Analysis Applied Mechanics
Al-Jifry, Mohammad S. Professor Ext.: 52506 ms_jiffry@hotmail.com	IE	1974 Oklahoma State Univ. USA	1977 Oklahoma State Univ. USA	1983 Oklahoma State Univ. USA	Operation Research Human Resource Planning
Aljinaidi, Abdulmalik A. Associate Professor Ext.: 68128 aljinaidi@yahoo.com	MENG	1988 KAU, KSA	1991, KAU, KSA 1994, Univ. of Maryland, USA	1995 Univ. of Maryland, USA	Applied Mechanics & Design Smart Structures
Al-Johani, Mmohammed S. Associate Professor Ext.: 52964 maljohani@hotmail.com	NE	1983 KAU, Saudi Arabia	1985 KSU, Saudi Arabia	1996 Georgia Inst. Of Tech. Atlanta Georgia, USA	Computational Fluid Dynamics, and heat transfer
Aljuhani, Mohammad S. Associate Professor Ext.: 52184 mjuhani@kau.edu.sa	MINE	1985 King Abdul-Aziz Univ. KSA	1988 University of Pittsburgh. USA	1994 West Virginia Univ. Morgantown, USA	Mining Engineering (Planning and management). Surface Mining
Al-Juhany, Khalid A. Assistant professor Ext.: 68153 Chairman-aero@kau.edu.sa	AE	1987 George Washington Univ. USA	1989 California Inst. of Technology. USA	1993 California Inst of Technology USA	Experimental Aerodynamics Gas Dynamics
Al-Khateeb, Abdulahameed F. Assistant Professor Ext.: 68328 drkhateeb@kau.edu.sa	EE	1987 KAU K.S.A	1992 Univ. of Michigan U.S.A	1997 Pensylvania Univ. U.S.A	Biomedical Eng.

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Al-maghrabi, Mohammad N. Associate Professor Ext.: 52273 mmaghrabi@kau.edu.sa	MINE	1981 King Abdul-Aziz Univ. KSA	1986 S. Dakota School of mines and Technology, USA	1994 Nottingham Univ. UK	Mineral Processing. Rock Mechanics. Eng. Management.
Al-Masood, Abdul Rahmen H. Associate Professor Ext.: 68203 amasoud@kau.edu.sa	EE	1981 KAU K.S.A	1986 KAU K.S.A	1992 Strathclyde Univ. U.K	Power Systems; Protection
Almasoumi, Abdullah S. Assistant Professor Ext.: 52980 abdullahalmasoumi@hotmail.com	NE	1974 KSU, Saudi Arabia	1978 Massachusetts Inst., USA	1990 OSU, USA	Industrial Applications of Nuclear Techniques Monte Carlo Modeling of Transport Phenomena
Al-Mohammadi, Abdulaziz. Lecturer Ext.: 68329	CE	1977 King Fahd U.P.M. KSA	1982 Toledo University USA	N.A.	Structures
Al-Moreb, Ahmed A. Associate Professor Ext.: 68459 dr.moreb@gmail.com	IE	1978 Arizona State Univ. USA	1981 California Univ. USA	1988 C. Florida. Univ. USA	Stat. & Stoch. Process Operations Research
Al-Nabulsi, Khalid A. Professor Ext.: 68216 knabulsi@kau.edu.sa	EE	1976 King Saud Univ. K.S.A	1980 Arizona univ. U.S.A	1984 Arizona Univ. U.S.A	Electronics, Communications & Electromagnetics
Alnefaie, Khaled A. Assistant Professor Ext.: 52277 kalnefay@hotmail.com	MENG	1991 KAU, KSA		2000 Univ. of Central Florida, USA	Mechanical Design Applied Mechanics Modal Analysis
Al-Noury, Solaiman I. Professor Ext.: 68300 salnoury@hotmail.com	CE	1973 Cairo University Egypt	1976 Purdue University USA	1980 Purdue University USA	Structural Analysis, Structural Dynamics Numerical Methods R.C. Design
Al-Othmany, DheyaS. Assistant Professor Ext.: 52260 dothmany@kau.edu.sa	NE	1981 KAU, Saudi Arabia	1984 Iowa State University, USA, 1987 Univ. of Missouri Columbia, USA	1995 Univ. of Aberdeen, UK	Radiation Protection Radioactive Waste Disposal Tritium Enrichment by Gas Chromatography

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Al-Qadi, Ibrahim M. Assistant professor Ext.: 68611 ialqadi@kau.edu.sa	AE	1993 KAU, KSA	1997 Ohio State Univ. USA	2003 Ohio State Univ. USA	CFD Aero dynamics GAS Dynamics Heat Transfer
Al-Qasabi, Majid A. Associate Professor Ext.: 68088	IE	1981 Portland Univ. USA	1984 Missouri Univ. U.S.A	1985 Missouri Univ. U.S.A	Eng. Management Stat. & Stoch. Process.
Alqasmi,Redwan M. Associate Professor Ext.: 68135 ralqasemi@gmail.com	MENG	1994 KAU	Wichita State Univ. 2001	Univ. of South Florida 2007	Robotics
Al-Qassimi, Abdulaghani M. Assistant Professor Ext.: 68009 aqasimi@kau.edu.sa	EE	1980 KAU K.S.A	1983 Univ. of Michigan, U.S.A	1988 Colorado S. Univ. U.S.A	Computer Engineering.
Al-Rabghi, Omar M. Professor Ext.: 52997 / 68445 orabghi@kau.edu.sa orabghi@hotmail.com	MEP	1980 King Abdulaziz University SA	1982 Univ. of Michigan USA	1988 Univ. of California USA	Modeling of Thermal Systems Solar energy utilization Refrigeration & AC. Energy Conservation.
Al-Rawi, Ghazi M. Assistant Professor	EE	1994 KAU KSA	1998 Stanford Univ. U.S.A	2003 Stanford Univ. U.S.A	
Al-Shahrani, Saad Said Assistant Professor Ext.: 68042 sasasha@yahoo.com	ChE	1990 KAU KSA	1999 KAU KSA	2004 UMIST UK	Chem. Eng., Environ.
Al-Shenkiti, Mohamed A. Assistant Professor Ext.: 68019 mashnkit@kau.edu.sa	EE	1975 King Saud Univ. K.S.A	1981 Ohio Univ. U.S.A	1994 Univ. of Illinois U.S.A	VLSI Graph Theory Network Theory
Altajem, Muhammed A. Assistant Professor Ext.: 68040 mtajem@hotmail.com	ChE	1975 KFUPM S.A.		1982 University of Leeds U.K.	Environmental Eng. Petroleum Tech. Catalysis & Reaction Eng.

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Al-Turaif, Hamed A. Assistant Professor Ext.: 68044 halturaif@hotmailm.com	ChE	1989 KAU S.A.	1994 Univ. of Maine U.S.A	1999 Univ. of Maine U.S.A	Surface Analysis Science
Al-Turki, Abdullah M. Professor Ext.: 68047 / 52237 Abdu_sa@hotmail.com	MEP	1974 King Fahad Univ. of Petroleum and Min. SA	1981 Univ. of Iowa USA	1984 Univ. of Iowa USA	Heat transfer Numerical Calculation Thermal Science
Al-Turki, Ali A. Lecturer Ext.: 68223	CE	1984 King AbdulAziz Univ. KSA	1988 King AbdulAziz Univ. KSA	N.A.	Structures
Al-Turki, Yusuf A. Professor Ext.: 68024 yaturki@yahoo.com	EE	1980 KAU K.S.A		1985 Manchester Univ. U.K	Electrical Power Systems and Machines
Aly, Samir E. Professor Ext.: 68126 samaly43@hotmail.com	MEP	1965 Alexandria Univ. Egypt	1973 Trondheim Univ. Norway	1975, 1979 Trondheim Univ, Norway 1979 Glasgow Univ., UK	Desalination Technology Energy Conversion Two-Phase Flow
Al-Zahrani, Abdul Rahim H. Professor Ext.: 68281 ahmzahrani@hotmail.com	CE	1975 King Saud University KSA	1978 Bradley University USA	1983 Washington State University USA	Traffic Management Haj Transportation Transport Planning Traffic Studies
Al-Zahrani, Abdulrahim A. Professor Ext.: 68246 aaoz@hotmail.com	ChE	1982 KFUPM S.A.	1983 Oregon State Univ. U.S.A	1989 Oregon State Univ. U.S.A	Process Control, Modeling and Simulation Fluidization Waste Treatment
Alzaidi, Samir A. Professor Ext.: 66485 samiraalzaidi@hotmail.com	NE	1968 Univ. of Mustansaria, Iraq	1972 Georgia Inst. Of Tech. Atlanta Georgia, USA	1976 Georgia Inst. Of Tech. Atlanta Georgia, USA	Radiation Technology Radiation Measurement Nuclear Medicine

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Al-Zehary, Abdul MutiY. Assistant Professor Ext.: 68313	EE	1976 Univ. of California U.S.A	1977 Univ. of Southern California U.S.A	1992 Sant Andurz Univ. U.K	Biomedical Eng.
Ashour, Sameer A. Professor Ext.: 68496 samir_ashour@yahoo.com	CE	1981 King Fahd U. P. M. KSA	1983 University of Michigan USA	1987 University of Michigan USA	Earthquake Engineering Reinforced Concrete Steel Design
Ashraf uddin Assistant Professor Ext.: 68093 Uddin98@hotmail.com	EE	1980 phyics honours	1982 micro-electronics	1991 micro-electronics	micro-electronics
Asiri, Saeed A. Assistant Professor Ext.: 68175 saeed@asiri.net	MENG	1995 KAU, KSA	2002 Univ. of Maryland, USA	2003 Univ. of Maryland, USA	Vibrations Applied Mechanics
Awedh. Mohammad Assistant Professor Ext.: 68234 mhawedh@kau.edu.sa	EE	King Abdullaziz Saudi Arabia Jeddah	King Abdullaziz Saudi Arabia Jeddah	University of Colorado of Boulder USA	Computer Eng. Formal verrdicodion of Hardware system
Badr, Salah A. E. Assistant Professor Ext.: 66474 Sbadr200@gmail.com	MINE	1992 Suez Canal Univ. Egypt	1999 Al-Azhar University Egypt	2004 Clorado University USA	Mining and Earth System Engineering
Bafail, Abdullah O. Associate Professor Ext.: 68471 abafail@kau.edu.sa	IE	1979 K. Fahad Univ. of Petroleum S.A.	1982 S. California Univ. USA	1989 Arizona State Univ. USA.	Prod. Planning & Control Stat. & Stoch. Process Forecasting
Baghdadi, Zaki A. Professor Ext.: 68235 baghdadiz@yahoo.com	CE	1974 King Saud University KSA	1977 University of South California, USA	1982 University of Arizona USA	Soil Properties Soil Improvement Foundations
Bajodah, Abdulrahman H. Assistant professor Ext.: 68031 abajodah@yahoo.com	AE	1412h KAU, KSA		2003 Georgia Instit. and Technolgy USA	Automatic control.

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Balamesh, Ahmed S. Assistant Professor Ext.: 68464 abalamesh@kau.edu.sa	EE	1986 KAU K.S.A	1989 Univ. of Michigan U.S.A	1995 Univ. of Michigan U.S.A	Electronics & Communications
Balamesh. Abdullah Assistant Professor	EE	King Abdullaziz Saudi Arabia Jeddah	Syraluse University Syracasc,NY USA	University of Arizouna. Tucau,AZ USA	Modeling & Performance eralyation of computer vetworks
Bamani, Ali H. Professor Ext.: 68028 abamani@kau.edu.sa	EE	1977 King Saod Univ. K.S.A.	1980 Tulane Univ. U.S.A	1985 Univ. of Colorado U.S.A	Automatic Control
Bamufleh, Hisham S. Assistant Professor Ext.: 68811 hbamufleh@kau.edu.sa	ChE	1997 KAU S.A.	1999 University of Tulsa\ Oklahoma U.S.A.	2002 University of Tulsa Oklahoma U.S.A.	Pero chemical Petroleum Refining Fluidization
Banafa, Ahmed M. Assistant Professor Ext.: 68352 banafa@members.asce.org	CE	1980 King AbdulAziz Univ. KSA	1987 University of Colorada USA	1991 University of Colorada USA	Value Engineering Probabilistic Approach in Construction
Basalama, Mohammed K. Assistant Professor Ext.: 52250 mbasa2000@yahoo.com	CE	1980 King AbdulAziz Univ. KSA	1984 Univ. of Michigan USA	1988 Colorodo State University USA	Soils Properties Geostatistics Soil Dynamics
Bashir, Muhammad D. Associate Professor Ext.: 68039 madbashir@hotmail.com	ChE	1966 Univ. of Engg. and Tech. Lahire Pakistan	1970 Univ. of Manchester Institute of Science and Tech., UK	1974 Univ. of Manchester I.S.T UK	Process Design, Automation, Safety and Environmental Engineering
Bogasha, Saleh A. Associate Professor Ext. 66335	MEP	1980 South University of Gabes Tunesia	1985, National Institute of Polytechneque France 1992, Almanar Uni Tunesia	2003 Almanar University Tunesia	Memberane Technology Desalination Chemical Engineering Renewble Energy

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Bogis, Haitham A. Assistant Professor Ext.: 68010 hbogis@hotmail.com	MENG	1983 Cairo Univ., Egypt	1987 Univ. of Wisconsin- Madison, USA	1994 Univ. of Wisconsin- Madison, USA	Machine Design Applied Mechanics
Bokhary, Ahmed Y. Assistant Professor Ext.: 66263 / 68049 abokhary@kau.edu.sa aybokhary@gmail.com	MEP	1981 King Abdulaziz University SA	1985 Univ. of Michigan USA	1999 Sheffield Univ. UK	Thermal Science Internal Combustion Engines Air Conditioning
Bourchak Mostefa Assistant professor Ext 68031 mosbour@yahoo.co.ok	AE	2000 Kingston Univ UK	2003 Bristol Univ UK	2007 Bristol Univ UK	Composite Struchres Fahgur thalrs NDT / NDE Vibration
Daous, Muhammed A. Associate Professor Ext.: 68342 mdaous@hotmail.com	ChE	1975 KFUPM S.A.	1978 Oregon State Univ. U.S.A	1983 Oregon State Univ. U.S.A	Fluidization Engineering Heterogeneous Catalysis Solid Waste Treatment
Darwish, Mahmoud A. Proffoser Ext.: 52192 darwishmam@hotmail.com	MINE	1970 Montana College of Science & Tech. USA	1977 West Virginia Univ. USA	1984 West Virginia Univ. USA	Rock Blasting (Fragmentation) Mining Methods.
Dawoud, Uthman M. Associate Professor Ext.: 68271 udawoud@hotmail.com	ChE	1972 KFUPM S.A.	1975 KFUPM S.A.	1980 The Univ. of Oklahoma U.S.A	Corrosion Heat & Mass Transfer
Diken, Hamza Professor Ext.: 68253 hdiken@yahoo.com	MENG	1978 Istanbul Technical Univ., Turkey	1980 Istanbul Technical Univ., Turkey	1986 Rensselaer Polytech. Inst., USA	Robotics Control Vibrations
Djouider, Farthi Assistant Professor Ext.: 68194 fathid@yahoo.com	NE	1980 University of Science & Technology, Algiers	1986 University of Rome	1994 University of Leeds, England	Nuclear Engineering

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Dubaie, Abdullah M. Assistant Professor Ext.: 68158 adobaie@kau.edu.sa	EE	1981 KAU K.S.A	1989 KAU K.S.A	1995 Colorado S. Univ. U.S.A	Communications
El Zein El Siddig Abdalla Lecturer hrs-zein@hotmail.com	CE	1985 University of Khartoum Sudan	1990 International Institute for Hydrolic and Environmental Engineering Netherlands		Hydrolic Engineering
Elgohary, Mahmoud E. Lecturer Ext.: 68347 maljohari@kau.edu.sa	NE	1994 Univ. of Alexandria, Egypt	2001 Univ. of Alexandria, Egypt		Simulation of Radiation Interaction Using Mol. Dynamic Technique
El-Hindawi, Mohamed M. Assistant Professor Ext.: 68276 mmhin@hotmail.com	EE	1969 Al-Azher Univ. Egypt	1975 Al-Azher Univ. Egypt	1981 Cairo Univ. Egypt	Power Electronics
El-Komy, Adel S. Assistant Professor Ext.: 68709 asalkomy@hotmail.com	CE	1985 Cairo University Egypt	1989 Cairo University Egypt	1996 Cairo University Egypt	Surveying Photogrammetry
Elshazly, Ahmed Hassan Associate Professor Ext.: 68039 Elshazly-a@yahoo.com	ChE	1991 Alexandria University Egypt	1996 Alexandria University Egypt	2001 Alexandria University Egypt	Chemical Engineering
Enani, Mohammed A. Assistant Professor Ext.: 52546 enanim@yahoo.com	NE	1984 KAU, Saudi Arabia	1988 Univ. of Missouri Columbia, USA	1997 Univ. of Missouri Columbia, USA	Nuclear Reactor Thermal Hydraulics and Simulation Nuclear Radiation Safety and Detection Reactor Physics and Safety Radioactivity levels in food.

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Fadol, Abbas A. Associate Professor Ext.: 52192 alfadol@yahoo.com alfadol@kau.edu.sa	MINE	1971 The Univ. of Utah USA	1976 S. Dakota School of Mines and Technology, USA	1991 Univ.of Wisconsin-Madison, USA	Mining Engineering Mining Economics Mine Project Planning Spreadsheet Simulation
Farid, Syed M. Lecturer Ext.: 68768 Smfarid44@hotmail.com	NE	1972 Rajshahi Univ. Bangladesh	1980 Kurukshetra Univ. India	1984 Univ. of Birmingham , UK	Radiation Physics Health Physics
Fatani, Abdulhadi A. Associate Professor Ext.: 68169 eng_the@hotmail.com	MEP	1974 King Fahad Univ SA	1977 Univ. of Washington USA	1983 Oregon State Univ. USA	Heat transfer Numerical analysis Fluid mechanics
Fatani, Mohamed Noor Y. Professor Ext.: 68105 mnfatani@kau.edu.sa	CE	1970 California State Univ. USA	1973 University of Arizona USA	1980 University of Arizona USA	Highway Materials Geotechnical Engineering
Fatani, Waddah H. Lecturer Ext.: 66224	EE	1977 Cairo Univ. Egypt	1981 Miami Univ. U.S.A		Computer Science
Gari, Abdullateef Abdulhadi Assistant Professor Ext. 66211 agari@kau.edu.sa dr.abdullatif.gari@gmail.com	MEP	1994 King Abdulaziz University SA	1999 Oklahoma State University USA	2006 University of South Florida USA	Computational Heat Transfer Applied Heat transfer Air Conditioning
Ghandourah, Emad Ismat Lecturer	NE	1996 KAU KSA	2003 KAU KSA		Nuclear Engineering
Gouda, Alaa M. Assistant Professor Ext.: 68132 agouda@kau.edu.sa	EE	1986 Cairo Univ. Egypt	1991 Monoufiah Univ. Egypt		Electronics Computer Eng.
Gulzar, Waqar A. Assistant Professor Ext.: 68034 wahmed@kau.edu.sa	IE	1996 Preston Univ. USA	1998 Preston Univ. USA	2000 Preston Univ. USA	Information Systems Software Development

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Habeebullah, Badr A. Associate Professor Ext.: 68232 /66666 bhabeeb@kau.edu.sa	MEP	1981 King Abdulaziz University SA	1984 Univ. of Michigan USA	1989 Univ. of Colorado. USA	Thermodynamic Analysis Combustion
Habib, Sami S. Associate professor Ext.: 68171 Sami_habib@hotmail.com	AE	1978 KFUPM KSA	1983 Univ. of California USA	1986 Univ. of Leads U.K.	Aircraft Design, Flight Safety, Aircraft structures, and Materials
Hafez, Salah M. Assisstat professor Ext 66696 shafaz@kau.edu.sa	AE	1979 Cairo Univ Egypt	1985 Cairo Univ Egypt	1990 Melb . Univ Australia	Low Speed Aerodynamics Boundory layer Turbnlence Cont
Hajjar, Amjed F. Assistant Professor Ext.: 68015 amjadhajjar@hotmail.com	EE	1992 K.A.A.U K.S.A	1997 Colorado S. Univ. U.S.A	2002 Colorado S. Univ. U.S.A	VLSI Design
Hamdi, Ameen S. Lecturer Ext.: 68506 ahamdi@kau.edu.sa	CE	2004 King AbdulAziz Univ. KSA	2007 King AbdulAziz Univ. KSA		Transportation
Hamed, Mostafa A. Professor Ext.: 68290 moshamed@hotmail.com	MENG	1973 Cairo University, Egypt	1977 Cairo University, Egypt	1981 Univ. of South Carolina, USA	Applied Mechanics Machine Design
Harasani , Wail I. Associate professor Ext 66172 wailharasani@hotmail.com	AE	1996 King Abdul Aziz Univ	1998 Kansas Univ . USA	2005 Cranfield Univ U . K .	Aircraft Design, Fleet Planning , And stability And control
Hashem, Ayman A. Assistant Professor Ext.: 68076 ibnarab@yahoo.com	IE	1985 Stanford Univ. USA	1988 Stanford Univ. USA	1999 Michigan Univ. USA	Eng. Management Stat. & Stoch. Process.
Hassan, Said Ali Professor Ext: 68033 saalquliti@kau.edu.sa	IE			1981 Tech. National Inst. France	Info. Sys. Operations Research

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Hedia, Hassan Sayed Associate Professor Ext.: 68218 hedia@mans.edu.eg	MENG	1981 Cairo University, Egypt	1989 Mansoura University Egypt	1996 Mansoura University Egypt	Production Engineering
Hegazy, Yaser A. Associate Professor Ext.: 68747 yhegazy@kau.edu.sa	CE	1990 Cairo University Egypt	1996 Georgia Institute of Technology USA	1998 Georgia Institute of Technology USA	Geotechnical Engineering
Husein, Rashad M. Assistant Professor Ext.: 68018 r_husein@hotmail.com	CE	1983 King AbdulAziz Univ. KSA	1987 University of Illinios USA	1990 University of Illinios USA	Value Engineering Repair of Structures Thermal Insulation
Hussein H. Maged Assistant Professor Ext.: 68181 drmagedhhd@gmail.com	CE	1985 Zagazig Univirsity Egypt	1996 Cairo University Egypt	2002 Cairo University Egypt	Water Resources Environmental Engineering
Hussein, Wael S. A. Lecturer Ext.: 68577 wsalsaid@yahoo.com	IE	1998 Zagazig Univ. Egypt	2005 Zagazig Univ. Egypt	NA	Facility Layout Genetic Algorithms Operations Research
Idris, Gaber Mohammed Assistant Professor Ext.: 66460 Gaber-idris@yahoo.com	ChE	1990 Alexandria University Egypt	1994 Alexandria University Egypt	2001 Institute National Polytechnique de Toulouse- France	Chemical Engineering
Iskanderani, Faisal I. Associate Professor Ext.: 68036 faisalimi@hotmail.com	ChE	1976 KFUPM S.A.	1979 Stanford U.S.A	1985 Univ. of Florida	Enhanced Oil Recovery Materials Engineering Comp. Appl. In Che. Eng.
Jalal, Aabdulaziz M. Associate professor Ext.: 68078 ajalal1@hotmail.sa	EE	1981 KAU K.S.A	1986 Colorado Univ. U.S.A	1993 Toledo Univ. U.S.A	Power System Control
Jiffry, Mustafa A. Assistant Professor Ext.: 68027 mjiffry@kau.edu.sa	EE	1978 Univ. of California U.S.A	1993 K.A.A.U K.S.A	2000 Londen univ. U.K.	Concurrency and Language Compiling

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Jomoah, Ibrahim M. Associate Professor Ext.: 68404 ijomoah@hotmail.com	IE	1986 KAU. S.A.	1990 Miami Univ. USA	1994 Miami Univ. USA	Human Factors Eng. Eng. Management Ind. Safety & Hygiene
Justanieah, Ahmed M. Assistant Professor	ChE	1997 KAU S.A.	2000 Univ.of California U.S.A.	2004 Univ.of California Los Angekes U.S.A	
Kada Belkacem Assis tant Prfcuor Ext 68015 Belkacamkad@hotmail.com	AE	1992 USTO ORON Algana	1998 USTO ORAN Algana	2006 Laval Univ Canada	Complex Automatn and Automatic conrpl Signal prlessing Aircraft Desingn and onalyn
Kaki, Adnan H. Lecturer	EE	1977 Purdue Univ. U.S.A	1979 O.S.U. U.S.A		Computer Eng.
Karagozoglu Bahattin M. Associate professor Ext.: 68468 bkaragoz@kau.edu.sa	EE	1972 Middle East Tech. Univ. (METU) Turkey	1974 METU, Ankara Turkey	1977 Strathclyde Univ. Glasgow, U.K	Biomedical Eng.
Karuvatt, Shaoukath A. Assistant Professor Ext.: 68050 shoukath@kau.edu.sa	IE	1968 Kerala Univ. India	1970 Kerala Univ. India	1993 Indian Inst. Of Tech, Bombay India	Operations Research Stat & Stoch. Process.
Khairy, Ahmed T. Lecturer Ext.: 68502 akhairy_1999@yahoo.com	CE	1983 Ain-Shams University Egypt	1991 Ain-Shams University Egypt	N.A.	Structures
Khalafallah, Bahjat H. Assistant Professor Ext.: 52229 b_h_khalafallah@hotmail.com	CE	1974 King Saud University KSA	1977 Stanford University USA	2001 Aston University UK	Structures, Expert Systems, Concrete in Fire, Structural Design for Fire Safety
Khaled, Abdul Rahim Assaad Professor Ext.: 68360 / 52249 gzaki@kau.edu.sa zakigalal@hotmail.com	MEP	1965 Alexandria Univ. Egypt	1970 Cairo Univ. Egypt	1972 Trondheim Univ., Norway	Two phase flow Energy conversion Thermofluids of nuclear reactors

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Khan, Ahmed M. Assistant Professor Ext.: 68364 amksk@hotmail.com	CE	1968 Univ. of Eng.& Tech. Lahore-Pakistan	1974 Univ. of Eng.& Tech. Pak. 1976, Asian Inst. Of Tech. Thailand	1998 University of Birmingham UK	Deep Foundations Carbonate Soils Rock Properties Geo Environment Soil Mechanics
Khan, Md Rashidur Rotab Associate Professor Ext: 68076 mrkhan@kau.edu.sa	IE	1977 Calcutta Univ. India	1981 Demaere College Of Advance Technology, Enschede, Holland	1990 University of Leeds UK	Industrial Engineering Simulation Modeling Quality Engineering
Khan, Zahid A. Associate Professor Ext:68577 zakhan@kau.edu.sa	IE	1986 Aligarh Muslim University, India	1998 Aligarh Muslim University, India	2001 Jamia Millia Islamia India	Human Factors Engg. Quality Control Application of ANN & Fuzzy Control
Khushefati, Waleed H. Ahmed Assistant Professor Ext.: 68223 khushefati@hotmail.com	CE	1980 King AbdulAziz Univ. KSA	1985 Cornell University, Ithaca, NY, USA	2004 Imperial College, Univ.of London, UK	Structures, Concrete Durability, Healing of cracks in concrete
Kinsara, Abdul Raheem K. Associate Professor Ext.: 52648 bestrami@hotmail.com	NE	1983 KAU, Saudi Arabia	1987 Univ. of Missouri Columbia, USA	1991 Univ. of Missouri Columbia, USA	Radiation Protection Radio-Aerosol Study
Kutbi, Ibrahim I. Professor Ext.: 52198 iikutbi@hotmail.com	NE	1975 KSU, Saudi Arabia	1977 Iowa State University, USA	1981 Iowa State University, USA	Reliability and Availability of Nuclear Desalination System Nuclear Safety, Desalination Plants
Madani, Anas A. Associate Professor Ext.: 68168 anasmadani@hotmail.com madanianas@yahoo.com	MEP	1978 Cairo Univ. Egypt	1982 Oregon State Univ. USA	1985 Cornell Univ,USA	Freeze Desalination Crystallization
Magram, Saleh F. Assistant Professor Ext.: 68505 sfmagram@yahoo.com	CE	1985 King AbdulAziz Univ. KSA	1988 University of Illinois USA	1992 University of Kansas USA	Sanitary Engineering Sewage Systems Waste Management Environmental Pollution

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Mahdi, Sulaimanul F. Associate professor Ext.: 68120 smahdi@kau.edu.sa	EE	1961 Dhaka Univ. Bangladesh	1963 Texas A&M Univ. U.S.A	1969 Univ. of Michigan U.S.A	Electronics & Communications
Makki, Sohel A. Assistant Professor Ext.: 68457 makki@kau.edu.sa	CE	1982 King AbdulAziz Univ. KSA	1985 Purdue University USA	1991 Purdue University USA	Photogrammetry & Remote Sensing Surveying
Mansouri, Samir A. Ext.: 68183 Assistant Professor	CE	1982 King AbdulAziz Univ. KSA	1985 Stanford University USA	1990 University of Illinois USA	Reinforced Concrete Finite Element Anal.
Maqbool, Mohammed R. Lecturer Ext.: 66695 rehan-ma@hotmail.com	IE	1995 Punjab Univ. Pakistan	2000 Preston Univ. USA	NA	Computer Sciences Information Systems Finance
Megahed, Ibrahim E. Associate professor Ext.: 68260 imegahed@hotmail.com	AE	1973 Cairo Univ. Egypt	1975 Cairo Univ. Egypt	1979 Imperial College, London, U.K.	Heat & Mass transfer Combustion CFD
Melaibari, Abdulghani M. Associate Professor Ext.: 52185 amelaibari@kau.edu.sa	NE	1980 KAU, Saudi Arabia	1983 Michigan State University, USA	1987 Iowa State University, USA	Reactor Physics Numerical Analysis Nuclear Power
Meriky, Hassan M. Lecturer Ext.: 68070 hmeriky@kau.edu.sa hmeriky@hotmail.com	MINE	1981 King Abdul-Aziz Univ. KSA	1990 University of Pittsburg, USA 1997 Nottingham Univ., UK		Mining Engineering. Mine Ventilation, Environmental Safety.
Mohammad Alharbi Ext 66420 Meshary2000@yahoo.com	AE	1987 KAU KSA	Dec 1996 Univ of mayland USA	1990 Melb . Univ Australia	FEMA Alcs trucre Compsite mateils
Mohammad, Abdel-Salam Associate Professor Ext.: 68030 enf3003@yahoo.com	MENG	1975 Univ. of Science and Tech., Ghana	1978 Univ. of California at Berkeley, USA	1985 Univ. of Washington, USA	Applied Mechanics Vibrations

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Mohorjy, Abdullah M. Professor Ext.: 52227 amohorjy@kau.edu.sa	CE	1981 King AbdulAziz Univ. KSA	1983 University of Michigan USA	1987 Colorodo State University USA	Environmental Impact-Assessment Water Resources Planning and Management
Morfeq, Ali H. Assistant Professor Ext.: 68176 morfeq@kau.edu.sa	EE	1982 KAU K.S.A	1985 O.S.U. USA	1990 Univ. of Colorado USA	Computer Eng.
Mufti, Anwar H. Professor Ext.: 68268 amufti@jcci.org.sa	EE	1980 K.A.A.U K.S.A		1987 Saliford U.K.	High Voltage
Najjar, Ismail M. R. Assistant Professor Ext.: 52262 rearearow@hotmail.com	MENG	1990 KAU, KSA	1993 KAU, KSA	2003 Univ. of Warwick, UK	Metrology & Quality Control
Nocier, Shaaban A. Associate Professor Ext.: 68037 snosier@hotmail.com	ChE	1982 Alexandria Egypt	1987 Alexandria Egypt	1992 Alexandria Egypt	Heat Transfer Mass Transfer Industrial Pollution Control
Noorwale, Mahmoud A. Associate Professor Ext.: 68038 mnoorwali@hotmail.com	ChE	1978 KSU S.A.	1981 Oregon State Univ. USA.	1986 Colorado State Univ. USA.	Process Control Modeling & Simulation Computer aided Design
Noweir, Madbuli H. Professor Ext.: 68552 madbuli@yahoo.com	IE	1955 Alexandria Univ. Egypt	1959 Alexandria Univ. Egypt	1964 Bestburg Univ. USA	Human Factors Eng. Eng. Management
Obaid, Raed R. Assistant Professor Ext.: 68577	IE	1993 KAU S.A.	1998 Loughborough University UK	2007 De Montfort Uni UK	CAD/CAM
Obaid, Ramzy R. Assistant Professor Ext.: 68341 ramzy_obaid@yahoo.com	EE	1992 K.A.A.U K.S.A	1998 Georgia Institude of Tech. U.S.A	2003 Georgia Institude of Tech. U.S.A	Power Electronics

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Olwi, Ibrahim A. Associate professor Ext.: 68351 Direct(6952278) iolwi@hotmail.com	AE	1976 KFUPM, KSA	1980 Ohio State Univ. USA	1984 Tulane Univ. USA	Low Speed Aerodynamics Thermal Systems Solar Energy
Qutub, Mohamed Zuhair A. Assistant Professor Ext.: 68365 mgutub@hotmail.com	CE	1978 King Fahd U.P.M. KSA	1981 Tulane University USA	1991 University of Wales UK	Geotechnical Engineering Finite Element Aanalysis
Qutub, Saud A. Associate Professor Ext.: 68237 sgutob@kau.edu.sa	CE	1978 King Fahd U. P. M. KSA	1981 California State University USA	1988 Colorodo State University USA	Ground Water and Hydraulics
Radain, Talal A. Associate Professor Ext.: 68231 tradain@kau.edu.sa	CE	1977 KFUPM, SA	1982 University of Miami USA	1989 University of Rhode Island USA	Corrosion of R.C. Structures Structural Repairs High Strength Concrete
Radhwan, Abdulhaiy M. Professor Ext.: 68500 / 52244 aradhwan@kau.edu.sa	MEP	1973 KFUPM, SA	1975, KFUPM, SA 1980, Univ. of Colorado USA	1981 Univ. of Colorado Boulder, USA	Thermal Science A/C.
Rizvi, Sayed A. H. Professor Ext.: 68577 alulrizvi@yahoo.com	IE	1971 Aligarh Muslim Univ. India	1974 Aligarh Muslim Univ. India	1986 Indian Institute of Technology, India	Human Factors Engg. Quality Control
Rushdi, Ali M. Professor Ext.: 68013 arushdi@kau.edu.sa arushdi@ieee.org	EE	1974 Cairo Univ. Egypt	1977 Univ. of Illinois U.S.A	1980 Univ. of Illinois U.S.A	Computer & Control Engineering, Reliability, Electromagnetic Communications
Sabbagh, Abdulghany O. Associate Professor Ext.: 68269 agsabbagh@yahoo.com	CE	1974 King Saud University KSA	1982 University of Arizona USA	1986 University of Arizona USA	Geotechnical and Foundation Engineering and Pavement Materials

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Saber. Ahmed Assistant Professor Ext.: 68093	EE	1999 (BUET) Dhaka, Bangladesh	1999 (BUET) Dhaka, Bangladesh	University of the Ryukyus Japan in 2007	Power system Optimization
Samman, Tamim A. Associate Professor Ext.: 68187 tamimsamman@yahoo.com	CE	1977 K.F.U.P.M. KSA	1980 University of Miami USA	1987 University of Arizona USA	Strucutres Concrete Repair Construction Materials
Shaikh, Muhammad S. Assistant Professor Ext.: 66224 ysmab@yahoo.com	EE	1983 University of Sind Pakistan	1999 Muroran Inst. of Tech. Japan	2002 Muroran Inst. of Tech. Japan	Computer Engineering
Shakour, Tanweer Hassan Associate Professor Ext.: 68189 Tanweer20@gmail.com	CE	1991 BUET Bangladesh	1993 BUET Bangladesh	1998 Kansas Sate University USA	Traffic Engineering and Management
Shehata, Ahraf H. Assistant Professor. Ext.: 66490 Ashehata2@kau.edu.sa	NE	1990 Alexandria University Egypt	1998 Alexandria University Egypt	2005 North Carolina University	Nuclear Engineering
Sheikh, Imran I. Lecturer Ext.: 66391 imranishrat@kau.edu.sa	IE	1996 Lucknow Univ. India	2000 Aligarh Muslim Univ. India 2003 Univ. of Ottawa Canada	NA	Operation Research Engineering Management
Sheikh, Manzoor H. Assistant Professor Ext: 52253 msheikh@kau.edu.sa	IE	1995 Preston Univ. USA	1997 Preston Univ. USA	2001 Preston Univ. USA	System Analysis & Design Cyber Security
Sheikh, Muntasir. M. Assistant Professor Ext.: 68022 muntasir@ieee.org	EE	1987 KAU Univ. K.S.A	1991 Bradford U.K	1999 Univ. of Arizona U.S.A	Electronics and Communications Eng.
Shihata, Sabry A. Professor Ext.: 68182 sshihata@hotail.com	CE	1973 King Saud University KSA	1979 University of California USA	1983 University of Illinois USA	Pavement Systems, Materials, Design and Performance

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Siddique, Mansoor M. Associate Professor Ext.: 68173 mansoorsid@yahoo.com	MEP	1980 Bosporous Uni. Turkey	1984 Quaid-e-Azam Uni. Pakistan	1992 M. I. T., Cambridge USA	Boiling, Condensation and Heat Transfer
Sirajuddin, Abdullah M. Associate Professor Ext.: 68267 sirajuddin@maktoob.com	CE	1980 King AbdulAziz Univ. KSA	1983 Pennsylvania State Univ. USA	1991 University of Nothingham UK	Construction Engineering and Management
Taha, Mahmoud A. Associate Professor Ext.: 68906 mahmoud-taha@excite.com	CE	1982 Cairo University	1986 Cairo University	1994 Wisconsin Madison- USA	Construction Engineering and Management
Tas, Umet M. Lecturer Ext.: 68004	EE	1982 ITU Turkey	2002 Mermerah Univ. Turkey		
Taylan, Osman I. Assistant Professor Ext.: 68331 otaylan@kau.edu.sa	IE	1991 Istanbul technical Univ. Turkey	1994 Istanbul Technical Univ. Turkey	1999 Sakarya Univ. Turkey	Fuzzy Modeling Industrial Engineering
Tayyeb, Zuhair A. Assistant Professor Ext.: 52956 ztayyeb@hotmail.com	NE	1984 KAU, Saudi Arabia	1987 Birmingham, UK	1990 Birmingham, UK	Radiation Damage Nuclear Materials
Turkmen, Nadim H. Assistant Professor Ext.: 68426 enesnt@yahoo.com nturkmen@kau.edu.sa	MEP	1988 Istanbul Technical Univ. Turkey	1991 Istanbul Technical Univ. Turkey	1997 Istanbul Technical Univ. Turkey	Heat Transfer Refrigeration & Air – Conditioning
Ulhaque, Muhammad E. Associate Professor Ext.: 685554 mulhaque@kau.edu.sa	IE	1981 PMA Pakistan	1996 Preston Univ. USA	1999 Preston Univ. USA	System Analysis & Design Software Engineering Industrial Management
Ullah, Mohammad S. Lecturer Ext.: 68559 mshafi_ullah@hotmail.com	IE	1973 Univ. Of Chittagong, Bangladesh	1984 Asian Inst. of Technology, Bangkok, Thailand	2004 Washington Intl. Univ. USA	Computer Systems & Information Technology

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Wafa, Faisal F. Professor Ext.: 68279 fwafa@kau.edu.sa	CE	1974 King Saud University KSA	1977 Stanford University USA	1981 University of New Mexico USA	Structures Reinforced Concrete Repair and Strengthening of Concrete
Wazzan, Abdulaziz A. Associate Professor Ext.: 68249 awazzan@hotmail.com	ChE	1987 KAU S.A.	1991 Univ. of Manchester Inst. Of Sci. & Tech., U.K.	1995 Univ. of Manchester Inst. Of Sci. & Tech. U.K.	Polymer Technology Composite Technology Toughened Materials
Wazzan, Wajdi A. Assistant Professor Ext.: 68088 wwazzan@kau.edu.sa	IE	1993 KAAU. S.A.	1999 Univ. of Central Florida USA	2007 Central Florida USA	Information Systems Engineering Management Human Factors
Youssef, Abdul-Hay A. Assistant Professor Ext.: 68024 abdoysf@hotmail.com	EE	1964 Cairo Univ. Egypt	1975 New Jersey Univ. U.S.A	1988 Al-Azher Univ. Egypt	Computer Eng.
Zahed, Adnan. H. Professor Ext.: 68248, 68666 azahed@kau.edu.sa azahed12@hotmail.com	ChE	1976 KFUPM S.A.	1979 University of Cal. Davis U.S.A.	1982 University of Cal. Davis U.S.A	Heat and mass Transfer Solar Energy Drying in moving & fixed beds Modeling & Simulation
Zahran, Shaher Z. Associate Professor Ext.: 68080 shaher_z@hotmail.com	CE	1978 King Fahd U.P.M. KSA	1985 N. Carolina State University USA	1988 N.Carolina State University USA	Paving Materials Asphalt Technology Highway Design & Cons.
Zaki, Galal M. Professor Ext.: 68360 / 52249 gzaki@kau.edu.sa zakigalal@hotmail.com	MEP	1965 Alexandria Univ. Egypt	1970 Cairo Univ. Egypt	1972 Trondheim Univ., Norway	Two phase flow Energy conversion Thermofluids of nuclear reactors
Zaytoon, Mohammad A. M. Lecturer Ext.: 66695 mzaytoon@kau.edu.sa	IE	1993 Alexandria Univ. Egypt	2000 Alexandria Univ. Egypt	2007 Alexandria Univ. Egypt	Industrial Engineering Human Factors

Name and Rank	Dept.	B.Sc	M.Sc	Ph.D.	Specialization
Zughaibi, Abdul Wahab M. Assistant Professor Ext.: 68118 zughaibi@gmx.net	CE	1973 University of Colorada USA	1980 University of Washington USA	1987 Univ.of Texas USA	Construction Engineering and Management