KFU
جامعة الملك فيصل
KING FAISAL UNIVERSITY
جـامعة ووطـن.. نمـاء.. واسـتدامة..

COLLEGE of ENGINEERING

STUDENT HANDBOOK

ENGINEERING KFU

2020-2021

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About the College

A royal decree for the establishment of the College of Engineering at King Faisal University (KFU) was issued in the year 2007 G (1428 H). The decree paved the way for the College to offer engineering education in the following seven programs:

1. Biomedical Engineering
2. Chemical Engineering
3. Civil and Environmental Engineering
4. Electrical Engineering
5. Mechanical Engineering
6. Materials Engineering
7. Desalination Engineering

In 2009-2010 G (1430/1431 H), the College started teaching in the Electrical Engineering, Mechanical Engineering and Civil Engineering programs. The decision to start with these programs was based on a market survey of the engineering manpower needs in the Saudi market, and on the fact that these three programs represent the core general engineering programs which serve the more specialized programs.
In 2013-2014, the College started the Chemical Engineering Program for male students and the Biomedical Engineering program for female students, respectively.
The chemical, civil, electrical, and mechanical engineering program are accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.
Since establishment, the College has adopted a scientific approach based on the principles of strategic planning and quality in higher education in order to achieve excellence and distinction. In one hand, the curriculum development emerged from an exhaustive search including market surveys, research in labor market needs, and benchmarking against other renowned universities. On the other hand, Standards from internationally recognized sources such as ABET and the KSA National Commission for Academic Accreditation and Assessment (NCAAA) have been utilized.

College Vision:

The College of Engineering aspires to be recognized for supporting and sustaining the success of its community and stakeholders to contribute to the Kingdom's development objectives and enrichment of humanity.

College Mission :

The College of Engineering strives for providing quality services through close partnership with the community by demonstrating commitment to

- Quality education that prepares graduates through a project-based learning with broad basic engineering knowledge to be professionals and to pursue postgraduate studies and research.
- Quality research that leads to better solutions to engineering-related problems with emphasis on issues of national significance by working closely with industry and research centers.

College Values

As the College of Engineering realizes that different types of competitive advantages correspond to and require a different set of values, the college has selected the following list as its values based on the competitive advantages it seeks to accomplish, namely, quality and community engagement (partnership) .
The College has the following values:

- Academic excellence and freedom.
- Assessment and continuous improvement of our programs and processes.
- Being a collaborative part of King Faisal University.
- Diversity among our students, faculty, and staff.
- Professional development of our students.
- Success of our students and seek to know them personally.
- The personal and professional development of our faculty and staff.
- Transparency teamwork and initiative.

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I- Overview and Important Regulations

Admission to the College of Engineering

The College sets stringent requirements to guarantee and maintain the quality of its outcomes such that their standards are comparable to those of respected colleges elsewhere. Accordingly, the college applies a set of minimum criteria to those applying for admission that starts with selecting a limited number of students according to the weighted average admission criteria (High School Grade, General Aptitude Test and Subject Achievement Test) and then other constraints on Prep Year performance. In addition, pre-specified stringent criteria apply to those who file for transfer from other colleges.

New students seeking admission to the College of Engineering at KFU are first admitted by the Deanship of Admission and Registration to the Engineering/Science branch of the Preparatory Year (PY). The process for this admission includes the following steps:

1) The student accesses the KFU website (www.kfu.edu.sa) where he/she will be directed to a student enrollment application site and are allotted a new account using his/her national ID number.
2) The student selects the degree he/she is applying for and the college (College of Engineering) and will be prompted to enter the personal information and his/her GPA in high school.
3) Using the Banner system, the candidates for the faculty of Engineering are ranked based on their composite average as explained below, and the deanship of Academic and registration will make the decision concerning their admission to the preparatory year based on the criteria below.

Minimum Requirements Criteria for Admission to the Preparatory Year

- The number of accepted students should not exceed the number specified by the university council for the program.
- Students are ranked and selected according to their composite average of the following:
  i. **30% for Aptitude Test:** This test has two components: Mathematics and Linguistics. The test is aimed at determining the general capabilities of students in the two areas mentioned above.
  ii. **30% for High School GPA**.
  iii. **40% for Subject Achievement Test**: It is a multiple-choice test given in five subjects, i.e., Mathematics, Physics, Chemistry, Biology and English. The objective of this examination is to evaluate the student's knowledge and ability in English and Science.

After completing the Preparatory Year Program (PYP), students are accepted into the College of Engineering and then given a maximum of one year to select the program according to their preference. The requirement for the admission of students to the College of Engineering is based on the following:

i. **GPA from the PYP with a minimum of 3.0 out of 5.0.**
ii. **A minimum grade of C in all English courses.**

Student Transfer

The General Transfer Conditions are:

- Student must be registered in a recognized and reputable college/university.
- Student must not have been expelled from transfer university for disciplinary\educational reasons.
- Number of units to be studied at KFU should not be less than 50% of number of units scheduled to obtain the KFU bachelor's degree.
- Student transfer request should be filed, at least, five weeks before the start of the first semester of any given academic year.
- Transfer applications are accepted only in the first semester of any given KFU's academic year.

Student Transfer options offered by KFU

KFU offers three types of transfer as follows:

Transfer from any KFU College to CoE.

- Student must successfully pass the KFU Preparatory Year Program.
- Student must have spent at least two semesters at the college he wishes to transfer from, with no less than 24 registered units in his transcript record.
- Student must have a **cumulative GPA (CGPA)** of at least **4 out of 5**.
- Student must obtain at least **B** grade in English or student have a **score of 500 in TOEFL** (Paper-Based) or its equivalent in (Computer-Based).
- Student must obtain at least **B** grade in, Mathematics, and Basic Sciences courses at KFU.

Transfer from a College outside KFU to CoE.

- Student must successfully pass the Preparatory Year Program with Engineering Track.
- Student must have spent at least two semesters at the college he wishes to transfer from, with no less than 24 registered units in his transcript record.
- Student must have a **cumulative GPA (CGPA)** of at least **4 out of 5 or 3 out of 4**.
- Student must obtain at least **B** grade in Mathematics, Chemistry, and Physics courses.
- Student must obtain at least **B** grade in English or student have a **score of 500 in TOEFL** (Paper-Based) or its equivalent in (Computer-Based).

KFU Students Who Want to Study Courses in Other Universities:

1. Fill in a course transfer form and submit it to the program chairman.
2. The chairman consults the faculty who teaches the course.
3. The faculty reviews the syllabus of the transfer course considering the program course syllabus and checks the equivalency of the syllabus and credits.
4. The chairman approves the equivalency and signs the transfer form.
5. The student should then get the approval of the vice dean.
6. The student submits the form to university registrar office and gets an official acceptance letter to study the course at the specified university.
7. After studying the course, the student should get an official completion letter and the transcript from the registrar office of the university where the transfer course was completed.
8. Finally, the student should submit the official completion letter to the KFU registrar office.

Admission to Specific Program

For Newly Admitted Students:

All newly admitted students to the College of Engineering must successfully complete the preparatory year per its regulations and in two semesters.

- **First Group:** To select an engineering program, students need to complete the following four courses (11 CH) in the first semester:

Course ID	Course Name	اسم المقرر	CH
2200-100	Introduction to Engineering	مدخل الى الهندسة	**1**
0814-140	General Physics I	فيزياء عامة	**3**

0815-140	General Chemistry I	كيمياء عامة1	**3**
0817-144	Calculus I	تفاضل وتكامل	**4**

- If the students got **3.75** out of **5** GPA, the student will get the first choice directly.
- If the students get less than **3.75**, he will be granted first choice depending on vacancy.
  - **Second Group:** The students who have finish **8** CHs but less than **11** CHs from the previous table, they will compete with each other based on their GPAs, and base on the vacancy.
  - **Third Group:** The students who have finish less than 8 CHs from the previous table, then they will be considered after finalizing group 1 and 2.
  - **Fourth Group:** Student who did not apply through the system, the College have the right to distribute them on the departments that have less number of students, to make sure that all departments have almost the same number of students**.**

For program selection, students are encouraged to complete the program selection form and submit it online before the beginning the final exams for the current semester. After the final exams are graded and students' GPA are updated, the program selection forms will be reviewed by the college and the program request is assigned based on the completion of the general engineering program courses, program requirements and student cumulative GPA.

Engineering Program selection procedure:

First year college students who are expected to complete the first year “Basic Courses” should submit Major Declaration online as follows:

1. Student visits the KFU official website at (link will be sent to the students by email)
2. Student must type their username and password and click Login.
3. Student must Go to "Major Declaration" field.
4. Student must Select **Major Choice #1, Major Choice #2**, **Major Choice #3** and **Major Choice #4** from the table listed below.
5. **After selection, students must** Click on the "Save Major Choices" button.

Department	Biomedical Engineering	Chemical Engineering	Civil & Environmental Engineering	Electrical Engineering	Mechanical Engineering
Major Code	BME	CHE	CEE	EE	ME

Students are granted their first major choice if they have completed the "basic courses" and their GPA is in the top range. Otherwise, they will be granted Choice # 2. The selection process continues until all students are assigned to the four engineering programs CHE, CEE, EE and ME (male students) and the BME (female students),

Change of Program:

Should the student wish to choose another program, the form found in the Appendix must be filled by the students and must be submitted to program chair for processing. The student will receive a notification of program transfer at the beginning of the next semester. Following should be met to change the program in the college.

- **First:** All students can apply after the end of the **second semester** of the **first year** or right **after the summer semester**. Students are not allowed to apply after that date**.** Or be given one year in their program to switch to another program
- **Second:** Student should finish **30** CH including **Math**, **Physics**, and **Chemistry** Courses.
- **Third:** Students should get **3.85** out of **5** CGPA.
- **Fourth:** The students need to apply using the **changing program form** within that period.
- **Fifth:** Changing the program can done only **one time** and the student is not allowed to change his department once he accepted in that new department.

Graduation:

The College of Engineering recognizes and accepts credits for the academic courses that are successfully completed, senior design projects successfully completed, and a required engineering training (0 credit hour usually done in summer after the 6th semester). The Deanship of Admission and Registration at KFU is responsible for ensuring that graduating students have met all the graduation requirements.

The academic registrar checks and makes sure that graduating students are fulfilling all the requirements to graduate (Engineering Training, Senior Design, and course requirements). In addition, the advisor of the final year students keeps a progress study plan containing all the courses in the Engineering Program-plan distributed over eight semesters.

The final year advisor has the responsibility to meet with the student and update this plan in each semester to make sure the student has satisfied the graduation requirements prior to the actual graduation. Consequently, the program chairman will write a letter to the Deanship of Admission and Registration giving the names of the students who have successfully completed their graduation requirements.

A student graduates after the successful completion of the graduation requirements as per the applicable study plan, if his GPA is not less than 3.0 of out 5. In cases where a student passes all courses but still fails to achieve the minimum GPA, the College Council may identify many courses for the student to register in to raise his GPA to above 3.0 out of 5.0 as recommended

by the Department Council. Students enrolled before 2012 must have a minimum cumulative GPA of 2.0 out of 5.0 for graduation.

Warnings and Probation

Academic Warning:

Academic warning designates a period whereby a student is warned that satisfactory academic progress is not being made. During this period, the student must meet a set of conditions to remain active in the College of Engineering. Warning is a serious step on the part of the college. Students may receive academic warning for many reasons.

Some students simply do not want to be in college or have not become engaged in their college experiences. Students may be unmotivated or in a course of study that is too difficult or doesn't interest them. Some students are unprepared for the difficulty of college work. Some students have poor study habits and time management skills. Some students may be negatively influenced by peers or by campus culture. For some students, poor academic performance may be a symptom of greater problems. In this case, students and their parents may need to consider counseling or other helps. Students usually have a certain timeframe, often one semester, to improve their academic performances.

First Academic Warning:

First academic warning will be given to a student at the end of the semester in which his/her Cumulative Grade Point Average (CGPA) is below 3.0 out of 5.0. An academic warning is a formal sanction with a notation on the transcript. The concerned student and his/her parent will receive an official letter from director-registration office. Students who receive an academic warning are strongly advised to develop a plan for academic improvement in consultation with their academic advisors.

Second Academic Warning:

Second academic warning will be given to a student who fails to obtain the minimum CGPA of 3.0 out of 5.0in the following semester. The student and his parent will receive an official letter from director-registration office.

Third Academic Warning:

Third and last academic warning will be given to a student who fails to obtain the minimum CGPA of 3.0 out of 5.0 for the 3rd time consecutively. After it, the student will be transferred to other college based upon the other college requirements such as College of Science, College of Education, College of arts, College of Agricultural Science, College of Veterinary, College of IT and Computer Science and College of Business Administration. The general KFU rules to transfer from one college to other will also be applicable. Please see this link for more information:
(https://www.kfu.edu.sa/ar/Deans/AdmissionRecordsDeanship/Pages/eServicesV2.aspx)

Advising

Academic advisors provide educational counseling to the students. The academic advisor's primary responsibility is to evaluate the student's plan of study to ensure whether it satisfies

the college and university requirements while meeting each student's specific needs. The advisor should consider that different students have different abilities, interests, aspirations, needs, experiences, and problems so that his approach in dealing with students can be different from one to another.

To fulfill this requirement, the general advising responsibilities include:

- Advice and assist students in early registration and registration formalities.
- Provide guidance in dropping and adding courses and in improving academic performance.
- Ensure that the students understand the academic regulations and follow their academic programs in a sequential order.
- Follow-up the students' academic progress, especially those who are not in good academic stand. The advisor will seek to meet these academically weak students (whose GPA is below 3 out of 5) and recommend them the proper course of action that they might need to improve their GPA.
- Develop an academically conducive and respectful environment that allows students to define, develop and achieve their realistic goals.
- Assist students in developing skills pertaining learning, communication, decision making, etc.
- Make students aware of how to connect academic experiences to real life.
- Motivate students' sense of responsibility towards their educational plans and achievements.
- Understand and effectively make the students aware of the department policies and procedures, graduation requirements and educational requirements.
- Guide the students to effectively pursue and benefit from the university and the college of engineering educational and entertainment resources.

Guidelines for Advisees:

The student must meet the academic advisor every semester prior to or during the pre-registration week. The purpose of this meeting is to review the student's academic requirements. In addition, the student should continue meeting the academic advisor to discuss on the program, career plans, or any other issues he/she may encounter about the program. The program/college have adopted a policy to ensure that each student should meet his/her advisor either before or during pre-registration, and if he/she needs to add or drop a course upon starting of the semester within the permissible timeframe.

Academic Advising:

Engineering students are assigned to faculty advisors by the chairman of the department. Each department has a list of Student Advisor that can be found in the website or the department bulletin board. All students must report to their advisors prior to completing registration for the following semester. Each student must complete an advisement form (find the Student Advisement Form at enclosed above) that is completed with the assistance of the faculty advisor. The student should keep a copy of this information along with the faculty advisor to make academic plan adjustments if needed or to resolve any future discrepancies in advisement information. After the advisement meeting, students are eligible to enroll into their courses for the subsequent semester using the Student BANNER System. During the ongoing semester,

students are also encouraged to meet with their advisors as frequently as needed either during faculty office hours, by appointment or even during faculty open office hours.
Students are encouraged to communicate with their advisors using all available modes of communication that most frequently include email and office phone. Faculty advisors assist students with placement in Engineering Training and encourage student to participate in student professional organizations such as Institute of Electronics and Electrical Engineering (IEEE), Society for Petroleum Engineers (SPE), American Society of Mechanical Engineering (ASME) and the American Institute of Chemical Engineers (AICHE), Biomedical Engineering Society etc.

Registration Procedure

During the early registration week, engineering students should meet their academic advisors who keep an updated record of their progress in terms of the courses they had completed or will take in the coming semester.
The student will bring along the latest transcripts to this meeting and the list of courses he/she wishes to register for the coming semester. This visit will help the advisor make sure the student is following the recommended sequence of courses to finish his/her course plan, and if not the advisor will suggest the proper corrective actions to help the student get back on track.
All engineering programs have adopted a policy that will ensure that the student will meet his advisor before or during pre-registration. If he fails to do so, a hold will be placed on his BANNER account that will prevent him from confirming his registration during the confirmation week.

Students refer to their advisor if they need help in their registration, to seek his advice in career choices, or for any question related to their student life. The signature of the advisor to authorize Add/Withdrawal is fully enforced such that a student cannot add or withdraw a course without the prior approval of his advisor. The student must confirm his registration within the first week of the semester.

The maximum load for each student is determined as shown in the following Table (The student's Load in A Semester Based on his CGPA). Note that, there are exceptions that could be made for expected graduating students.

CGPA	Maximum Number of Credit Hours
Less than 3.00 out of 5.00	12
3.00 – 3.49	15
3.50 – 3.99	19
More than 4.00	23

Early Registration:

All students must register online for the courses to be taken in the following semester based on his program of study. Students must meet with the advisor before early registration to select

which courses the students should pre-register. Students may not be able to register for the following semester if he does not pre-register at the end of the previous semester. In addition, he may not find enough courses to register once all sections are filled during pre-registration. The registration office may help the student to solve registration problems only and not to register him. In fact, it is the student's responsibility to:

- Confirm his pre-registration
- Follow up registration with his advisor
- Check deadlines for pre-registration, confirmation, and advising according to both the university and the college timetable and regulations.

Engineering Training

Engineering students at King Faisal University (KFU) are required to undergo a comprehensive Engineering Training with a reputable and specialized industrial organization in or outside the Kingdom of Saudi Arabia relevant to their major. The purpose of this training is to enhance the students' practical experiences, promote their career opportunities, and deepen their technical knowledge through practical experience in real-life industrial enterprises. In addition, such training strengthens the relationship between the College of Engineering at KFU and the governmental and private industrial organizations. Also, it provides the business and industry with well-trained and better prepared professionals.

The Engineering trainee is required to be aware of the following:

- Student must fulfil the following eligibility requirements to be qualified for Engineering Training:
    - Completion of not less than 90 total credit hours by the time of requesting for a training assignment (including the credit hours expected to be completed at the end of the semester prior to the training).
    - Pass all general engineering courses carrying the code ENGR###.
    - Being a regular student during the training (not dismissed for academic or disciplinary reasons).
- Student is responsible for knowing and following the academic rules and regulations, including requirements for graduation. Academic advisors shall assist student in planning and managing their academic program.
- Student is not allowed to register for any course(s) during their training period.
- Student must complete the training work before their last semester in the university.

The qualifying student should spend at least eight working weeks on a full-time basis with the training organization abiding by its regulations like any other employee.

Upon the completion of training, student is required to submit a final formal written Engineering Training Report and present his work. The training organization shall also fill in

a confidential Engineering Training Evaluation Form to be emailed to the Engineering Training Office.

The student will be given a PASS/FAIL grade (Pass ≥ 60%) by an examining committee that will be formed for this purpose according to the following criteria:

- Organization's evaluation will carry a weight of 50% of the total grade.
- The training final report will carry 30% of the total grade.
- Presentation and discussion will carry 20% of the total grade.
- Student should get at least 60 % of the company weight to pass the course.

Grading System

Evaluating Student Performance

Student performance in each course is evaluated by the course instructor, culminating with the assignment of a grade for this course. According to what is most appropriate for the course in question, the grade is distributed between examinations, quizzes, homework, and/or laboratory reports. Projects and/or oral presentations are required for most courses.

For Senior Design project, a panel of three faculty members and the project supervisor evaluate the student's coursework, project prototype, design written report and oral presentation as well as several assignments. The methods of Evaluating Student Performance are:

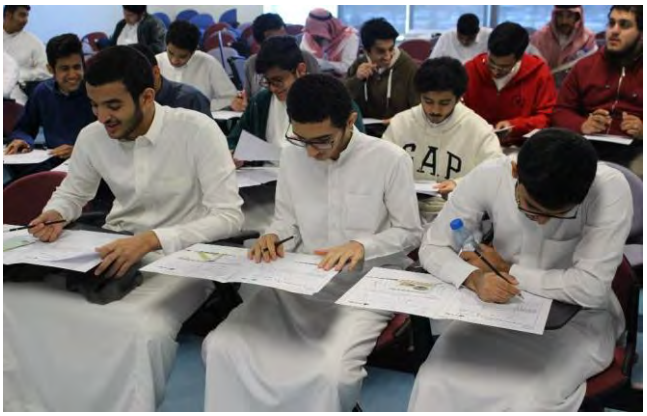
- Quizzes and homework: to assess student gradual understanding of course subjects.
- Projects: to assess technical ability as well as personal interaction and communication skills. These projects are assigned in most Engineering courses since each engineering program has adopted project based learning (PBL) teaching strategy, in which one or more projects are assigned to students in each course where students work in teams. Each project usually includes design and/or analysis, simulation and verification through measurement.
- Midterm Exam: to assess students' understanding of course subjects, problem solving abilities, and analytical and/or design capabilities. Usually one midterm exam is given in a lab, while at least two midterm exams are given in a regular course in each semester.
- Final Exam: to assess the students' overall understanding of the course as well as their analytical and problem-solving capabilities.

At least 30% of the student's mark is based on the final exam and the remainder from the student's coursework. The passing grade for any course is 60%. This is equivalent to a grade of D. The grading system at KFU is provided in the following Table. The student's grade point average (GPA) is determined by dividing the cumulative point value of all courses attempted by the number of credits in the student's semester schedule.

Symbol	Grade Range	Point Average	Value
A+	95 – 100	5.00	Exceptional
A	90 – less than 95	4.75	Excellent
B+	85 – less than 90	4.50	Very Good Plus
B	80 – less than 85	4.00	Very Good
C+	75 – less than 80	3.50	Good Plus
C	70 – less than 75	3.00	Good
D+	65 – less than 70	2.50	Average
D	60 – less than 65	2.00	Pass
F	less than 60	1.00	Fail
IP	--	--	In Progress
IC	--	--	Incomplete
DN	--	1.00	Denied
NP	60 and more	--	No grade-Pass
NF	Less than 60	--	No grade-Fail
W	--	--	Withdrawn

Examinations

To maintain the high academic standards within the University, these guidelines for conducting examinations are provided to prevent as well as to manage incidences of exam-related misconducts. In this regard, there are responsibilities for program chairs, instructors, proctors and students.



For Students:

These regulations shall apply to all examinations. Any violation of the regulations, whether committed intentionally or unintentionally, shall be regarded as misconduct and dealt per the University's discipline procedures. Students must adhere to all KFU and instructor examination rules. More information can be obtained from the Vice Dean's Office for Academic Affairs and from the Examination Office in the College of Engineering.

Before the Examination

Students:

1. Check the timetable of the examination carefully and ensure that you have the correct date, time and location of your exams.
2. Make sure you know where the exams hall is.
3. Check the sitting plan outside the exam hall. You must sit in your allocated seat.
4. Switch your mobile phone off, including any alarms that may be set, and put it in your pocket.
5. Use the restroom (toilet) before entering the examination room and the students might not be allowed to use restroom during the exam except for medical circumstances.
6. Put all revision notes outside the exam hall before the start of the exam and do not keep them with you or under your desk.

7. Check if he is allowed to bring a textbook into the exam hall. Unless informed otherwise, textbooks are not permitted. If the instructor allows textbooks to be used in examinations, students should check if any annotations are allowed.
8. Not speak to anyone other than the invigilator once they enter the examination room. Speaking to friends, even if just wishing them good luck, will be automatic grounds for investigation for cheating.
9. Bring exam related materials into an exam hall. Such material includes pens, pencils, erasers, rulers and pencil sharpener. Electronic calculators can be used only if permitted. Pencil cases are not allowed in the exam hall.
10. Must write your answers legibly in blue pen and pencil may be used for diagrams.
11. Must bring your own calculator (if permitted) and you must not borrow a calculator during the exam. Make sure that your calculator has new, fresh batteries and is in good condition.
12. Must use standard (non-programmable) calculator.
13. The cover of the calculator considered illegal during the exam and students must leave it outside exam hall.
14. Avoid wearing any suspicious clothing, unless necessary, during exams such as hats, abnormal clothing.
15. Must remove outer coats and jackets and leave them in a designated area in exam hall before proceeding to their allocated seat. In case of headwear, your face must be clear and not hidden by any clothing material under any circumstances.
16. Students are only permitted to bring one small bottle of water with them to exam hall for consumption during the exam unless it is stated that drinks are not permitted (for example in PC cluster).
17. Must bring student University ID card with clear photo. If you do not bring your student University ID card, you will be asked to report to an invigilator. The invigilator will take additional steps to verify your identity.
18. Must sign on an obligation, which states that all students read and understood all the examination regulations.

During the Exam:

1. You must sit on your allocated seat number. Examination seat numbers are listed outside exam's hall.
2. Make sure you write your name and ID number clearly in each paper. You will not be given extra time at the end of the exam to write your information.
3. All students are required to have their Student ID Card present with them during the exam. The invigilator in charge will check your name on your ID card and make sure it matches with your details on the exam paper.
4. Make sure that your mobile phone is switched off completely. A phone detector will be utilized by the invigilator to ensure that all mobile phones are switched off.
5. Exchanging calculator with another student is not permitted at all. You must bring your own calculator.
6. Students are not permitted to have wireless communication devices (e.g. cellphones, tablets, or smart watches) on their desks under any circumstances.
7. If a student needs to speak to the invigilator, he/she should raise his/her hand and remain seated.
8. Students are not allowed to receive any assistance pertaining the exam performance from anyone during the exam.
9. Students are not allowed to copy any material or be in possession of unauthorized aids (e.g. notes).
10. Students are not allowed to use dictionary unless otherwise stated by the instructor.
11. Generally, no extra papers will be provided to the students during the exam. Students are also not allowed to detach any paper from the answer booklet unless permitted by the course instructor.

12. Eating is not permitted in the exam hall without the special permission of the invigilator in charge.
13. Invigilators will not answer questions concerning examination content. Questions concerning possible errors, ambiguities or omissions on the exam paper will be directed to the invigilator, who will forward them to the course instructor.
14. If a student has concerns about the quality of the examination environment, these concerns should be expressed to the invigilator, who will take appropriate possible action.
15. Students are not permitted to either leave the hall during the first 30 minutes of the exam. If a student arrives after the first 30 minutes of the exam, he/she will not be permitted to enter the exam and will need to submit a petition to the Examinations Committee.
16. Students who arrive after the examination has begun, within the first 30 minutes of the exam, will not be given extra time. Late arrival report will be issued by invigilator which, will be placed in student's file.
17. Students will not be allowed to leave the exam hall during the last 15 minutes of the examination period and must remain seated quietly until the invigilator announces the end of the examination period.
18. At ten and five minutes remaining before the end of the exam, the invigilator will announce the number of minutes remaining.
19. After the five-minute announcement, all students should remain in their seats quietly – even if they have finished the exam – until all the exam papers have been collected and the invigilator announces they may leave the hall.
20. When the end of the examination is announced, all students must stop writing immediately, assemble their answer booklets and any special data provided and hand the mall to the invigilator who will collect all materials from the seats.
21. Once the invigilator announces the end of the examination period, students will not be given extra time even to write their names.
22. Students who fall in sickness and feel that they cannot continue the examination should report to the invigilator and hand in their papers. The invigilator will complete an incident report, which will be placed in the student's file. The student must submit the medical note within the next three days to the Examination Committee.
23. In the event of a fire alarm or power shutdown during the exam, students will be instructed by the invigilator to stop writing, leave all materials on their desk and make their way to the nearest exit. Students must not communicate with each other and examination conditions will be maintained.
24. Unruly, disruptive and antisocial behavior by any student during or after the exam will be reported and, if necessary, the college security guards will be called immediately.

Following the Exam:

1. Students should take all their personal belongings after the examination. The University has no responsibility for loss of, or damage to, personal belongings brought into the examination hall.
2. If any student forgot to take his personal belongings from the examination hall, then he is not allowed to collect them back until the end of the examination.
3. To help students to concentrate on their examinations, no other students can stay and talk next to exam halls.
4. After exam, students should listen to the instructions from the invigilators. Unruly disruptive or anti-social behavior at the end of your examination will be reported and you may be penalized.
5. In case of illness, students must submit a full medical excuse from an accepted hospital to the examinations committee within 3 working days. Students should also fill in the form which is available at the registration office. The office will then hand it to the Vice Dean office for final decision.

II-Academic Departments

Chemical Engineering Department

The Bachelor of Science in Chemical Engineering program provides a strong foundation in chemical engineering, giving you every chance to excel in these industries: chemical, petroleum, petrochemicals, pharmaceutical sciences, food, energy, life sciences, chemical process design and research.

Chemical engineering is a branch of engineering that uses principles of chemistry, physics, mathematics, biology, and economics to efficiently use, produce, transform, and transport chemicals, materials, and energy. A chemical engineer designs large-scale processes that convert chemicals, raw materials, living cells, microorganisms, and energy into useful forms and products.

Chemical engineers invent, develop and design the processes that convert raw materials into useful products, with minimal environmental impact. They're also involved with pollution control, protection of the environment, and energy conservation and conversion. Not surprisingly, as populations grow and resources and energy reserves decline, demand for chemical engineers is increasing. Apart from that Chemical engineers are also involved in many aspects of plant design and operation, including safety and hazard assessments, process design and analysis, control engineering, chemical reaction engineering, construction specification, and operating instructions.

What Chemical Engineers do?

A chemical engineer is an 'enabler'; someone who makes things happens efficiently on a massive, industrial manufacturing scale. They aim to get the best results at the least cost and with the lowest impact on the environment possible. And skills in chemistry, physics, and mathematics, and even economics are what make a chemical engineer so valuable.

As a chemical engineer, you could find yourself working on the following activities:

* Design and development of chemical processes and equipment

* Optimization and control of industrial operations
* Plant operation and management
* Fundamental and applied research from the molecular level to full industrial scale
* Environmental management, monitoring and pollution control
* develop alternative fuels and renewable sources for chemicals, pharmaceuticals and power production
* design, develop or improve industrial processes and equipment for large-scale chemical and biochemical manufacturing plan and test methods of manufacturing improve energy efficiency or reduce water use at manufacturing sites
* develop methods for the treatment of by products and waste from manufacturing processes
* devise production processes that are safe, efficient, profitable, and environmentally sound
* research naturally occurring chemical reactions so that these processes can be copied for human benefit
* conduct environmental impact studies
* develop and implement lower emission production technologies
* research and develop new processes and products including mathematical modelling
* design, develop and use new materials.

Note from the Program Chair

The Chemical Engineering Program at King Faisal University has been initiated in 2011 with the objective to produce high quality chemical engineers to cater to the needs of ever-increasing demand of quality chemical engineers for the booming Saudi chemical industry. Research is an important focus of activity and the Department has an excellent faculty who lead high quality research programs in a wide spectrum of areas. The Department has a strong core curriculum complemented by electives in the important traditional and emerging areas. The program is a blend of traditional chemical engineering topics and modern topics. The chemical engineering program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

Program Mission

The Chemical Engineering Department is committed to quality education that prepares graduates through a project-based curriculum with broad basic engineering knowledge to be professionals and to pursue postgraduate studies and research in Chemical Engineering.

The department is also committed to research that leads to better solutions to Chemical Engineering related problems with emphasis on issues of national significance including, energy, petrochemicals and environmental issues, by working closely with industry and research centers.

Program Educational Objectives (PEOs):

The ChE graduates are expected to attain the following program educational objectives within a few years of graduation:

PEO 1: Become technically competent engineers for successful and productive careers in the chemical engineering profession.
PEO 2: Demonstrate effective leadership skills in a diverse environment.
PEO 3: Engage in life-long learning for the purpose of professional development.
PEO 4: Pursue graduate studies and research in chemical engineering.

Student Outcomes (SOs):

The graduates of the Chemical Engineering Department, College of Engineering at King Faisal University are expected to demonstrate:

1. Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. Ability to communicate effectively with a range of audiences.
4. Ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. Ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. Ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Program Description

The demand for programs in engineering led to the creation of the College of Engineering at King Faisal University. Approval from the Ministry of Higher Education for the establishment of the College of Engineering was issued in the year 1428 H (2007 G). The Chemical Engineering Program is one of the five programs that currently form the College of Engineering. Namely, these programs are: Chemical, Civil, Electrical, Mechanical, and Biomedical Engineering. Approval was also given for programs in Material and Desalination Engineering.

In the fall semester of the academic year 1431/1432 H (2010/2011 G), the College started offering the Chemical Engineering program. The curriculum development was derived from comprehensive research comprising market surveys, research in labor market needs and benchmarking against other renowned universities. Standards from recognized international sources, such as ABET and the KSA National Commission for Academic Accreditation and Assessment (NCAAA), were utilized.

The Chemical Engineering program is delivered through 8 full semesters following the completion of the preparatory year program. The program is in-class, in the daytime, and on-campus. The classes are offered 5 days/week (Sunday through Thursday) through traditional lectures, lab work, and tutorial lectures. The main lectures are usually offered between 7:30

AM and 2:30 PM. Lab work is usually offered between 2:30 PM and 6:00 PM. The academic year consists of two main semesters (15 weeks/semester, excluding final exams) in addition to an optional 8-week summer semester. Students usually do their practical summer training during the 8-week summer semester. Occasionally, students take summer courses. The program is offered on the main campus of King Faisal University. There are two buildings serving the program. One is for the classrooms, faculty offices, and a few labs. The other building is for the remaining labs. Within two years from now, the program with the other engineering programs will move to the new College of Engineering building on the new university campus.

Chemical Engineering program recognizes and accepts credits for the academic courses that are successfully completed, graduation projects successfully completed, and required practical training/internship (0 C.H. - usually taken in the summer). The Deanship of Admission and Registration at King Faisal University is responsible for ensuring that graduating students have met all the graduation requirements. The academic registrar checks and ensures that graduating students are fulfilling all the requirements to graduate summer training, graduation project, and course requirements; awarded degree is Bachelor of Science in Chemical Engineering. The Chemical Engineering Curriculum consists of 136CH. Students will graduate after succeeding in all courses with a final minimum cumulative GPA of 3.00/5.00.

Program Study Plan:

First Semester					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Math 144	Calculus I	4	Required		Math and Basic Sciences
Phys 140	General Physics I	3	Required	C:Math 144 C:Phys 144	Math and Basic Sciences
Phys 144	General Physics I Lab	1	Required		Math and Basic Sciences
Chem 140	General Chemistry I	3	Required		Math and Basic Sciences
Engr 100	Introduction to Engineering	1	Required		General Engineering
Engr 106	Engineering Graphics	2	Required		General Engineering
Eng 133	English Composition I	2	Required		Broad Education
Semester Credit Hours		**16**			

Second Semester					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Math 145	Calculus II	4	Required	P: Math 144	Math and Basic Sciences
Phys 141	General Physics II	3	Required	P:Phys 140 C:Phys 145	Math and Basic Sciences
Phys 145	General Physics II Lab	1	Required	C: Phys 141	Math and Basic Sciences
Chem 142	General Chemistry II	3	Required	P:Chem 140 C:Chem 143	Math and Basic Sciences
Chem 143	General Chemistry Lab	1	Required	C:Chem 142	Math and Basic

					Sciences
Engr 105	Engineering Computing & Skills	2	Required	P:Engr 100 C:Math 145	General Engineering
Eng 134	English Composition II	2	Required	P: Eng 133	Broad Education
Eng 138	Fundamentals of Speech Communication	2	Required	C: Eng 134	Broad Education
Semester Credit Hours				**18**	

Third Semester					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Bio 140	Biology	3	Required		Math and Basic Sciences
Math 244	Multivariate Calculus	3	Required	P: Math 145	Math and Basic Sciences
ChE 201	Principles of Chemical Engineering	3	Required	P:Phys 140 P:Engr 106	Core Chemical Engineering
Chem 242	Physical Chemistry	3	Required	P:Chem 142	Math and Basic Sciences
ChE 203	Chemical Engineering Thermodynamics I	3	Required	P:Chem 142	Core Chemical Engineering
SSC 101	Creed and doctrines	2	Required		Broad Education
Semester Credit Hours				**17**	

Fifth Semester					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
ChE 302	Process Heat Transfer	3	Required	P: ChE 204	Core Chemical Engineering
ChE 301	Chemical Engineering Thermodynamics II	3	Required	P:ChE 203 C:Chem 242	Core Chemical Engineering
ChE 303	Separation Processes I	3	Required	P: ChE 204	Core Chemical Engineering
Engr 205	Materials Science	3	Required	P: Chem 142	Math and Basic Sciences
Engr 310	Numerical Methods	3	Required	P:Math 240, P: CS 204, P: Engr 105	General Engineering
Eng 137	Technical Writing	2	Required	P:Eng 134 P:Eng 138	Broad Education
Semester Credit Hours				**17**	

Sixth Semester					
Course Code	**Course Title**	**CH**	**Required/ Elective**	**Pre-& Co-requisite**	**Curriculum Category**
ChE 308	Mass Transfer	3	Required	P:ChE 302 P:Math 244	Core Chemical Engineering
ChE 304	Reaction Engineering	3	Required	P:ChE 301 C:Chem 243	Core Chemical Engineering
ChE 307	Biochemical Engineering	3	Required	P:Bio 140 C:ChE 304	Core Chemical Engineering
ChE 306	Chemical Engineering Lab I	1	Required	P:ChE 302 P:ChE 303 P: Engr 206 P: Eng 137	Core Chemical Engineering
Engr 307	Engineering Economics	3	Required	P:Engr 100	General Engineering

SSC xxx	University Elective I	2	Required		Broad Education
Mgt 292	Management Fundamentals & Skills	3	Required		Broad Education
Semester Credit Hours				**18**	

Summer Term					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Engr 399	Engineering Training	0	Required	P: Senior Standing P:Eng 137	Core Chemical Engineering
Semester Credit Hours			**0**		

Seventh Semester					
Course Code	**Course Title**	**CH**	**Required/ Elective**	**Pre-& Co-requisite**	**Curriculum Category**
ChE 401	Separation Processes II	3	Required	P:ChE 308 C:Engr 310	Core Chemical Engineering
ChE 402	Plant Design	3	Required	P:Engr 223, P: Engr 307 P:Engr 205 P: ChE 401 C:ChE 410	Core Chemical Engineering
ChE 405	Chem. Eng. Lab. II	1	Required	P: ChE 304	Core Chemical Engineering
ChE 410	Computer-Aided Process Design Lab.	1	Required	C: ChE 402	Core Chemical Engineering
ChE xxx	Technical Elective I	3	Required		Core Chemical Engineering
ChE 495	Senior Design I	2	Required	P:Senior Standing C: ChE 402	Core Chemical Engineering
SSC 102	Islamic Culture	2	Required		Broad Education
Semester Credit Hours				**15**	

Eighth Semester					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
ChE 403	Separation Processes III	3	Required	P: ChE 401	Core Chemical Engineering
ChE 406	Chemical Engineering Lab III	1	Required	C:ChE 403 C:ChE 304	Core Chemical Engineering
ChE 404	Process Dynamics & Control	3	Required	P:Math 240 P:ChE 304	Core Chemical Engineering
ChE xxx	Technical Elective II	3	Required		Elective Chemical Engineering
ChE 496	Senior Design II	2	Required	P: ChE 495	Elective Chemical Engineering
ChE xxx	Technical Elective III	3	Required	P:Eng 134 C:Eng 138	Elective Chemical Engineering
SSC xxx	University Elective II	2	Required		Elective Chemical Engineering
Semester Credit Hours			**17**		

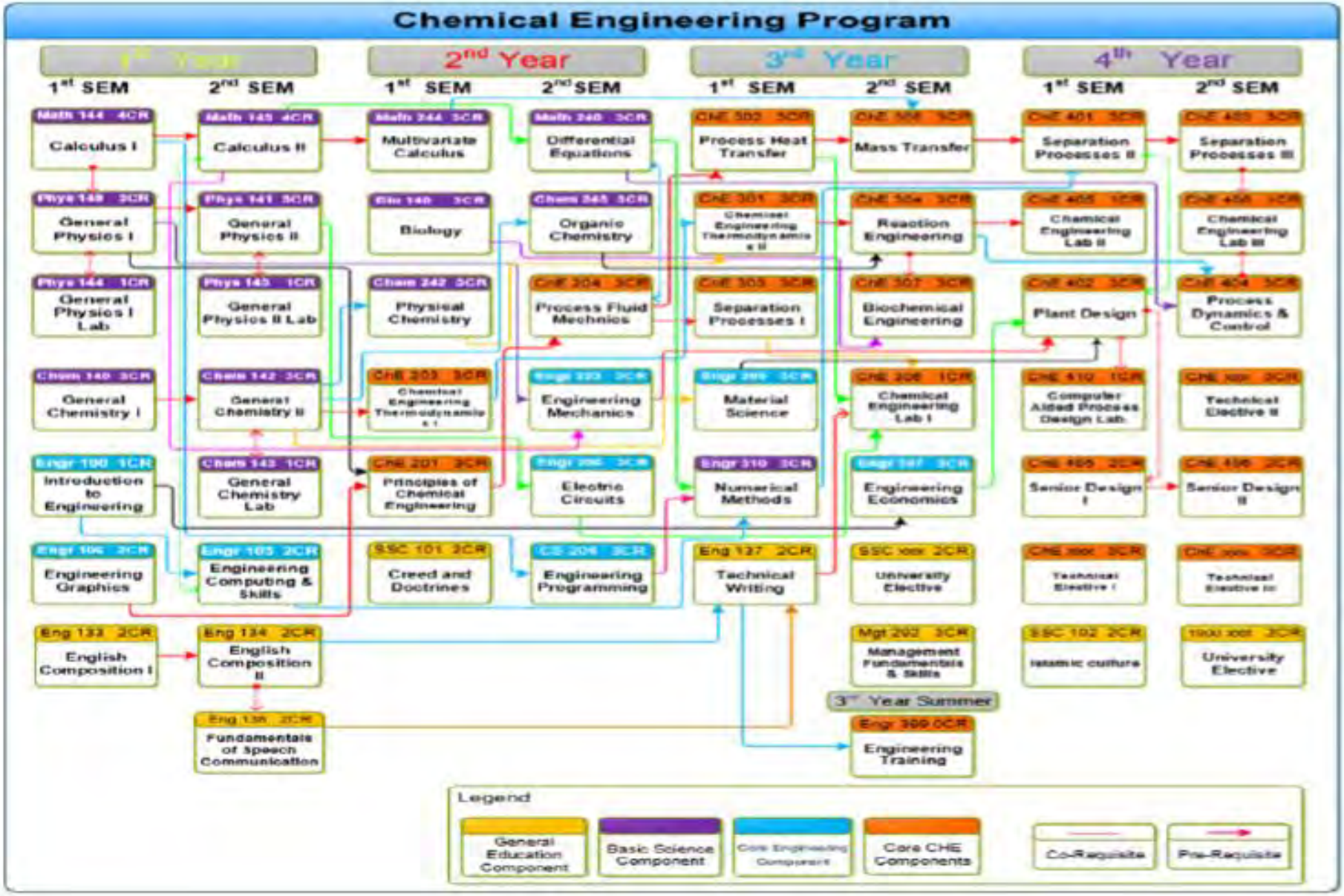
Department Technical Electives					
Course Code	**Course Title**	**CH**	**Required/ Elective**	**Pre-& Co-requisite**	**Curriculum Category**
ChE 305	Chemical Process Industries	3	Elective	P:Chem 243	Elective ChE

ChE 407	Chemical Engineering Optimization	3	Elective	P: Engr 310	Elective ChE
ChE 408	Chemical Process Safety	3	Elective	P:ChE 304	Elective ChE
ChE 420	Experimental Design and Data Analysis	3	Elective	P:Engr 310	Elective ChE
ChE 421	Corrosion Engineering	3	Elective	P:Engr 205	Elective ChE
ChE 430	Polymer Engineering	3	Elective	P:Chem 243	Elective ChE
ChE 431	Natural Gas Engineering	3	Elective	P:Chem 243	Elective ChE
ChE 432	Petroleum Refining Engineering	3	Elective	P:Chem 243	Elective ChE
ChE 433	Petrochemical Industries	3	Elective	P:Chem 243	Elective ChE
ChE 441	Introduction to Environmental Engineering	3	Elective	P:ChE 303	Elective ChE
ChE 442	Industrial Water Treatment	3	Elective	P:ChE 303	Elective ChE
ChE 443	Industrial Wastewater Treatment	3	Elective	P:ChE 303	Elective ChE
ChE 444	Water Desalination	3	Elective	P:ChE 303	Elective ChE
ChE 452	Air Pollution and Control	3	Elective	P:ChE 303	Elective ChE
ChE 481	Undergraduate Research I	3	Elective	P: Senior Standing	Elective ChE
ChE 482	Undergraduate Research II	3	Elective	P: Senior Standing	Elective ChE
ChE 483	Special Topics I	3	Elective	P: Senior Standing	Elective ChE
ChE 484	Special Topics II	3	Elective	P: Senior Standing	Elective ChE

University Electives (Before Fall 2018/2019)					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Deic 102	Fiqh Biography	2	Elective	None	Broad Education
Deic 302	Islam and Science and Technology Issues	2	Elective	None	Broad Education
Deic 317	Islamic Morals and Ethics	2	Elective	None	Broad Education
Deic 318	Economic System in Islam	2	Elective	None	Broad Education
Deic 401	Islamic Social System	2	Elective	None	Broad Education
Deic 418	Political System and Human Rights in Islam	2	Elective	None	Broad Education

University Courses (For Batch 2018 & above): From Supporting Studies Centre					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
SSC 103	Islamic Morals and Ethics	2	Elective	None	Broad Education
SSC 104	Studies in the Biography of the Prophet	2	Elective	None	Broad Education
SSC 105	Medical jurisprudence	2	Elective	None	Broad Education
SSC 106	Economics & Politics in Islam	2	Elective	None	Broad Education

SSC 107	Islamic Social & Family Behaviour	2	Elective	None	Broad Education
SSC 108	Management & Entrepreneurship	2	Elective	None	Broad Education
SSC 109	Health & Fitness	2	Elective	None	Broad Education
SSC 110	Research skills	2	Elective	None	Broad Education
SSC1 11	Volunteer work	2	Elective	None	Broad Education
SSC 112	Medicine: Type and use	2	Elective	None	Broad Education
SSC 113	Human Rights in Islam	2	Elective	None	Broad Education
SSC 114	Food and Nutrition	2	Elective	None	Broad Education


Chemical Engineering Program
1st Year
2nd Year
3rd Year
4th Year
1st SEM
2nd SEM
1st SEM
2nd SEM
1st SEM
2nd SEM
1st SEM
2nd SEM
Math 144 4CR
Calculus I
Math 145 4CR
Calculus II
Math 244 3CR
Multivariate Calculus
Math 246 3CR
Differential Equations
CHE 302 3CR
Process Heat Transfer
CHE 304 3CR
Mass Transfer
CHE 401 3CR
Separation Processes II
CHE 403 3CR
Separation Processes III
Phys 143 3CR
General Physics I
Phys 141 3CR
General Physics II
Bio 140 3CR
Biology
Chem 345 3CR
Organic Chemistry
CHE 301 3CR
Chemical Engineering Thermodynamics II
CHE 304 3CR
Reaction Engineering
CHE 405 1CR
Chemical Engineering Lab II
CHE 406 2CR
Chemical Engineering Lab III
Phys 144 1CR
General Physics I Lab
Phys 145 1CR
General Physics II Lab
Chem 242 3CR
Physical Chemistry
CHE 204 3CR
Process Fluid Mechnics
CHE 303 3CR
Separation Processes I
CHE 307 3CR
Biochemical Engineering
CHE 402 3CR
Plant Design
CHE 404 3CR
Process Dynamics & Control
Chem 140 3CR
General Chemistry I
Chem 142 3CR
General Chemistry II
CHE 203 3CR
Chemical Engineering Thermodynamics I
Engr 220 3CR
Engineering Mechanics
Engr 209 3CR
Material Science
CHE 206 1CR
Chemical Engineering Lab I
CHE 410 1CR
Computer Aided Process Design Lab
CHE xxx 2CR
Technical Elective II
Engr 100 1CR
Introduction to Engineering
Chem 143 1CR
General Chemistry Lab
CHE 201 2CR
Principles of Chemical Engineering
Engr 205 3CR
Electric Circuits
Engr 310 3CR
Numerical Methods
Engr 307 3CR
Engineering Economics
CHE 405 2CR
Senior Design I
CHE 406 2CR
Senior Design II
Engr 106 2CR
Engineering Graphics
Engr 105 2CR
Engineering Computing & Skills
SSC 101 2CR
Creed and Doctrines
CS 204 3CR
Engineering Programming
Eng 127 2CR
Technical Writing
SSC xxx 2CR
University Elective
CHE 3xx 3CR
Technical Elective I
CHE 3xx 3CR
Technical Elective III
Eng 133 2CR
English Composition I
Eng 134 2CR
English Composition II
Mgt 202 3CR
Management Fundamentals & Skills
SSC 102 2CR
Islamic culture
1XXX xxx 3CR
University Elective
3rd Year Summer
Eng 135 2CR
Fundamentals of Speech Communication
Engr 399 0CR
Engineering Training
Legend
General Education Component
Basic Science Component
Core Engineering Component
Core CHE Components
Co-Requisite
Pre-Requisite

Courses Description (Catalog)

Math 144–Calculus I 4(4-0-0): This is an introductory course of mathematics for college of engineering students. The course covers the basic concepts and methods of calculus. At the beginning of the course the instructor will provide students the knowledge of the number systems, algebraic operations and functions of single variable with domain and range so that students can learn differentiation of the functions. The main topics to be covered in this course include: Limits, Continuity, Differentiation of functions of a single variable, Exponential, Logarithmic, Trigonometric, Inverse trigonometric functions, Applications of derivatives, Differentials, Curve Sketching, L'Hopital Rule, Mean value theorems, Area and estimating with finite sums, Introduction to integrals and definite integrals. Four 1-hour lectures per week. Co-requisite: None.

Math 145–Calculus II 4(4-0-0): This is an intermediate level calculus course designed for undergraduate Engineering students. This course covers mainly the integration and basic principles of Vectors and their applications. At the beginning of this course, the instructor will give the review of differentiation and integration. In depth, the students will learn the methods of integration and vectors. The topic covered include, Techniques of Integration, Improper Integration, Applications of Integration, Infinite Sequences and Series, (Power series and Taylor series), Polar coordinates, Transcendental Functions, Vectors, Vector Valued Functions. Four 1-hour lectures per week. Pre-requisite: Math 144.

Math 240–Differential Equations 3(3-0-0): This course is an introductory course of differential equations for college of engineering students. The course covers different methods and concepts to solve first and second order differential equations. At the beginning of the course we discuss some definitions and terminology about differential equations. Then we move to solving first and second order differential equations. The topics in this course include, linear differential equations, solving first order differential equations, solving second order differential equations, series solutions of second order linear differential equations, solving systems of linear differential equations, Laplace transform and its applications in solving differential equations. Three 1-hour lectures per week. Pre-requisite: Math 145.

Math 244–Multivariate Calculus 3(3-0-0): This course is an advanced course in calculus, designed for undergraduate students of engineering. The course covers the basic principles and methods of differentiation and integration of two or more variables. At the beginning of the course, the Instructor will give a review of functions of one variable and its differentiation and integration. Then, the functions of two or more variables with domain and range will be discussed. Throughout the course, the following main topics will be covered: solid analytic geometry; vector calculus; partial derivative; and multiple integrals. The coverage will also include relevant and important applications in the sciences and engineering. Three 1-hour lectures per week. Pre-requisite: Math 145.

Phys 140–General Physics I 3(3-0-0): The course is an introduction to units, measurements, motion in one and two dimensions, kinematics and dynamics, Newton's laws, work and energy, rotational dynamics, linear and angular momentum, torque, and collisions. Basic calculus and multi-variable algebra will be used. Three 1-hour lectures per week. Co-requisite: Math 144 & Phys 144.

Phys 141–General Physics II 3(3-0-0): This course introduces students to the physics of electricity and magnetism and the connections between them. The concepts of electric charge, electric field, electric potential, Kirchhoff Law, Gauss Law, electric and magnetic fluxes, capacitance, resistivity and resistance, connections in series and in parallel, RC-circuit, magnetic field, magnetic force, magnetic and electric torques, Ampere Law, electromagnetic induction, and Faraday Law and Lenz Law will be taught. Three 1-hour lectures per week. Pre-requisite: Phys 140. Co-requisite: Phys 145.

Phys 144–General Physics I Lab. 1(0-0-3): Measure basic constants such as length, weight and time, value of acceleration due to gravity. Design and conduct experiments in mechanics. Analyze and interpret experiment data. Write a scientific report. Draw and interpret a graph. Apply experimental principles and error calculations to mechanics. Three hours Lab. per week. Co-requisite: Phys 140.

Phys 145–General Physics II Lab. 1(0-0-3): This course introduces students to the basic electrical measurements' techniques and to the physics of electricity and magnetism. The concepts of basic measurements, Resistors in series and in parallel, Verifying Ohm's law, Wheatstone Bridge, Verifying Kirchhoff's Laws, Resistivity, Capacitors in series and in parallel, RC circuit, Introduction to Oscilloscope, the Mechanical Equivalent of Heat, the Negative Temperature Coefficient of Resistance

(Thermistor), Galvanometer, and the Magnetic Moment will be taught. Three hours Lab. per week. Co-requisite: Phys 141.

Chem 140-General Chemistry I 3(3-0-0): Matter properties and measurement, Atoms and the Atomic Theory, Chemical Compounds, Chemical Reactions, Reactions in Aqueous Solutions, Liquids Solids and Intermolecular Forces, Electrons in Atoms, Periodic Table and Atomic Properties, Chemical Bonding, Valence-Bond, Hybridization of Atomic Orbital, Multiple Covalent Bonds, Molecular Orbital Theory, Liquids and Solids. Three 1-hour lectures per week. Co-requisite: None.

Chem 142-General Chemistry II 3(3-0-0): Properties of Gases: Kinetic-molecular theory of gases, Ideal gas law, Mixtures of gases, Thermo- chemistry, Principles of Chemical Equilibrium, Acids and Bases, Buffer Solutions, Neutralization Reactions and Titration Curves, Solubility and Complex-Ion Equilibria, Spontaneous Change: Entropy and Free Energy, Thermodynamic, Solutions and Their Physical Properties, Chemical Kinetics and Electrochemistry. Three 1-hour lectures per week. Pre-requisite: Chem 140. Co-requisite: Chem 143.

Chem 143–General Chemistry Lab. 1(0-0-3): Laboratory safety rules and Evaluation of analytical data, Definition and determination of density, explanation and determination of specific heat, concept of Acids, bases and Heat of Neutralization Reaction and its determination, reversible reactions, concept of equilibrium constant and its determination, LeChatelier principle and its verification, principle involved in Acid base titrations, indicators, Ionization of electrolytes, determination of dissociation constant of weak acid(Ka), principle involved in complex metric titrations, hardness of water and its determination. Three hours Lab. per week. Co-requisite: Chem 142.

Chem 242–Physical Chemistry 3(3-0-0): Molecular kinetic theory of gases, First law of thermodynamics, Thermos chemistry, Second and third laws of thermodynamics, Free energies, Phases and solutions, Phase Equilibrium, Chemical equilibrium, Surface Chemistry. Three 1-hour lectures per week. Three 1-hour lectures per week. Prerequisite(s): Chem 142.

Chem 243–Organic Chemistry 3(3-0-0): Introduction, nomenclature of organic compounds, chemical bonding, isomers, aromatic and aliphatic hydrocarbons, olefins, acetylenes, cycloalkanes, stereoisomers, halogenated organic compounds, reactions of free radicals, alcohols, ethers, epoxides, thiols, sulfides, synthetic polymers. Three 1-hour lectures per week. Prerequisite(s): Chem 142.

Bio 140–Biology 3(3-0-0): The course is designed to enhance students' knowledge to understand basic biological processes including the followings: The energy in the cellular work, Cellular respiration, Photosynthesis, Cell reproduction, various pattern of inheritance, DNA replication, Gene Regulation, DNA Technology and Evolution. Three 1-hour lectures per week. Pre-requisite: None.

Engr 100-Introduction To Engineering 1(1-0-0): This course introduces engineering to students, particularly those who are interested in an engineering profession. It covers engineering ethics, teamwork, communication skills, engineering topics, and engineering problem solving skills and design methodology. One 1-lecture per week. Co-requisite: None.

Engr 105-Engineering Computing & Skills 2(2-0-0): Problem solving skills and computing using MATLAB. Two 1-hour lectures per week. Pre-requisite: Engr 100. Co-requisite: Math 145.

Engr 106–Engineering Graphics 2(1-0-3): An introductory course in engineering graphics focuses on graphical communication. Topics include descriptive geometry elements, visualization, engineering drawing techniques, orthographic projection, pictorial representation, section views, and basic dimensioning. The course incorporates computer aided drafting (CAD) with engineering applications using 2-D drawing. This course is divided in to two sections: sketching and AutoCAD. The course begins by teaching the basics of engineering graphics using sketching. Freehand sketching using only a pencil and paper is an important skill for any engineer. It is a means of quickly conveying technical information to others. Through sketching the concepts of pictorial projections, section views, auxiliary views and dimensioning are taught. Once the foundation of engineering graphics is known, these concepts can be applied using computer aided design (CAD) software. AutoCAD is taught first. AutoCAD is a drawing software package used to create two dimensional engineering drawings. One 2-hours lecture per week. Co-requisite: None.

Engr 205-Material Science 3(3-0-0): Mechanical, electrical and chemical properties of engineering materials, fundamentals of crystallography, crystal defects, Impurities and imperfections in solids.

Atomic diffusion. Single phase metals and alloys; elastic and plastic deformation, recrystallization and grain growth. Multi-phase materials: phase diagrams and equilibrium microstructural development, Heat treatment process, Studies of the widely-used engineering metals, alloys, polymers, composites & ceramics. Three 1-hour lectures per week. Prerequisite(s): Chem 142.

Engr 206-Electric Circuits 3(3-0-0): Resistors, capacitors, inductors, currents; voltages; power and energy; circuit analysis techniques; DC and AC analysis; magnetic circuits and transformers; Introduction to DC and AC machines. Three 1-hour lectures per week. Pre-requisite: Phys 141.

Engr 223-Engineering Mechanics 3(3-0-0): Engineering Mechanics, covering both statics and dynamics. Topics include vector algebra, force systems, free-body diagrams, equilibrium of particles and rigid bodies, kinematics of particles and rigid bodies, Newton's laws applied to particles and rigid bodies, friction. Three 1-hour lectures per week. Prerequisite(s): Math 145 & Phys 140. Co-requisite(s): None.

CS 204–Engineering Programming 3(3-0-0): Introduction to computer systems; problem solving methodology; testing and debugging of programs; variables, declarations, and assignments; input and output; data types; control flow and looping; functions and overloading; streams and input/output; one-dimensional arrays; two-dimensional arrays; pointers and dynamic arrays; structures; abstract data types and classes; inheritance; friends, overloaded operators, and arrays in classes; recursive functions.. Projects that will require lab work will be assigned weekly. Three 1-hour lectures per week. Prerequisite: Math 144.

Engr 307–Engineering Economics 3(3-0-0): The course covers the following topics: Engineering Economic Decisions; Understanding Financial Statements; Cost Concepts and Behaviors; Time is Money; Understanding Money and Its Management; Principles of Investing; Present Worth Analysis; Annual Equivalent Worth Analysis; Rate of Return Analysis; Depreciation; Taxes; Break-Even Analysis, Cost Estimation; Developing Project Cash Flows; Inflation; Replacement Decisions. Three 1-hour lectures per week. Prerequisite(s): Engr 100.

Engr 310-Numerical Methods 3(3-0-0): Introduction to Numerical Methods, Solution of Nonlinear Equations, Solution of Simultaneous Linear Algebraic Equations, Solution of Matrix Eigenvalue Problem, Curve Fitting and Interpolation, Numerical Differentiation, Numerical Integration, Ordinary Differential Equations: Initial-Value Problems, Ordinary Differential Equations: Boundary-Value Problems. Three 1-hour lectures per week. Prerequisite: Math 240, CS 204 & Engr 105.

Engr 399-Engineering Training 0(0-0-0): All engineering students are required to undergo a comprehensive "Engineering Training Program" with a reputable and specialized industrial firm. The firm can be in or outside Saudi Arabia relevant to his major area of interest in engineering analysis, design, or construction. The main purpose of this summer training is to enhance the students' practical experience and career abilities. Also, it deepens their engineering knowledge acquired during their academic years in the field of practical experience in real-life engineering projects. Additionally, such a program improves the relationship between the College of Engineering and the governmental and private industrial firms. Also, it can provide the industry with well-trained professionals in the near future. The qualifying student should spend at least eight weeks in a governmental organization, a reputable industrial firm, or a research center that is involved with engineering activities. Two months of full time training. Pre-requisite: Senior Standing & Eng 137.

ChE 201-Principles of Chemical Engineering 3(3-0-0): Use of basic mathematical concepts, physical laws, stoichiometry, and the thermodynamic properties of matter to obtain material and energy balances for steady and unsteady state systems including those with chemical reaction. Three 1-hour lectures per week. Prerequisite(s): Phys 140 & Engr 106.

ChE 203-Chemical Engineering Thermodynamics I 3(3-0-0): Thermodynamics concepts and definitions (states, properties, systems, control volume, processes, cycles, units, tables of properties), work and heat, first law, internal energy and enthalpy, conservation of mass, steady–state and uniform state processes, second law, reversible processes, entropy, Claudius inequality, principle of the increase of entropy, efficiencies, irreversibility and availability, power and refrigeration cycles. Three 1-hour lectures per week. Prerequisite(s): Chem 142.

ChE 204-Process Fluid Mechanics 3(3-0-0): Fluid statics, continuity equation, Bernoulli's equation, and flow measuring devices, fluid friction of flowing systems, momentum balance, pump types and

pump performance curves. Three 1-hour lectures per week. Prerequisite(s): ChE 201. Co-requisite(s): Math 240.

ChE 301-Chemical Engineering Thermodynamics II 3(3-0-0): Properties of ideal and non-ideal vapors and liquids, ideal and non-ideal vapor-liquid equilibria, ideal and non-ideal liquid-liquid equilibria, equilibria of chemical reaction systems, electrolytic solutions, surface thermodynamics, solid phase thermos-dynamics. Three 1-hour lectures per week. Prerequisite(s): ChE 203 & Chem 242.

ChE 302-Process Heat Transfer 3(3-0-0): Modes of heat transfer, steady-state heat conduction, unsteady-state heat conduction, principles of convection, natural and forced convection, radiation heat transfer, boiling and condensation and design of heat exchangers and heat transfer equipment. Three 1-hour lectures per week. Prerequisite(s): ChE 204.

ChE 303-Separation Processes I 3(3-0-0): Analysis and design of unit operations involving: particulate solids handling and storage, screening and classification, size reduction processes, filtration, settling, centrifugation and fluidization. Three 1-hour lectures per week. Prerequisite(s): ChE 204.

ChE 305-Chemical Process Industries 3(3-0-0): Fundamentals of chemical industries, water treatment, industrial gases; inorganic acids, petroleum and petrochemicals, ceramic, cement and glass industries; fertilizers industries; oil and fat, soap and detergents; pigments and surface coating industries. Three 1-hour lectures per week. Prerequisite(s): Chem 243.

ChE 308-Mass Transfer 3(3-0-0): Molecular diffusion, unsteady state mass transfer, mass transfer coefficients, mass transfer across interfaces, and analogy between momentum, heat and mass transfer, mass transfer between phases, membrane separation. Three 1-hour lectures per week. Prerequisite(s): ChE 302 & Math 244.

ChE 304-Reaction Engineering 3(3-0-0): Rate laws and stoichiometry, kinetics and mechanisms of homogeneous and heterogeneous reactions, analysis of kinetics data, design of ideal isothermal and no isothermal reactors. Three 1-hour lectures per week. Prerequisite(s): ChE 301 & Chem 243.

ChE 307-Biochemical Engineering 3(3-0-0): Introduction to the basic concepts of biochemical engineering; application of chemical engineering skills to the analysis, design, and mitigation of hazards of biologically based processes; kinetics, heat and mass transfer, and thermodynamics as they apply to enzyme catalysis, microbial growth, bioreactor design, and product recovery and safety. Three 1-hour lectures per week. Prerequisite(s): Bio 140. Co-requisite(s): ChE 304.

ChE 401-Separation Processes II 3(3-0-0): Fundamentals & design-related issues of the following separation techniques: absorption, stripping, binary & multi-component distillation, liquid-liquid extraction, and leaching. Three 1-hour lectures per week. Prerequisite(s): ChE 308 & Engr 310.

ChE 402-Plant Design 3(3-0-0): Design of chemical processes including process flow sheet preparation, equipment selection and design, materials of construction and corrosion, utilities, plant location and plant layout, process economics, profitability analysis, optimum operating conditions, computer aided design, design optimization, health, safety and environment aspects. Three 1-hour lectures per week. Prerequisite(s): Engr 307, Engr 205 & Engr 223. Co-requisite(s): ChE 401 & ChE 410.

ChE 403-Separation Processes III 3(3-0-0): Evaporation, humidification and dehumidification, drying, adsorption, crystallization. Three 1-hour lectures per week. Prerequisite(s): ChE 401.

ChE 404-Process Dynamics & Control 3(3-0-0): Introduction to control systems, modeling of steady and unsteady-state behavior of chemical processes, transfer functions, dynamic behavior of first and second order systems, basic components of control systems, design and analysis of feedback control systems related to chemical engineering processes. Three 1-hour lectures per week. Prerequisite(s): Math 240 & ChE 304.

ChE 405-Chemical Engineering Lab II 1(0-0-3): Experiments selected from reaction engineering and thermodynamics courses. Three hours Lab. per week. Prerequisite(s): ChE 304.

ChE 406-Chemical Engineering Lab III 1(0-0-3): Selected experiments from separation processes II, separation processes III and process dynamics and control courses. Three hours Lab. per week. Co-requisite(s): ChE 403 & ChE 404.

ChE 407-Chemical Engineering Optimization 3(3-0-0): Survey of continuous optimization

problems, structure and formulation of optimization problems in chemical engineering, unconstrained optimization problems, linear programming, introduction to constrained optimization, solution of constrained optimization problems, selected applications in chemical engineering, software packages in optimization. Three 1-hour lectures per week. Prerequisite(s): Math 310.

ChE 408-Chemical Process Safety 3(3-0-0): Hazards of fire and explosions, effects of toxic materials on human and its control, local and international codes and regulations, handling and disposal of hazardous materials, hazard identification and risk assessment from process industries, safety procedures for process industries, emergency plans. Three 1-hour lectures per week. Prerequisite(s): ChE 304.

ChE 420-Experimental Design and Data Analysis 3(3-0-0): Review of statistical distributions, simple comparative experiments, experiments with a single factor, analysis of variance, randomized blocks, Latin squares and related designs, incomplete block designs, factorial designs, two-level fraction factorial designs, multi-factor experiment and nested designs. Three 1-hour lectures per week. Prerequisite(s): Engr 310.

ChE 421-Corrosion Engineering 3(3-0-0): Electrochemical and metallurgical aspects of corrosion, forms of corrosion, modern theory of corrosion and its application, iron and steel corrosion, corrosion prevention, case studies. Three 1-hour lectures per week. Prerequisite(s): Engr 205.

ChE 430-Polymer Engineering 3(3-0-0): Definition of polymers, classification of polymers, effect of chemical structure on polymer properties, microstructure of polymers: crystallinity, orientation, molecular conformation, relation between microstructure and physical properties of polymers, polymerization methods, polymerization techniques, molecular weight characterization, polymer processing: extrusion, injection molding, blow molding, thermoforming, film blowing. Three 1-hour lectures per week. Prerequisite(s): Chem 243.

ChE 431–Natural Gas Engineering 3(3-0-0): Current and prospective energy situation, sources of natural gas, characterization of natural gas; Exploration and production of natural gas; Design and operations of systems related to the hydrocarbon gases and liquids for industrial and commercial applications; Unit operations of gas processing including compression, transportation, acid gas removal, gas liquefaction, and cryogenic distillation, concentration of their components by absorption and fractionalization procedures; Gas processing products and economics, conversion of natural gas; Use of computer aided design and economic evaluation of natural gas equipment and facility designs. Three 1-hour lectures per week. Prerequisite(s): Chem 243.

ChE 432-Petroleum Refining Engineering 3(3-0-0): Origin, occurrence and constituents of petroleum, crude oil analysis; Petroleum products and their uses; Crude oil distillation; Chemical reactions and refinery operations of delayed coking, catalytic reforming and isomerization, catalytic cracking, hydrotreating, catalytic hydrocracking, alkylation; Product blending and production of lubricating oil; Asphalt technology. Three 1-hour lectures per week. Prerequisite(s): Chem 243.

ChE 433-Petrochemical Industries 3(3-0-0): Physical and chemical properties of raw materials, processes used in the manufacture of petroleum-based chemicals; Application of scientific and engineering principles involved in the production of hydrogen, alcohols, olefins; Aromatics, aldehydes, ketones, acids, rubber, and other polymers. Three lectures per week. Prerequisite(s): Chem 243.

ChE 441- Introduction to Environmental Engineering 3(3 -0-0): Concepts and terminology; Sources and impacts of water pollutants; Conventional water and wastewater treatment processes; Sources and impacts of air pollutants; Air pollution control through gas cleaning devices; Solid waste classification, handling and ultimate disposal. Three 1-hour lectures per week. Prerequisite(s): ChE 303.

ChE 442-Industrial Water Treatment 3(3-0-0): Water sources, impurities and chemistry; External treatment; Boiler water systems; Cooling water systems; Pretreatment of cooling water systems; Control of corrosion, deposits and scale. Three 1-hour lectures per week. Prerequisite(s): ChE 303.

ChE 443-Industrial Wastewater Treatment 3(3-0-0): Sources, characteristics and treatment techniques for wastewater generated from various industrial categories. Three 1-hour lectures per week. Prerequisite(s): ChE 303.

ChE 444-Water Desalination 3(3-0-0): Water sources and characterization, water chemistry, water treatment processes; Scale formation problems and pretreatment requirements; Desalination processes:

thermal desalination processes, membrane processes; Post treatment of product water. Three 1-hour lectures per week. Prerequisite(s): ChE 308.

ChE 452–Air Pollution and Control 3(3-0-0): Economic, social and health implications of air pollution; Air pollution case studies; Methods of air pollution control and design techniques; Sources, types and characteristics of air pollution; Air quality standards and other legislation containing air pollution; Types of air pollution; Environmental regulations for air pollution; Engineering alternatives for air pollution control. Three 1-hour lectures per week. Prerequisite(s): ChE 303.

ChE 481-Undergraduate Research I 3(3-0-0): This course is designed to enhance an undergraduate curriculum in chemical engineering by providing students with the opportunity to engage in research activities. Requires progress reports and a comprehensive written report. Three 1-hour lectures per week. Prerequisite(s): Senior Standing.

ChE 482-Undergraduate Research II 3(3-0-0): This course is designed to enhance an undergraduate curriculum in chemical engineering by providing students with the opportunity to engage in research activities. Requires progress reports and a comprehensive written report. Three 1-hour lectures per week. Prerequisite(s): Senior Standing.

ChE 483-Special Topics I 3(3-0-0): The course covers special topics in an area of chemical engineering. Given on demand. Three 1-hour lectures per week. Prerequisite(s): Senior Standing.

ChE 484-Special Topics II 3(3-0-0): The course covers special topics in an area of chemical engineering. Given on demand. Three 1-hour lectures per week. Prerequisite(s): Senior Standing.

ChE 495- Senior Design I 2(2-0-0): The first course of a two-semester sequence of senior capstone design. Each group selects a project under the supervision of a faculty member and makes literature review, process selection, plant capacity determination, and mass and energy balances. They will prepare and submit a formal report and make public presentation. Two 1-hour lectures per week. Prerequisite(s): Senior Standing. Co-requisite(s): ChE 402.

ChE 496- Senior Design II 2(2-0-0): This is the second course of a two-semester sequence of senior capstone design. It provides students with experience in the process and practice of a chemical component/system design from concept through final design and implementation. Emphasis is on teamwork, project management, testing through simulation, oral and written communications. Two 1-hour lectures per week. Prerequisite(s): ChE 495.

Eng 133–English Composition I 2(2-0-0): This is an intermediate level writing class. Students are guided through the stages of the writing process to write paragraphs that are both meaningful and organized and include a topic sentence with a controlling idea and conclusion. Students write multi-draft compositions from a variety of practical and academic purposes. They improve their writing by studying model sentences and paragraphs, basic sentence patterns, mechanics, coordinating conjunctions, transitions and vocabulary. Two 1-hour lectures per week. Prerequisite: None.

Eng 134–English Composition II 2(2,0,0): This English course is designed to take learners from the paragraph level of writing in English to the Essay level. It concentrates of the essential form and function of the essay and prepares the ground for the academic essay. Particular importance is given to tasks of description and argumentation, including work on comparison, definition, cause-effect and expression of opinion in essay writing. Thus, students are taken through the major stages of the essay composition process. Two 1-hour lectures per week. Pre-requisite: Eng 133.

Eng 137–Technical Writing 2(2-0-0): This course introduces students to the fundamentals of writing, designing and conveying technical information to different audiences. Students will learn about technical writing conventions, such as organization, style and tone and illustration and layout as they work through the writing process to produce a variety of common technical documents that they will encounter in their academic work. Two 1-hour lectures per week. Pre-requisite: Eng 134.

Eng 138–Fundamentals of Speech Communication 2(2-0-0): A study of communication theories as applied to speech: practical communicative experiences ranging from interpersonal communication and small-group process through problem identification and solution in discussion, to informative and persuasive speaking in standard speaker-audience situations. One 2-hours lectures per week. Co-requisite: Eng 134.

Mgt 292–Management Fundamentals & Skill 3(3-0-0): The course covers Management fundamentals & Skill, such as, Global Management - Change and Innovation - Appendix: Managing Entrepreneurial Ventures - Decision Making - Strategic Management - Module Planning Tools and Techniques - In class discussion: Ethics Dilemma - Operations Management - Marketing Management - E Business - Marketing Plan - Human Resource Management - Team Building - Foundations of Individual Behavior - Communication. Three 1-hour lectures per week. Prerequisite(s): None.

SSC 101- Creed and Doctrines 2(2-0-0): Creed: definition, importance, sources, characteristics, study methodology, pillars of faith, influence of creed on individuals and society, belief nullifiers, thought constraints, study of some contemporary doctrines: secularism, Satan worshipers, Baha'ism, Zionism, Misoneism, Christian fundamentalism. Student is required to memorize part of the holy Quran. One 2-hours lectures per week. Prerequisite(s): None.

SSC 102 Islamic Culture 2(2-0-0): Moderation, Islam globalism and human ties, discrimination and nationalism, Arabic as the medium of education and culture, science and religion, interfaith dialogue, Orientalism and Christianization, Colonialism, Westernization, modernity in literature, Globalization, Terrorism, Development of Moslem nations. One 2-hours lectures per week. Prerequisite(s): None.

SSC 103 Islamic Morals and Ethics 2(2-0-0): Ethics: its definition, importance, swearing, and stature in Islam. Characteristics of Islamic morals. Moral obligation, moral responsibility, and moral sanction. Pictures of the manners of the Prophet Mohammed, peace and blessings be upon him. Pictures of the morals of his companions. Ethics and ethics of the profession. The Kingdom of Saudi Arabia's efforts in the field of protecting integrity and combating professional corruption, while mentioning ethical applications from Saudi professional systems. Introduction to the National Anti-Corruption Commission "integrity". The role of the National Anti-Corruption Commission "integrity" in protecting the integrity and combating professional corruption. Prerequisite(s): None

SSC 104 Studies in the Biography of the Prophet 2(2-0-0): The importance of studying the Prophet Mohammed's biography. A glimpse into Arab life before Islam: religious, moral, social, and political life. The scientific method in the study of the Prophet's biography. Stages of the Prophet's Biography and the values learned from them. The Characteristics of the Prophet. Prophetic merits: the characteristics of the Prophet, both moral and ethical. The role of the Kingdom of Saudi Arabia in serving the prophetic biography. The personal efforts of some scholars of the Kingdom of Saudi Arabia to defend the Sunnah of the Prophet. Prerequisite(s): None

SSC 105 Medical jurisprudence 2(2-0-0): Medical jurisprudence. Treatment in Islamic law. Prophetic Medicine: preventive commandments, and treatment models. Examples of the scientific miracle of prophetic medicine. Legitimate Ruqyah and its evidence. Provisions of acts of worship related to the patient and the medical practitioner. Authorization and medical responsibility. Responsibility for a medical error. Applications of legal rules and intentions on medical provisions. Examples of contemporary medical issues: plastic surgery, fertilization outside the body, birth control and its regulation, milk bank, sperm freezing, miscarriage, gender determination, HIV/AIDS, organ and cell transplantation, resuscitation devices, and weight loss. Prerequisite(s): None

SSC 106 Economics & Politics in Islam 2(2-0-0): Political system: definition, and characteristics. Characteristics of the Islamic political system. The pillars of the state: the nation, and society. Manifestations of application of the political system in the Kingdom of Saudi Arabia. The Islamic economic system: definition, origin and development, importance, basics, and the characteristics of the economic system in Islam. Contemporary economic systems. Economic globalization. Property in Islam. Areas of intellectual property. Legitimate methods of ownership. Islam and economic freedom. Socioeconomic solidarity. Prerequisite(s): None

SSC 107 Islamic Social & Family Behavior 2(2-0-0): The social system in Islam. Social security and its role in preserving society. The importance of the family in Islam. Family protection factors in Islam. The role of the family in achieving community security. The response to the most prominent suspicions raised about the family. The most important social problems and ways to prevent. A study of some contemporary issues in the social system. Development and its impact on social renaissance. The relationship between the individual and society in Islam and positive systems. Study of contemporary issues related to women. The role of women towards their societies. The psychological characteristics of men and women, and their effect on family coexistence. Prerequisite(s): None

SSC 108 Management & Entrepreneurship 2(2-0-0):In the first part of this course, students from various disciplines will get acquainted with the most important basic concepts related to management and administrative decision, in addition to the most important traditional administrative functions of planning, organizing, directing and controlling, as well as what the knowledge and capabilities required by modern and future management come in the forefront of, Likewise leadership, participatory management, posterior leadership, technology management. In the other part of this course, students will have a solid foundation on the concept of entrepreneurship, its strategies, and its role in developing the national economy through small-scale projects. In this part, students will learn how to discover opportunities, understand, evaluate, and then transform them into sustainable business. Each student will also be able to learn the features and characteristics of entrepreneurs and the difficulties associated with entrepreneurship. Prerequisite(s): None

SSC 109 Health & Fitness 2(2-0-0): What is health? Physical fitness. Textures. Healthy nutrition. Weight control. Infectious and non-infectious diseases. Smoking. Drug. First aid. Car Accidents. Psychological stress. Prerequisite(s): None

SSC 110 Research Skills Research 2(2-0-0): concept, goals, fields, types, and steps. Research Methods: Descriptive Approach, Experimental Approach, and Historical Approach. Elements of a scientific research plan: Introduction, its problem; Its goals, importance, assumptions, and questions. Review of previous studies: How to critically analyze previous studies. Research hypotheses: definition, types, and formulation. References: books, periodicals, scientific theses, bulletins, and manuscripts. How to obtain information from global databases, and the skills of using the library electronically. Methods for writing references and quotations. Samples: their types and methods of selection. Research tools: (questionnaire - interview - observation - tests and measurements) and checking their suitability for the application. Scientific writing for research (abstract in Arabic and foreign languages - introduction - discussion - conclusion). Research ethics: Scientific honesty in quoting and avoiding scientific plagiarism. Prerequisite(s): None

SSC 111 Volunteer Work 2(2-0-0): The concept of volunteering from a social perspective. The importance, fields, and sources of volunteer work. Voluntary work in Islam. Volunteering in international and Arabic legislations. Theoretical foundations for volunteer efforts. Obstacles to volunteer, with a statement of volunteering culture and the ethics of volunteering in Saudi society. Management and organizations of volunteer work (administrative organization of charitable societies and social institutions in the Kingdom of Saudi Arabia). Evaluating the reality of volunteer work in society, with an indication of the relationship between civil and governmental social bodies. Voluntary work and its relationship to community security. Examples of voluntary work organizations at the Arabic level in general and the Kingdom of Saudi Arabia in particular. Voluntary field exercise for four weeks. Reviewing and evaluating the student's voluntary experience. Prerequisite(s): None

SSC 112 Medicine: Type and use 2(2-0-0): The main objective of this course is to introduce students to medicine and its various types and forms. This course also aims to provide the student with some special skills for optimal interaction with some common types of drugs such as antibiotics and medications in some famous physiological situations such as pregnancy, lactation, and some chronic diseases. This approach deals with describing known drug interactions, especially when using medicines with some types of foods, herbs, and nutritional supplements. Prerequisite(s): None

SSC 113 Human Rights in Islam 2(2-0-0): Human rights: definition and importance. The basic premises of human rights. Principles of human rights in Islam, philosophy, and thought. The history of human rights. The Universal Declaration of Human Rights: legal value and criticism. Islamic Declaration of Human Rights, the Kingdom of Saudi Arabia's concern for human rights. The legal framework for human rights in the Kingdom. Basic human rights: the right to life, the right to justice, the right to freedom, the right to religion, and the right to work. Prerequisite(s): None

SSC 114 Food and Nutrition 2(2-0-0): Introduction to food science and nutrition. Food and nutritional terminologies. The global food security problem. Fields of the food industry in the Kingdom. Main food groups (dairy - meat - vegetables and fruits - grains). Nutrients (food ingredients): moisture, carbohydrates (starch) sugars, dietary fiber, proteins, oils and fats, vitamins, and minerals. Food additive. Food corruption, and the authorities concerned with food control in the Kingdom. Methods of food preservation: drying, packaging, cooling, and freezing. Nutrition and its importance for the human

body. Food physiology. Daily needs of nutrients. Nutrition and general health of the body. Nutritional status sections. An example of obese malnutrition diseases. Dietary energy, production, and use in the body - the body's energy needs. Prerequisite(s): None

Deic 317-Islamic Morals and Ethics 2(2-0-0): Morals and Ethics: definition and foundations, characteristics, study of model samples of the Prophets' morals and ethics, tools of moral/ethical education in Islam. Concept of profession and its importance in human life, constituents of professional morals/ethics and its constraints, model samples of professional morals/ethics in Islam. Student is required to memorize part of the holy Quran. One 2-hours lectures per week. Prerequisite(s): None

Deic 318-Economic System in Islam 2(2-0-0): Islamic Economy: (its nature and principles, development, and characteristics), the economic problem and how to face it, contemporary economic systems (capitalism, socialism), economic globalism, World Bank and its goals, World Trade Organization and its goals, ownership in Islam: definition, types, constraints. Islam and economic freedom, Production, distribution, expenditure, economic policies in contracts and transactions. Student is required to memorize part of the holy Quran. One 2-hours lectures per week. Prerequisite(s): None.

Deic 401- Islamic Social System 2(2-0-0): Society: definition, building blocks of society in Islam, Islamic society attributes, Family in Islam: definition, status, importance, building blocks, marriage and its purposes, spouses' rights, parents, siblings, and relatives' rights, women's status and rights in Islam, Family controversial issues about family system in Islam and responding to those issues (polygamy, inheritance, veil, divorce, etc.), Family problems and remedies (women's work, alimony, stewardship, etc.). Student is required to memorize part of the holy Quran. One 2-hours lectures per week. Prerequisite(s): None.

Civil and Environmental Engineering Department

1 Contribution in Society

The Department of Civil Engineering emphasise multidisciplinary approaches to solve complex infrastructure and environmental problems.

2 Department Mission

Educating our students is our core mission, and students are our inspiration. They come to CEE-COE to solve the world's big challenges

3 Industry Leaders

Our community is filled with industry leaders. We are changing the world with our groundbreaking work.

4 State of the Art Facilities

Our students spend valuable time learning and put their knowledge to real-world by using state of the art laboratories and facilities.

Civil & Environmental engineering is a professional engineering discipline that deals with the design, construction, and maintenance of the physical and naturally built environment, including public works such as roads, bridges, canals, dams, airports, sewerage systems, pipelines, structural components of buildings, and railways. Civil engineering is traditionally broken into a number of sub-disciplines. Civil engineering takes place in the public sector from municipal through to national governments, and in the private sector from individual homeowners through to international companies.

The Department of Civil & Environmental Engineering's offers undergraduate programme which emphasize multidisciplinary approaches to solve complex infrastructure and environmental problems. Bringing together flexible and innovative curricula, world-class teaching and research facilities, as well as faculty members that are well-regarded internationally in their respective areas of research expertise; we equip our graduates to stay relevant in a globalized technology-based economy, able to embark on multiple career pathways.

What Civil Engineers Do?

1. Develop the concept of a 'green building' that produces more electricity than it consumes and has a self-sufficient supply.
2. Design a water supply system for a new city.
3. Provide alternatives to relieve traffic congestion and to solve transport problems.
4. Develop ways of treating and reusing storm water and wastewater to preserve precious resources.
5. Manage the maintenance of the large bridges that link most cities' major arterials.
6. Develop new ways of tackling climate change through geological sequestration of carbon dioxide.
7. Prevent contamination of soil and ground water from industrial activities.
8. Design systems to control erosion in rivers and protect people from the devastation of floods.
9. Investigate, design and manage the construction of multi-story buildings.
10. Design a road, freeway or tunnel and manage its construction.
11. Interpret and organise drawings, plans, construction methods and procedures for an innovative foundation system for unstable soils.

Note from the Program Chair

The Civil Engineering program at King Faisal University, which is part of the Department of Civil & Environmental Engineering, was established in 1430H (2009) based on high quality national and international academic standards. The program is highly competitive and demanding and is expected to have a crucial impact on the progress, development, and the improvement of the quality and living standards in the kingdom. We believe that qualified and leader faculty members in their field, dynamic students, and up-to-date laboratories and facilities are keystones in the structure of our program.

Career opportunities for the civil engineering at national and regional levels are very high because of the pressing needs to build, improve, and maintain the infrastructure. Our undergraduate students receive a B.Sc. in civil engineering and may become specialized through the elective courses in one of the several areas of civil engineering, including Structure, Geotechnical, Transportation, Water and Environmental, & Construction Management. Considering the importance and need to have and maintain high level of quality in education,

the CE program, and from the early start, decided to go through and to practice the means and processes that will lead to the international recognition and accreditation. The civil engineering program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

Program Mission

The Department of Civil & Environmental Engineering strives for providing quality services through close partnership with the community by demonstrating commitment to:

- Quality education that prepares graduates through project-based learning with broad engineering knowledge to be professionals.
- Pursue graduate studies and quality research that leads to better solutions to engineering-related problems with emphasis on issues of national significance by working closely with industry and research centers.

Program Educational Objectives (PEOs):

The CE graduates are expected to attain the following program educational objectives within a few years of graduation:

PEO 1: Become technically competent engineers for dynamic and successful careers in the civil and environmental engineering professions.

PEO 2: Pursue graduate studies and innovative research to solve civil and environmental engineering problems.

PEO 3: Demonstrate leadership and teamwork skills and contribute to the community-based sustainable development.

PEO 4: Engage in life-long learning for continuous improvement and professional development.

Student Outcomes (SOs):

The graduates of the Civil Engineering Department, College of Engineering at King Faisal University are expected to demonstrate:

1. Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. Ability to communicate effectively with a range of audiences.
4. Ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. Ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. Ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Program Description

The Civil Engineering Program is part of the Department of Civil and Environmental Engineering. Approval from the Ministry of Higher Education for the establishment of the College of Engineering at King Faisal University was issued in the year 1428 H (2007 G). In the fall semester of the academic year 1430/1431 H (2009/2010 G), the College started teaching the Civil Engineering. The decision to start with this program was based on a market survey of the engineering manpower needs in the Saudi market, and on the fact that this program represents one of the core engineering programs. The curriculum development was derived from comprehensive research comprising market surveys, research in labor market needs, and benchmarking against other renowned universities. Standards from recognized international sources, such as ABET and the KSA National Commission for Academic Accreditation and Assessment (NCAAA), were utilized. The first batch of the Civil Engineering Program started in September 2009, and the first graduating batch was in June 2013.

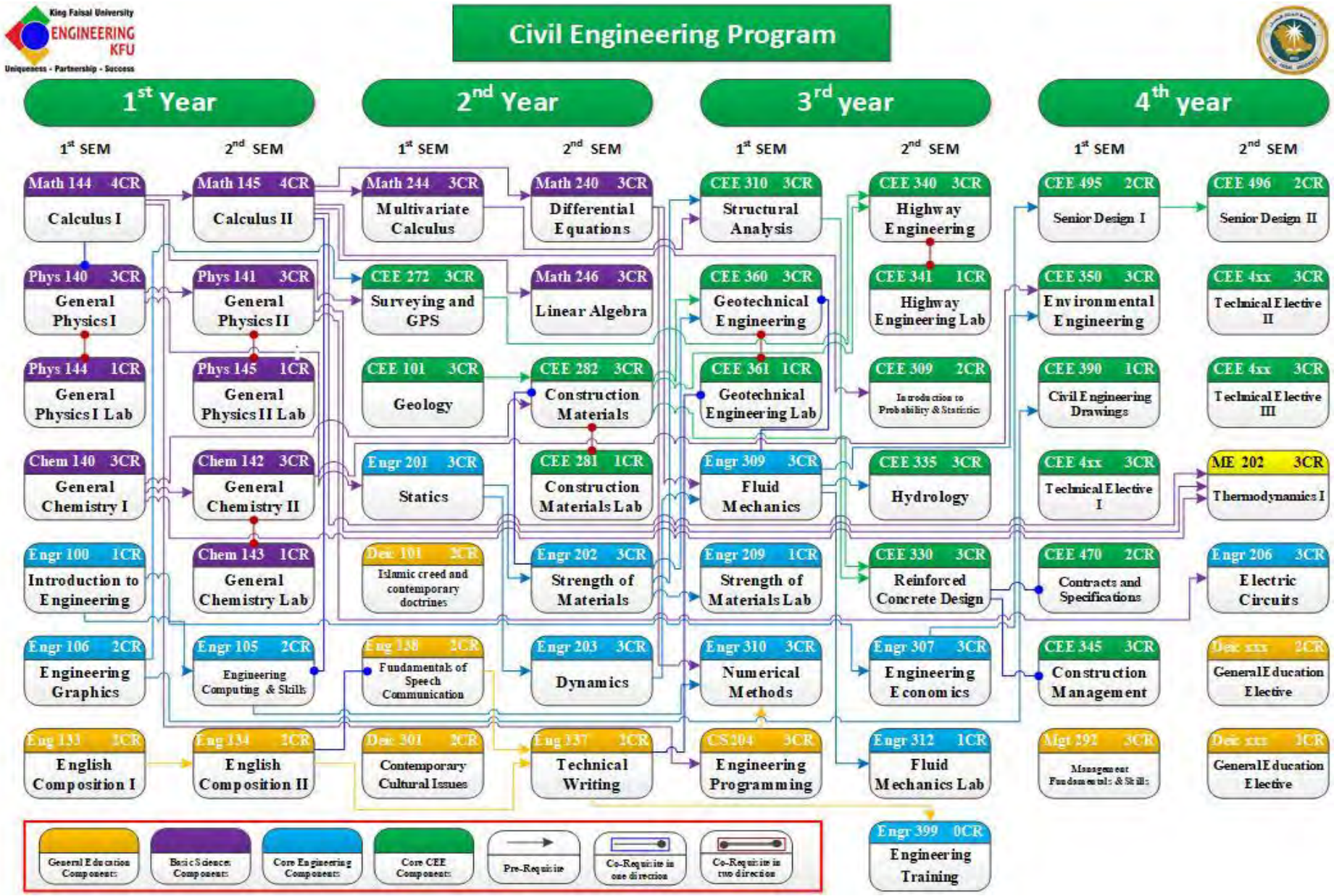
The Civil Engineering Curriculum consists of 136 CH. Students will graduate after succeeding in all courses with a final minimum cumulative GPA of 2.00/5.00 or above (Batch 2009-2011), for 2012 Batch and above, the GPA is 3.00 /5.00 or above. The 136 CH program requirements consist of: 19 CH of General Engineering courses, 37 CH of Math & Basic Sciences, 31 CH of Core Engineering Course, & 49 CH of Core Civil Engineering Courses (9 CH as electives). The curriculum covers all the civil engineering disciplines including: Structural, Transportation, Geotechnical, Water & Environmental, Material, Surveying & GPS, and Construction Engineering & Management.

The Civil Engineering Program is delivered through 8 full semesters (4 years) after completion of the preparatory year (2 semesters). The program is in-class, in the daytime, and on-campus. The classes are offered 5 days/week (Sunday through Thursday) through traditional lectures, lab work, and tutorial lectures. The academic year consists of two main semesters (15 weeks/semester, excluding final exams) in addition to an optional 8-week engineering training. Students usually do their practical engineering training during the 8-week summer term. After fulfilling all the program graduation requirements, the students are illegible to earn the bachelor’s degree in civil engineering.

Program Study Plan:

Course Code	Course Title	CH	Required /Elective	Pre-& Co-requisite	Curriculum Category
❶ First Semester (CH: 16)					
Engr 100	Introduction to Engineering	1	Required	None	Engineering
Engr 106	Engineering Graphics	2	Required	None	Engineering
Math 144	Calculus I	4	Required	None	Mathematics
Phys 140	General Physics I	3	Required	C: Math 144 & Phys 144	Basic Sciences
Phys 144	General Physics I Lab	1	Required	C: Phys 140	Basic Sciences
Chem 140	General Chemistry I	3	Required	None	Basic Sciences
Eng 133	English Composition I	2	Required	None	General Education
❷ Second Semester (CH: 18)					
Eng 134	English Composition II	2	Required	P: Eng 133	General Education
Engr 105	Engineering Computing & Skills	2	Required	P: Engr 100 & C: Math 145	Engineering
Math 145	Calculus II	4	Required	P: Math 144	Mathematics
Chem 142	General Chemistry II	3	Required	P: Chem 140 & C: Chem 143	Basic Sciences
Phys 141	General Physics II	3	Required	P: Phys 140 & C: Phys 145	Basic Sciences
Phys 145	General Physics II Lab	1	Required	C: Phys 141	Basic Sciences
Chem 143	General Chemistry Lab	1	Required	C: Chem 142	Basic Sciences
Deic 301 (SSC 102)	Contemporary Cultural Issues (Islamic Culture; since Fall 2018)	2	Required	None	General Education
❸ Third Semester (CH: 16)					
Math 244	Multivariate Calculus	3	Required	P: Math 145	Mathematics
CEE 101	Geology	3	Required	None	Civil Engineering
Engr 201	Statics	3	Required	P: Phys 140	Engineering
CEE 272	Surveying and GPS	3	Required	P: Math 144 & Engr 106	Civil Engineering
Eng 138	Fundamentals of Speech Communication	2	Required	C: Eng 134	General Education
Deic 101 (SSC 101)	Islamic Creed & Contemporary Doct. (Creed & Doctrines; since Fall 2018)	2	Required	None	General Education
❹ Fourth Semester (CH: 18)					
Math 240	Differential Equations	3	Required	P: Math 145	Mathematics
Engr 203	Dynamics	3	Required	P: Engr 201	Engineering
Engr 202	Strength of Materials	3	Required	P: Engr 201	Engineering
Eng 137	Technical Writing	2	Required	P: Eng 134	General Education
CEE 282	Construction Materials	3	Required	P: Chem 140 & CEE 101; C: CEE 281, & Engr 202	Civil Engineering
CEE 281	Construction Materials Lab	1	Required	C: CEE 282	Civil Engineering
CS 204	Engineering Programming	3	Required	P: Math 144	Engineering
❺ Fifth Semester (CH: 17)					
Math 246	Linear Algebra	3	Required	P: Math 145	Mathematics
Engr 209	Strength of Materials Lab	1	Required	P: Engr 202	Engineering
Engr 310	Numerical Methods	3	Required	P: Math 240, CS 204 & Engr 105	Mathematics
Engr 309	Fluid Mechanics	3	Required	P: Math 240 & Engr 203	Engineering

CEE 360	Geotechnical Engineering	3	Required	P: CEE 282 & Engr 202; C: CEE 361 & Engr 309	Civil Engineering
CEE 361	Geotechnical Engineering Lab	1	Required	C: Eng 137 & CEE 360	Civil Engineering
CEE 310	Structural Analysis	3	Required	P: Math 244 & Engr 202	Civil Engineering
⑥ Sixth Semester (CH: 18)					
CEE 340	Highway Engineering	3	Required	P: CEE 272 & CEE 282; C: CEE 341	Civil Engineering
CEE 341	Highway Engineering Lab	1	Required	C: CEE 340	Civil Engineering
CEE 309	Introduction to Probability & Statistics	2	Required	P: Math 145	Mathematics
CEE 335	Hydrology	3	Required	P: CEE 309	Civil Engineering
CEE 330	Reinforced Concrete Design	3	Required	P: CEE 310 & CEE 282	Civil Engineering
Engr 307	Engineering Economics	3	Required	P: Engr 100	Engineering
Engr 312	Fluid Mechanics Lab	1	Required	P: Engr 309	Engineering
Deic xxx (SSC xxx)	General Education Elective (since Fall 2018)	2	Required	None	General Education
Summer Semester (CH: 0)					
Engr 399	Engineering Training	0	Required	P: Level seven or above & Eng 137	Civil Engineering
⑦ Seventh Semester (CH: 17)					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
CEE 345	Construction Management	3	Required	C: CEE 330	Civil Engineering
CEE 350	Environmental Engineering	3	Required	P: Chem 142 & CEE 309	Civil Engineering
CEE 390	Civil Engineering Drawings	1	Required	P: Engr 106	Civil Engineering
CEE 4XX	Technical Elective I	3	Required		Civil Engineering
CEE 495	Senior Design I	2	Required	P: Engr 307 & 7th sem.	Civil Engineering
CEE 470	Contracts and Specifications	2	Required	C: CEE 330	Civil Engineering
Mgt 292	Management Fundamentals & Skills	3	Required	None	General Education
⑧ Eighth Semester (CH: 16)					
Deic xxx (SSC xxx)	General Education Elective (since Fall 2018)	2	Required	None	General Education
Engr 206	Electric Circuits	3	Required	P: Phys 141	Engineering
CEE 4XX	Technical Elective II	3	Required		Civil Engineering
CEE 4XX	Technical Elective III	3	Required		Civil Engineering
CEE 496	Senior Design II	2	Required	P: CEE 495	Civil Engineering
ME 202	Thermodynamics I	3	Required	P: Chem 140, Phys 141 & Math 145	Engineering
Total Credit Hours of the Program		**136**			


King Faisal University
ENGINEERING
KFU
Uniqueness - Partnership - Success
Civil Engineering Program
1st Year
2nd Year
3rd year
4th year
1st SEM
2nd SEM
1st SEM
2nd SEM
1st SEM
2nd SEM
1st SEM
2nd SEM
Math 144 4CR
Calculus I
Math 145 4CR
Calculus II
Math 244 3CR
Multivariate Calculus
Math 240 3CR
Differential Equations
CEE 310 3CR
Structural Analysis
CEE 340 3CR
Highway Engineering
CEE 495 2CR
Senior Design I
CEE 496 2CR
Senior Design II
Phys 140 3CR
General Physics I
Phys 141 3CR
General Physics II
CEE 272 3CR
Surveying and GPS
Math 246 3CR
Linear Algebra
CEE 360 3CR
Geotechnical Engineering
CEE 341 1CR
Highway Engineering Lab
CEE 350 3CR
Environmental Engineering
CEE 4xx 3CR
Technical Elective II
Phys 144 1CR
General Physics I Lab
Phys 145 1CR
General Physics II Lab
CEE 101 3CR
Geology
CEE 282 3CR
Construction Materials
CEE 361 1CR
Geotechnical Engineering Lab
CEE 309 2CR
Introduction to Probability & Statistics
CEE 390 1CR
Civil Engineering Drawings
CEE 4xx 3CR
Technical Elective III
Chem 140 3CR
General Chemistry I
Chem 142 3CR
General Chemistry II
Engr 201 3CR
Statics
CEE 281 1CR
Construction Materials Lab
Engr 309 3CR
Fluid Mechanics
CEE 335 3CR
Hydrology
CEE 4xx 3CR
Technical Elective I
ME 202 3CR
Thermodynamics I
Engr 100 1CR
Introduction to Engineering
Chem 143 1CR
General Chemistry Lab
Isic 101 2CR
Islamic creed and contemporary doctrines
Engr 202 3CR
Strength of Materials
Engr 209 1CR
Strength of Materials Lab
CEE 330 3CR
Reinforced Concrete Design
CEE 470 2CR
Contracts and Specifications
Engr 206 3CR
Electric Circuits
Engr 106 2CR
Engineering Graphics
Engr 105 2CR
Engineering Computing & Skills
Eng 138 2CR
Fundamentals of Speech Communication
Engr 203 3CR
Dynamics
Engr 310 3CR
Numerical Methods
Engr 307 3CR
Engineering Economics
CEE 345 3CR
Construction Management
Isic xxx 2CR
General Education Elective
Eng 133 2CR
English Composition I
Eng 134 2CR
English Composition II
Isic 301 2CR
Contemporary Cultural Issues
Eng 337 2CR
Technical Writing
CS 204 3CR
Engineering Programming
Engr 312 1CR
Fluid Mechanics Lab
Mgt 292 3CR
Management Fundamentals & Skills
Isic xxx 3CR
General Education Elective
Engr 399 0CR
Engineering Training
General Education Component
Basic Sciences Component
Core Engineering Component
Core CEE Component
Pre-Requisite
Co-Requisite in one direction
Co-Requisite in two direction

Courses Description (Catalog)

ENG 133 – ENGLISH COMPOSITION I 2 (2, 0, 0)

Course Description (catalog): This is an intermediate level writing class. Students are guided through the stages of the writing process to write paragraphs that are both meaningful and organized and include a topic sentence with a controlling idea and conclusion. Students write multi-draft compositions from a variety of practical and academic purposes. They improve their writing by studying model sentences and paragraphs, basic sentence patterns, mechanics, coordinating conjunctions, transitions and vocabulary

ENG 134 – ENGLISH COMPOSITION II 2 (2, 0, 0)

Course Description (catalog): English is a course designed to take learners from the paragraph level of writing in English to the Essay level. It concentrates of the essential form and function of the essay and prepares the ground for the academic essay. Particular importance is given to tasks of description and argumentation, including work on comparison, definition, cause-effect and expression of opinion in essay writing. Thus, students are taken through the major stages of the essay composition process. *Prerequisite: ENG 133.*

ENG 137 – TECHNICAL WRITING 2 (2, 0, 0)

Course Description (catalog): This course introduces students to the fundamentals of writing, designing and conveying technical information to different audiences. Students will learn about technical writing conventions, such as organization, style and tone and illustration and layout as they work through the writing process to produce a variety of common technical documents that they will encounter in their academic work. Two lectures per week. *Prerequisite: ENG 134.*

ENG 138 – FUNDAMENTALS OF SPEECH COMMUNICATION 2 (2, 0, 0)

Course Description (catalog): A study of communication theories as applied to speech: practical communicative experiences ranging from interpersonal communication and small-group process through problem identification and solution in discussion, to informative and persuasive speaking in standard speaker-audience situations. *Co-requisite: ENG 134.*

DEIC 101- ISLAMIC CREED AND CONTEMPRARY DOCTRINES 2 (2, 0, 0)

Course Description (catalog): Creed: definition, importance, sources, characteristics, study methodology, pillars of faith, influence of creed on individuals and society, belief nullifiers, thought constraints, study of some contemporary doctrines: secularism, Satan worshipers, Baha'ism, Zionism, Misoneism, Christian fundamentalism. Student is required to memorize part of the holy Quran.

DEIC 301- CONTEMPORARY CULTURAL ISSUES 2 (2, 0, 0)

Course Description (catalog): Moderation, Islam globalism and human ties, discrimination and nationalism, Arabic as the medium of education and culture, science and religion, interfaith dialogue, Orientalism and Christianization, Colonialism, Westernization, modernity in literature, Globalization, Terrorism, Development of Moslem nations.

DEIC 102- FIQH BIOGRAPHY 2 (2, 0, 0)

Course Description (catalog): Definition, importance, sources, characteristics, study methodology, pillars of faith, the influence of creed on individuals and society, belief nullifiers, thought constraints, Study of some contemporary doctrines: secularism, Satan worshipers, Baha'ism, Zionism, Misoneism, Christian fundamentalism.

DEIC 302- ISLAM AND SCIENCE AND TECHNOLOGY ISSUES 2 (2, 0, 0)

Course Description (catalog): Moderation, Islam globalism and human ties, discrimination and nationalism, Arabic as the medium of education and culture, science and religion, interfaith dialogue, Orientalism and Christianization, Colonialism, Westernization, modernity in literature, Globalization, Terrorism, Development of Moslem nations.

DEIC 317- ISLAMIC MORALS AND ETHICS 2 (2, 0, 0)

Course Description (catalog): Morals (Ethics: definition and foundations, characteristics, study of model samples of the Prophets' morals and ethics, tools of moral/ethical education in Islam. Concept of profession and its importance in human life, constituents of professional morals/ethics and its constraints, model samples of professional morals/ethics in Islam. Student is required to memorize part of the holy Quran.

DEIC 318- ECONOMIC SYSTEM IN ISLAM 2 (2, 0, 0)

Course Description (catalog): Islamic Economy: (its nature and principles, development, and characteristics), the economic problem and how to face it, contemporary economic systems (capitalism, socialism), economic globalism, World Bank and its goals, World Trade Organization and its goals, ownership in Islam: definition, types, constraints. Islam and economic freedom, Production, distribution, expenditure, economic policies in contracts and transactions. Student is required to memorize part of the holy Quran.

DEIC 401- SOCIAL SYSTEM IN ISLAM 2 (2, 0, 0)

Course Description (catalog): Society: definition, building blocks of society in Islam, Islamic society attributes, Family in Islam: definition, status, importance, building blocks, marriage and its purposes, spouses' rights, parents, siblings, and relatives' rights, women's status and rights in Islam, Family controversial issues about family system

in Islam and responding to those issues (polygamy, inheritance, veil, divorce, etc.), Family problems and remedies (women's work, alimony, stewardship, etc.). The students are required to memorize part of the holy Quran.

DEIC 418- POLITICAL SYSTEM & HUMAN RIGHTS IN ISLAM 2 (2, 0, 0)

Course Description (catalog): Political system: definition, characteristics. Country building blocks: homeland, society, authority, goals, foundations, principles of ruling in Islam, ruler selection, ruler duties, state authority, rights of Moslems and non-Moslems in the Islamic state, Manifestations of implementing the political system in KSA: Governance statute, Shura, judiciary system, security, Hisbah. Human rights in Islam: definition, significance, sources, constraints, Basic rights: (equality, freedom, life, justice, safety), Universal/International Declaration of Human Rights and position of KSA from it. Students are required to memorize part of the holy Quran.

CS 204 – ENGINEERING PROGRAMMING 3 (3, 0, 0)

Course Description (catalog): Introduction to computer systems; problem solving methodology; testing and debugging of programs; variables, declarations, and assignments; input and output; data types; control flow and looping; functions and overloading; streams and input/output; one-dimensional arrays; two-dimensional arrays; pointers and dynamic arrays; structures; abstract data types and classes; inheritance; friends, overloaded operators, and arrays in classes; recursive functions. Three lectures per week. Projects that will require lab work will be assigned weekly. *Prerequisite: MATH 144.*

MGT 292 – MANAGEMENT FUNDAMENTALS AND SKIL 3 (3, 0, 0)

Course Description (catalog): The course covers Management fundamentals & Skill, such as, Global Management, Change and Innovation, Appendix: Managing Entrepreneurial Ventures, Decision Making, Strategic Management, Module Planning Tools and Techniques, In class discussion: Ethics Dilemma, Operations Management, Marketing Management, E Business, Marketing Plan, Human Resource Management, Team Building, Foundations of Individual Behaviour, Communication.

MATH 144 – CALCULUS I 4 (4, 0, 0)

Course Description (catalog): This is an introductory course of mathematics for college of engineering students. The course covers the basic concepts and methods of calculus. At the beginning of the course the instructor will provide students the knowledge of the number systems, algebraic operations and functions of single variable with domain and range so that students can learn differentiation of the functions. The main topics to be covered in this course include: Limits, Continuity, Differentiation of functions of a single variable, Exponential, Logarithmic, Trigonometric, Inverse trigonometric functions, Applications of derivatives, Differentials, Curve Sketching, L'Hospital Rule, Mean value theorems, Area and estimating with finite sums, Introduction to integrals and definite integrals.

MATH 145 – CALCULUS II 4 (4, 0, 0)

Course Description (catalog): This is an intermediate level calculus course designed for undergraduate Engineering students. This course covers mainly the integration and basic principles of Vectors and their applications. At the beginning of this course, the instructor will give the review of differentiation and integration. In depth, the students will learn the methods of integration and vectors. The topic covered include, Techniques of Integration, Improper Integration, Applications of Integration, Infinite Sequences and Series, (Power series and Taylor series), Polar coordinates, Transcendental Functions, Vectors, Vector Valued Functions. *Prerequisite: MATH 144.*

MATH 240 – DIFERENTAIL EQUATIONS 3 (3, 0, 0)

Course Description (catalog): This course is an introductory course of differential equations for college of engineering students. The course covers different methods and concepts to solve first and second order differential equations. At the beginning of the course we discuss some definitions and terminology about differential equations. Then we move to solving first and second order differential equations. The topics in this course include, linear differential equations, solving first order differential equations, solving second order differential equations, series solutions of second order linear differential equations, solving systems of linear differential equations, Laplace transform and its applications in solving differential equations. *Prerequisite: MATH 145.*

MATH 244 – MULTIVARIATE CALCULUS 3 (3, 0, 0)

Course Description (catalog): This course is an advanced course in calculus, designed for undergraduate students of engineering. The course covers the basic principles and methods of differentiation and integration of two or more variables. At the beginning of the course, the Instructor will give a review of functions of one variable and its differentiation and integration. Then, the functions of two or more variables with domain and range will be discussed. Throughout the course, the following main topics will be covered: solid analytic geometry; vector calculus; partial derivative; and multiple integrals. The coverage will also include relevant and important applications in the sciences and engineering. *Prerequisite: MATH 145.*

MATH 246 – LINEAR ALGEBRA 3 (3, 0, 0)

Course Description (catalog): Linear transformations, finite dimensional vector spaces, matrices, determinants, systems of linear equations, and applications to areas such as linear programming. Markov chains and differential equations. *Prerequisite: MATH 145.*

PHYS 140 – GENERAL PHYSICS I 3 (3, 0, 0)

Course Description: The course is an introduction to units, measurements, motion in one and two dimensions, kinematics and dynamics, Newton's laws, work and energy, rotational dynamics, linear and angular momentum, torque, and collisions. Basic calculus and multi-variable algebra will be used. *Co-requisite: MATH 144 & PHYS 144.*

PHYS 141 – GENERAL PHYSICS II 3 (3, 0, 0)

Course Description: This course introduces students to the physics of electricity and magnetism and the connections between them. The concepts of electric charge, electric field, electric potential, Kirchhoff Law, Gauss Law, electric and magnetic fluxes, capacitance, resistivity and resistance, connections in series and in parallel, RC-circuit, magnetic field, magnetic force, magnetic and electric torques, Ampere Law, electromagnetic induction, and Faraday Law and Lenz Law will be taught. *Prerequisite: PHYS 140, & Co-requisite: PHYS 145.*

PHYS 144 – GENERAL PHYSICS I LAB 1 (0, 0, 3)

Course Description (catalog): Measure basic constants such as length, weight and time, value of acceleration due to gravity. Design and conduct experiments in mechanics. Analyze and interpret experiment data. Write a scientific report. Draw and interpret a graph. Apply experimental principles and error calculations to mechanics. *Co-requisite: PHYS 140.*

PHYS 145 – GENERAL PHYSICS II LAB 1 (0, 0, 3)

Course Description (catalog): This course introduces students to the basic electrical measurements techniques and to the physics of electricity and magnetism. The concepts of basic measurements, Resistors in series and in parallel, Verifying Ohm's law, Wheatstone Bridge, Verifying Kirchhoff's Laws, Resistivity, Capacitors in series and in parallel, RC circuit, Introduction to Oscilloscope, the Mechanical Equivalent of Heat, the Negative Temperature Coefficient of Resistance (Thermistor), Galvanometer, and the Magnetic Moment will be taught. *Co-requisite: PHYS 141.*

CHEM 140- GENERAL CHEMISTRY I 3 (3, 0, 0)

Course Description (catalog): Matter properties and measurement, Atoms and the Atomic Theory, Chemical Compounds, Chemical Reactions, Reactions in Aqueous Solutions, Liquids Solids and Intermolecular Forces, Electrons in Atoms, Periodic Table and Atomic Properties, Chemical Bonding, Valence-Bond, Hybridization of Atomic Orbital, Multiple Covalent Bonds, Molecular Orbital Theory, Liquids and Solids.

CHEM 142- GENERAL CHEMISTRY II 3 (3, 0, 0)

Course Description (catalog): Properties of Gases: Kinetic-molecular theory of gases, Ideal gas law, Mixtures of gases, Thermo- chemistry, Principles of Chemical Equilibrium, Acids and Bases, Buffer Solutions, Neutralization Reactions and Titration Curves, Solubility and Complex-Ion Equilibria, Spontaneous Change: Entropy and Free Energy, Thermodynamic, Solutions and Their Physical Properties, Chemical Kinetics and Electrochemistry. *Prerequisite: CHEM 140, & Co-requisite: CHEM 143.*

CHEM 143 – GENERAL CHEMISTRY LAB 1 (0, 0, 3)

Course Description (catalog): Laboratory safety rules and Evaluation of analytical data, Definition and determination of density, explanation and determination of specific heat, concept of Acids, bases and Heat of Neutralization Reaction and its determination, reversible reactions, concept of equilibrium constant and its determination, Le Chatelier principle and its verification, principle involved in Acid base titrations, indicators, Ionization of electrolytes, determination of dissociation constant of weak acid (Ka), principle involved in complex metric titrations, hardness of water and its determination. *Co-requisite: CHEM 142.*

ENGR 100- INTRODUCTION TO ENGINEERING 1 (1, 0, 0)

Course Description (catalog): This course introduces engineering to students, particularly those who are interested in an engineering profession. It covers engineering ethics, teamwork, communication skills, engineering topics, and engineering problem solving skills and design methodology. One lecture per week.

ENGR 105- ENGINEERING COMPUTING & SKILLS 2 (2, 0, 0)

Course Description (catalog): Problem solving skills and computing using MATLAB**.** *Co-requisite: MATH 145.*

ENGR 106 – ENGINEERING GRAPHICS 2 (1, 0, 3)

Course Description (catalog): An introductory course in engineering graphics focuses on graphical communication. Topics include descriptive geometry elements, visualization, engineering drawing techniques, orthographic projection, pictorial representation, section views, and basic dimensioning. The course incorporates computer aided drafting (CAD) with engineering applications using 2-D drawing. This course is divided in to two sections: sketching and AutoCAD. The course begins by teaching the basics of engineering graphics using sketching. Freehand sketching using only a pencil and paper is an important skill for any engineer. It is a means of quickly conveying technical information to others. Through sketching the concepts of pictorial projections, section views, auxiliary views and dimensioning are taught. Once the foundation of engineering graphics is known, these concepts can be applied using computer aided design (CAD) software. AutoCAD is taught first. AutoCAD is a drawing software package used to create two dimensional engineering drawings.

ENGR 201 – STATICS 3 (3, 0, 0)

Course Description (catalog): The subject of Statics deals with forces acting on rigid bodies at rest covering coplanar and non-coplanar forces, concurrent and non-concurrent forces, friction forces, hydrostatic forces, centroid and moments of inertia. Much time will be spent finding resultant forces for a variety of force systems, as well as analyzing forces acting on bodies to find the reacting forces supporting those bodies. This course also shows how to find the internal forces in structural elements and how to get the centroid and inertia for areas. Students will develop critical thinking skills necessary to formulate appropriate approaches to problem solutions. *Prerequisite: PHYS 140*.

ENGR 202 - STRENGTH OF MATERIALS 3 (3, 0, 0)

Course Description (catalog): The course covers strength of materials in depth including the followings: Basic Concepts in Strength of Materials, Direct Stress, Strain, Axial Deformation and Thermal Stress, Torsion, Transverse Shearing Forces, Bending Moments in Beams and Stress Due to Bending, Shearing Stresses in Beams, Combined Stresses and Pressure Vessels, Stress Transformations, Deflection of Beams, Columns. *Prerequisite: ENGR 201*.

ENGR 203 – DYNAMIC 3 (3, 0, 0)

Course Description (catalog): Fundamentals of particle and rigid body dynamics. Kinematics and kinetics of a single particle and system of particles. Application of Newton's laws and energy and moment principles in solving problems involving particles or rigid bodies in planar motion. Introduction to kinetics of rigid bodies in three dimensions, angular acceleration, angular momentum, instantaneous centre, mechanical vibrations of simple spring-mass systems**.** *Prerequisite: ENGR 201.*

ENGR 206 - ELECTRIC CIRCUTES 3 (3, 0, 0)

Course Description (catalog): Resistors, capacitors, inductors, currents; voltages; power and energy; circuit analysis techniques; DC and AC analysis; magnetic circuits and transformers; Introduction to DC and AC machines. *Prerequisite: PHYS 141.*

ENGR 209 – STREGTH OF MATERIALS LAB 1 (1, 0, 3)

Course Description (catalog): Strength of materials lab contains several equipment that can be utilized to introduce the most important concepts of materials and its ability to withstand external loads without failure which is the base of machine and components design. On the other hand, strength of material lab will support student information in materials and its properties and strength of materials and types of loadings and types of stresses induced in members due to the loadings. The most important experiments in the field of strength of materials like tensile test, compression test, torsion test, Fatigue test, Hardness test, impact test, and creep test will be discussed. *Prerequisite: ENGR 202.*

ENGR 307 – ENGINEERING ECONOMICS 3 (3, 0, 0)

Course Description (catalog): The course covers the following topics: Engineering Economic Decisions; Understanding Financial Statements; Cost Concepts and Behaviors; Time is Money; Understanding Money and Its Management; Principles of Investing; Present Worth Analysis; Annual Equivalent Worth Analysis; Rate of Return Analysis; Depreciation; Taxes; Break-Even Analysis, Cost Estimation; Developing Project Cash Flows; Inflation; Replacement Decisions. *Prerequisite: ENGR 100.*

ENGR 309 - FLUID MECHANICS 3 (3, 0, 0)

Course Description (catalog): The course addresses flow classification, fluid properties, fluid in statics, pressure measurements, buoyancy, fluids in motion, continuity equation, pressure gradient in fluid flow, Bernoulli's, Reynold's transport theorem, momentum and energy equations, dimensional analysis and similitude, and an introduction to the hydrodynamic boundary layer. *Prerequisite: ENGR 203 & MATH 240.*

ENGR 310 - NUMERICAL METHODS 3 (3, 0, 0)

Course Description (catalog): Introduction to Numerical Methods, Solution of Nonlinear Equations, Solution of Simultaneous Linear Algebraic Equations, Solution of Matrix Eigenvalue Problem, Curve Fitting and Interpolation, Numerical Differentiation, Numerical Integration, Ordinary Differential Equations: Initial-Value Problems, Ordinary Differential Equations: Boundary-Value Problems. *Prerequisite: MATH 240, CS 204, & ENGR 105.*

ENGR 312 – FLUID MECHANICS LAB 1 (0, 0, 3)

Course Description (catalog): Conduct experiments to understand the basic concepts of fluid mechanics such as Hydrostatic Bench, Orifice and Jet Flow Apparatus, Bernoulli's Theorem Apparatus, Impact of Jet Apparatus, Piping Loss Test Panel, Open Circuit Wind Tunnel, Pump Test Set, Turbine Service Unit, Series/ Parallel Pumps, Variable Slope Channel**.** *Prerequisite: ENGR 309.*

ENGR 399 - ENGINEERING TRAINING 0 (0, 0, 0)

Course Description (catalog): All engineering students are required to undergo a comprehensive "Engineering Training Program" with a reputable and specialized industrial firm. The firm can be in or outside Saudi Arabia relevant to his major area of interest in engineering analysis, design, or construction. The main purpose of this summer training is to enhance the students' practical experience and career abilities. Also, it deepens their engineering knowledge acquired during their academic years in the field of practical experience in real-life engineering projects. Additionally, such a program improves the relationship between the College of Engineering

and the governmental and private industrial firms. Also, it can provide the industry with well-trained professionals in the near future. The qualifying student should spend at least eight weeks in a governmental organization, a reputable industrial firm, or a research center that is involved with engineering activities. Two months of full time training. *Prerequisite: ENG 137 & (Level 7 or above).*

ME 202 – THERMODYNAMICS I 3 (3, 0, 0)

Course Description (catalog): Thermodynamics concepts and definitions, states, properties, systems, control volume, processes, cycles, units, tables of properties, work and heat, first law, internal energy and enthalpy, conservation of mass, steady–state and uniform state processes, second law, reversible processes, entropy, Claudius inequality, principle of the increase of entropy, efficiencies, irreversibility and availability, power and refrigeration cycles. *Prerequisite: CHEM 140, PHYS 141, & MATH 145.*

CEE 101 – GEOLOGY 3 (3, 0, 0)

Course Description (catalog): The course provides sufficient knowledge of qualitative and quantitative description of soils and rock masses with emphasis on the physical properties as well as the geological processes, e.g., weathering, erosion, plate tectonics, earthquakes, groundwater flow, land subsidence etc. On the other hand, the basic concepts of structural geology are focused to some extent by considering the basics of geological mapping. The course provides an introduction of engineering geology with the purpose of making an understanding that how the geology influences the design and construction of engineering project. It also establishes a good understanding about the geological and geophysical techniques for site investigation process.

CEE 272 – SURVEYING AND GPS 3 (2, 1, 3)

Course Description (catalog): An introduction to surveying, which includes surveying terminology, distance and area measurement, coordinate systems, surveying techniques, equipment use, theory of errors, tape measurements, leveling, theodolite, traverse surveying, topographic surveys, highway curves, control survey and land survey. Introduction to reference systems; types of GPS observable; basic principles of GPS operations; GPS error analysis; field procedures; data collection, processing; applications. Emphasis is placed on use of the hand compass and GPS receivers. Designing and conducting experiments as well as to analyze and interpret data through conducting several field experiments ranging from distance measurements to topographic mapping. *Prerequisite: MATH 144 & ENGR 106.*

CEE 281 – CONSTRUCTION MATERIALS LAB 1 (0, 0, 3)

Course Description (catalog): This course is designed to provide civil engineering students fundamental principles of the behavior, physical and engineering properties of various common civil engineering materials, including, sands, aggregates, cement, and concrete. Selection and design of materials based on their intended use in design and construction are emphasized. The laboratory sections are designed to provide students a hand-on experience on concrete mix design which includes proportioning, mixing, casting, and concrete testing concepts and procedures. Written reports and oral presentation of experimental results will be required. *Co-requisite: CEE 282.*

CEE 282 – CONSTRUCTION MATERIALS 3 (3, 0, 0)

Course Description (catalog): This is an elementary course designed for undergraduate students of civil engineering. The course covers introduction to structures and properties of civil engineering materials such as cement, aggregates, concrete, asphalt, geological materials, steel, polymers, and wood. The properties range from elastic, plastic and fracture properties to porosity and thermal and environmental responses. *Prerequisite: CHEM 140 & CEE 101. Co-requisite: CEE 281, & ENGR 202.*

CEE 309 – INTRODUCTION TO PROBABILITY & STATISTICS 2 (2, 0, 0)

Course Description (catalog): This is a basic study of probability and statistical theory with emphasis on engineering applications. Students become knowledgeable of the collection, processing, analysis, and interpretation of numerical data. They learn the basic concepts of probability theory and statistical inference, and become aware of techniques of statistical design. Topics include elementary principles and applications of descriptive statistics, counting principles, elementary probability principles, probability distributions, estimation of parameters, hypothesis testing, linear regression and correlation, and Analysis of Variance. The primary goal of this online course is to become familiar and experienced with topics of probability and statistics. *Prerequisite: MATH 145.*

CEE 310- STRUCTURAL ANALYSIS 3 (3, 0, 0)

Course Description (catalog): This is an elementary structural analysis course designed for undergraduate students of civil engineering. The course covers basic principles and methods of structural analysis including the followings: Types of structures, structural systems, structural elements and loadings, Analysis and Design codes, densities of materials, estimation of loads, tributary areas for live loads, Determinate and indeterminate structures, stability in structures, Analysis of determinate structures to calculate reactions, Principle of superposition, Trusses, Internal loadings, Influence line diagrams, Maximum and absolute maximum values of functions, Deformations using double integration method, moment-area theorems, conjugate-beam method, method of virtual work, and method of least work, Analysis of indeterminate structures by Force method, Slope-deflection method, and Moment-distribution method, Analysis software SABLE and SAP2000. This course also gives a brief introduction

of difference between analysis and design, and application of structural analysis in structural design. Students also participate in a group or individual project related to analysis of real structures. *Prerequisite: ENGR 202 & MATH 244.*

CEE 330 – REINFORCED CONCRETE DESIGN 3 (3, 0, 0)

Course Description (catalog): This course is designed for undergraduate students. The objective of this course is to develop an understanding of the fundamental behavior and design of reinforced concrete structures. Students will become familiar with using the ACI 318 – Building Code Requirements for Structural Concrete. Students will learn about the application of concrete materials, and mechanics in the construction of civil structures, and to develop problem solving and engineering judgment skills. Specific areas to be covered include: materials for reinforced concrete, structural safety and design philosophy considering provisions of the ACI Code, behavior and design of reinforced concrete members under axial compression and bending (columns), under flexure and transverse shear (beams and one-way slabs), continuous beams and slabs using ACI moment and shear coefficients. *Prerequisite: CEE 282 & CEE 310.*

CEE 335 - HYDROLOGY 3 (3, 0, 0)

Course Description (catalog): A study of water properties, occurrence, distribution, and movement and their relationship with the environment within each phase of the hydrological cycle. The course also examines water quantity and quality issues, and water management policies. Concepts include watershed analysis, precipitation, infiltration, evaporation, runoff, detention, hydrograph routing, groundwater flow, and management. Three one hour lectures per week. *Prerequisite: ENGR 309.*

CEE 340 – HIGHWAY ENGINEERING 3 (3, 0, 0)

Course Description (catalog): The course covers requirements engineering in depth including the followings: Introduction of transportation engineering, basic elements of transportation engineering and their characteristics, Introduction to Pavement, different types of pavements, material consideration in pavement design (Properties, Environmental Effects and Evaluation), traffic load analysis, load equivalency factor concept, tire-pavement contact area concept, stress-strain analysis of flexible and rigid pavements, flexible pavement design, rigid pavement design, highway maintenance and rehabilitation, flexible pavement distresses and their repair techniques, highway drainage facility, introduction to Marshal mix design method and SuperPave Volumetric design method. *Prerequisite: CEE 272 & CEE 282. Co-requisite: CEE 341.*

CEE 341 – HIGHWAY ENGINEERING LAB 1 (0, 0, 3)

Course Description (catalog): The course covers requirements engineering in depth including the followings: Introduction to Performance Grade (PG) specifications and SuperPave mix design, hands-on testing on SuperPave equipment, determination of the rheological properties of Bitumen using SuperPave equipment, Evaluation of Hot Mix Asphalt (HMA) using SuperPave equipment. *Co-requisite CEE 340.*

CEE 345 – CONSTRUCTION MANAGEMENT 3 (3, 0, 0)

Course Description (catalog): The course covers construction management in depth including the followings: Basic concepts and terminology, Construction versus manufacturing processes, Construction industry and its structure, Contract type and bid package, Prequalification and award of contract, Issues during construction phase, Contract agreement, Change orders, Liquidated damages, Progress payments, Acceptance and final payment, Legal structure of organizations, Developing the work breakdown structure (WBS), Work packages, Cost control related to WBS, Estimating activity duration, Bar charts, Activity precedence diagrams, Critical path method, Activity floats, Relationship scheduling computations, Program evaluation and review techniques (PERT) network, Linear construction operations, Production curves, Cash flows, Project funding, Project cost control systems, Cost accounts, Cost coding systems, Material management process, Ordering material and approval process, Need for safe work practices, and Safety management system will be discussed. *Co-requisite CEE 330.*

CEE 350- ENVIRONMENTAL ENGINEERING 3 (2, 0, 3)

Course Description (catalog): This course is designed to introduce the student to the principles of environmental engineering. Topics include environmental chemistry, materials and energy balances, water quality management, water treatment, wastewater treatment, and air pollution. Weekly experiments carried out through the course, include water quality measurements such as dissolve oxygen measurement, pH and EC measurement, total solid measurement determination of biological oxygen demand (BOD), chemical oxygen demand (COD), total organic carbon (TOC), nitrogen, phosphorus, hardness, turbidity, alkalinity, etc. Two one hour lectures and three hours lab per week. *Prerequisite: CHEM 142 & ENGR 309.*

CEE 360 – GEOTECHNICAL ENGINEERING 3 (3, 0, 0)

Course Description (catalog): This course covers geology and origin of geomaterials, index and classification of soils, clay minerals and soil structure, water flow in soils (one and two dimensional water flow), geotextile filter design, soil stresses, compaction and stabilizing of soils, distribution of stresses in soil due to external loads, consolidation and consolidation settlement, shear strength of soils, stability of slope. *Prerequisite: ENGR 202 & CEE 282. Co-requisite: ENGR 309 & CEE 361.*

CEE 361 – GEOTECHNICAL ENGINEERING LAB 1 (0, 0, 3)

Course Description (catalog): Perform tests for soil samples in the following properties Index and classification of soil, soil stresses, soil compaction, consolidation and consolidation settlement, shear strength of soils. The course was provide laboratory and field practice to the civil engineering students on performing some of soil mechanics tests that are necessary to classify, stabilize, and obtain the engineering properties of soil. Water content determination, liquid and plastic limit, shrinkage limit, grain size distribution (sieve analysis), hydrometer analysis, compaction, in-situ field density, constant and falling head permeability tests, unconfined compression test, and direct shear test. *Co-requisite: CEE 360.*

CEE 390 – CIVIL ENGINEERING DRAWINGS 1 (0, 0, 3)

Course Description (catalog): This course is designed to provide civil engineering undergraduates with basic understanding of the theory and practice of civil engineering drawings. Students will learn to read and construct blueprints and working drawings by means of lectures, discussion of drawing, examples related to existing buildings or projects and CAD practice. Topics will include basic fundamentals of graphics and drafting principles, Auto-Cad fundamentals, RCC and steel structural drawings, Geotechnical drawings, Transportation drawings, and Hydraulic structure drawings. *Prerequisite: ENGR 106.*

CEE 410 – ADVANCED STRUCTURAL ANALYSIS 3 (3, 0, 0)

Course Description (catalog): This course covers advanced methods of structural analysis for indeterminate structures in depth including the followings: Theory and application of structural analysis, Degree of indeterminacy, Equilibrium and compatibility, Stiffness and flexibility methods of analysis, Application of deflection methods in force method, Influence lines for indeterminate structures: beams, frames, and trusses, Approximate methods of analysis, Moment distribution method: beams and frames with and without sway having vertical and sloping legs, Method of successive corrections: multi-storey frames having side-sway, Matrix method of analysis with emphasis on the direct stiffness method, Use of computer programs in structural analysis, Modeling of two- and three-dimensional. This course gives also a brief introduction of application of structural analysis in design. Students also participate in a group or individual project on analysis of real structures using hand calculations and verification by commercially available computer based software such as SAP2000. *Prerequisite: CEE 310.*

CEE 411- TRANSPORTATION ENGINEERING 3 (3, 0, 0)

Course Description (catalog): This course provides an introduction to transportation engineering and traffic analysis. Topics covered include an introduction to the significance of highway transportation to the social and economic underpinnings of society, transportation planning, road vehicle performance, geometric design of highways, traffic flow characteristics, highway capacity and level of service analysis, traffic control and analysis at signalized intersections, and travel demand and traffic forecasting. Introduction to railway and airport transportation systems. *Prerequisite: CEE 272 & CEE 309.*

CEE 427- FOUNDATION ENGINEERING 3 (3, 0, 0)

Course Description (catalog): Introduction, Soil mechanics review, Site investigation & subsurface exploration, bearing capacity of shallow foundation & foundation design, distribution of stresses in soils, mat foundations, settlement of shallow foundation, foundation on rock, pile foundations & group piles, lateral earth pressure and earth retaining structures, sheet pile walls, braced excavations. *Prerequisite: CEE 360. Co-requisite: CEE 330.*

CEE 430- STEEL DESIGN 3 (3, 0, 0)

Course Description (catalog): This is an introductory steel design course designed for undergraduate students of civil engineering. The course covers basic principles and methods of steel structural analysis and design. At the beginning of this course, Instructor will give a refresher to the students about the types of structures, structural systems, structural elements, loadings, analysis and design codes, densities of materials, estimation of loads, and tributary areas for live loads. In depth, students will learn designing of steel structures by Allowable stress design method (ASD), and Load and Resistance Factor Design (LRFD) method of American Institute of Steel Construction (AISC). Main topics covered include introduction to steel structures; types of loads; factor of safety; design of tension members; design for fatigue; design of compression members; buckling; residual stresses; beam design; serviceability requirements (deflection control); beam-column design; bolted and welded connections; plate girder; stiffness design of plate girder; design of a truss. *Prerequisite: CEE 310*

CEE 436- BRIDGE ENGINEERING 3 (3, 0, 0)

Course Description (catalog): This course is designed for undergraduate students. Bridge Engineering is one of the most important area of Civil Engineering. The objective of this course is to develop an understanding of the fundamentals of bridge design and construction. Different bridge types and various step of bridge construction ranging from initial site selection to final construction of bridges. Students are also introduced with American Association of State Highway Transportation Officials (AASHTO). Students will learn about the application of these specification for the design of concrete and steel bridges which will also improve their ability to problem solving and engineering judgment skills. Specific areas to be covered include: Bridge types, materials for construction, design philosophy, load calculation, load distribution, analysis and design of Slab Bridge, T-beam Bridge and Truss Bridge. Students will also be introduced to computer aided modelling of these bridges using SAP 2000. *Prerequisite: CEE 330.*

CEE 439 – FINITE ELEMENT METHOD 3 (3, 0, 0)

Course Description (catalog): This is an introductory course designed for undergraduate students of civil engineering. The course teaches basic fundamentals of the finite element methods (FEM), apprise the students about the finite element techniques, covers mathematical background of the FEM, and teaches how typical commercial Finite Element Analysis (FEA) software works to solve engineering problems. Beginning with a refresher to the students about the matrix algebra, one-dimensional problem, continuing to two- dimensional and three-dimensional elements, and ending with different application areas in various fields of engineering. However, major emphasis will be on the solution of problems related to Civil Engineering. *Prerequisite: CEE 310, CS 204, & MATH 246.*

CEE 451 - WATER SUPPLY AND SEWERAGE SYSTEMS 3 (3, 0, 0)

Course Description (catalog): This course aims to provide basic description and understanding of the water and sewerage distribution system. This will include coverage of the scientific basis of both the distribution systems as well as the conventional approach to their engineering design. The course will highlight quantification of water, wastewater and storm water, hydraulics, design of water supply system, design of sanitary and storm sewer systems, appurtenances of water, sanitary and storm networks, application of computer programs for design of water networks, and sewer construction and maintenance. *Prerequisite: CEE 335.*

CEE 452 – AIR POLLUTION 3 (3, 0, 0)

Course Description (catalog): This is an introductory course to air pollution covering a wide range of topics. In this course, students will learn effects of air pollutants on human beings and environment, what their sources are, and their physical and chemical behavior in the atmosphere. Also, students will get exposed to a wide range of control technologies and future trends towards preventing air pollution. Also, this course covers industrial, agricultural and municipal contributions to acid rain, smog, and toxic air pollutants. Students will demonstrate skills in the use of mathematical and computer predictions for the fate of air pollutants, in the design of air pollution control systems. The student, upon completion of this course, should have a knowledge of which air pollutants are of concern, their source, fate, atmospheric transport and transformation and policies developed to help manage the problem. Students will demonstrate skill in the use of mathematical and computer predictions for the fate of air pollutants, in the design of air pollution control systems. *Prerequisite: CEE 350.*

CEE 453 – SOLID WASTE MANAGEMENT 3 (3, 0, 0)

Course Description (catalog): This course is designed for students in Civil and Environmental Engineering to give the student fundamentals of municipal solid waste management including collection, transfer, transport, and disposal. Methods of processing, basic disposal facilities, disposal options, and the economic and environmental issues of solid waste management will be covered in this course. In addition, this course provides the student with relevant information about municipal solid waste reduction and recycling systems including technology, communications, and financial aspects. Topics include: the basis and impact of the 3 Rs on waste management systems, industry examples, recycling and recovery of paper, cardboard, metals, plastic, oil, glass, and other commodities, new uses of recycling and recovery, the basics of composting and other organic waste management methods, and design of plants for disposal. *Prerequisite: CEE 350.*

CEE 460- ROCK MECHANICS & UNDERGROUND STRUCTURES 3 (3, 0, 0)

Course Description (catalog): This introductory course explores the nature of rocks and rock masses as construction, foundation, or engineering materials. Topics covered include: Physical properties and classifications of intact rocks; stresses and strains; mechanical properties of rocks and rock masses; applications of theory of elasticity in rock mechanics; visco-elasticity; rock discontinuities; *in situ* stresses and stress measurements; rock slope engineering, Foundation on rocks, and underground excavations in rock. *Prerequisite: CEE 360.*

CEE 462 – ADVANCED CONCRETE DESIGN 3 (3, 0, 0)

Course Description (catalog): This course is designed for undergraduate students. Concrete design is one of the most important area of Civil Engineering. The objective of this course is to develop an understanding of the concrete design and construction problems. Design of different structural components such as columns, slabs, foundation and retaining walls would be tough in depth. Students would also learn computer aided modelling of these components as isolated members and as an assembly in the form of multi-storey concrete structure. Students are also introduced with American design codes such as American Concrete Institute ACI-318-11, Uniform Building Code UBC-97 and ASCE-07 Minimum design loads. Students will learn about the application of these specifications for the design of concrete structures, which will also improve their ability to problem solving and engineering judgment skills. Specific areas to be covered include design of slender columns, design of two-way slab, retaining walls and design of construction form work. Students will also be introduced to computer aided modelling of these structures using state of the art computer program such as SAP, ETABS and SAFE. *Prerequisite: CEE 330.*

CEE 470 – CONTRACTS AND SPECIFICATIONS 2 (2, 0, 0)

Course Description (catalog): The course covers contracts and specifications in depth including the following: Project delivery methods, contract management, Role of engineering professional societies and engineering code of ethics, Forming engineering and construction contracts, Contract administration models, Engineering design

contracts, Construction contracts, Duties and responsibilities of the Architects and Engineers, Performance and breach of contract, Ways to terminate contracts, Specifications and their types, Standard specifications, Technical standards, Government construction contracts, Bonding requirements and types, Change orders, Construction claims and management, Dispute resolutions methods, Contract negotiations, Contract mediation, Arbitration, Litigation, Dispute review boards, and ADR methods will be discussed. *Co-requisite: CEE 330.*

CEE 472 – APPLICATIONS OF GIS IN CIVIL ENGINEERING 3 (1, 0, 6)

Course Description (catalog): This course covers fundamental concepts underlying computerized geographic information systems (GIS) at an introductory and intermediate level, and its applications for Civil Engineering. It combines an overview of the general principles of GIS with a theoretical view of and analytical use of spatial information. The practical component of the course gives students hands-on experience with the latest ArcGIS software and focuses on data modeling, and management, and creating solutions to problems in civil engineering applications; usually three to five problem-solving tasks will be assigned at the end of each lecture. *Prerequisite: CEE 272 & (7th level or above).*

CEE 480– ADVANCED CONCRETE TECHNOLOGY 3 (3, 0, 0)

Course Description (catalog): This course provides a comprehensive understanding of the materials and civil engineering principles that result in the production and construction of high quality concrete, through the study of mixture proportioning with and without pozzolanic materials, aggregate testing, concrete testing, effects of admixtures, non-destructive testing, and durability issues. It covers the aspects of design and performance assessment of various cement-based materials, including normal and high strength concrete, as well as special cement composites. Other topics include properties of concrete in fresh and hardened states, strength and fracture, volume changes due to creep, shrinkage, and thermal dilation, transport of heat, moisture and ions, and durability against corrosion, freezing and thawing, and alkali-aggregate reaction. *Prerequisite: CEE 330.*

CEE 485 – SPECIAL TOPICS IN CIVIL ENGINEERING 3 (3, 0, 0)

Course Description (catalog): In this course an in-depth study of some civil engineering subjects will be conducted. The content of the course will be in different areas of interest in civil engineering aiming to enhance knowledge and understanding of the student in the selected area. Areas of interest include Construction Engineering, Geotechnical Engineering, Structures and Mechanics, Transportation Engineering, and Water Resources and Environmental Engineering. The specific content of the course offerings can vary from semester to semester and will be provided before the start of early registration for the semester in which the course is offered. *Prerequisite: 7th level or above.*

CEE 486 – UNDERGRADUATE RESEARCH 3 (3, 0, 0)

Course Description (catalog): This course covers in depth undergraduate research in civil engineering including the followings: student integrity, forbids cheating, fabrication, multiple submissions of academic work, plagiarism, academic research, presenting results, editing and reviewing. Students to know how to write a report including project title, abstract, description, objectives and constraints, data and assumption; design alternatives, expected conclusions and recommendations. The course includes project selection, conceptual design, data collection, identification of real-life constraints, possible design alternatives, and preparation of a work plan for implementing and completing the project. The course provides the student with an opportunity to prepare a research proposal under the guidance of the instructor. The students have to orally present the project. Students with a high GPA should take this course. *Prerequisite: 7th level or above.*

CEE 488 – ADVANCED ASPHALT MATERIALS 3 (3, 0, 0)

Course Description (catalog): This course provides an introduction to the advancement in asphalt materials. Topics covered include an introduction to the significance of materials used in highway construction, types of asphalt/bitumen and advances in bitumen technology to increase the pavement life, types and characteristics of bitumen modifiers, SuperPave binder testing and mix design. *Prerequisite: CEE 340 & CEE 341.*

CEE 493 – ESTIMATING CONSTRUCTION COSTS 3 (3, 0, 0)

Course Description (catalog): The course covers quantity surveying and estimation in construction including the followings: Types of estimates, Quantity surveying, Contract documents, Bonds and insurance, Project manual, Workup sheets and summary sheet, Computers in estimating, Overhead and contingencies, Labour hours and productivity, Labour burden, Pricing labour, Equipment operating and ownership costs, Rental and mobilization costs, Calculating excavation for new site grades and rough grading, Cross-section method, Average end area method, Perimeter and area, Topsoil removal, General and special excavation, Backfilling, Rock excavation, Asphalt paving, Estimating concrete and reinforcing, Estimating masonry, Concrete masonry, Estimating tile, Estimating wood, Doors and windows, Electrical works, Plumbing work, and HVAC work will be discussed. *Prerequisite: CEE 282. Co-requisite: CEE 390.*

CEE 494 – SAFETY AND RISK MANAGEMENT IN CONSTRUCTION 3 (3, 0, 0)

Course Description (catalog): This course covers in depth safety and risk management in construction including the followings: Construction accidents and injuries, Cost of construction worker injuries, OSHA, Problem areas in construction safety, Job-site safety assessment, Safety meetings, Safety in construction contracts, Subcontractor safety, Elements of an effective safety program, Safety Management and Safety Culture, Risk and uncertainty in

projects, Risk and opportunity identification, Risk and opportunity analysis, Risk response, Developing and implementing a successful risk and opportunity management system, Risk allocation and liability sharing in construction. *Prerequisite: ENGR 307 & CEE 345.*

CEE 495 – SENIOR DESIGN I 2 (1, 0, 3)

Course Description (catalog): This is the first phase of the senior design project that is a continual project comprise of two semesters. It involves a group of students, where numbers of students in the group are selected based on the type of the assigned project. Students are required to work as a team tackling different aspects of the civil engineering works in an efficient manner. This phase mainly introduces policies, identifying problems, statement formulation, knowledge of ethical responsibilities, and conceptual design. It also includes project selection, conceptual design evaluation, data collection, identification of real-life constraints (e.g. economy, environmental, global, and contemporary issues), generation of possible design alternatives considering client needs, selection of the preferred alternative, and preparation of a work plan for implementing and completing the project. All work conducted during the semester must be compiled in a final report and orally presented to the examining committee which is comprised of project advisor, departmental faculty and senior design coordinator. *Prerequisite: ENGR 307 & (Level 7 or above).*

CEE 496- SENIOR DESIGN II 2 (1, 0, 3)

Course Description (catalog): This is the second and final phase of the senior design project, where students are required to implement their plan, devised at senior design-I level. It includes designing a system, component, or process to meet set objectives. Students mainly carry out design calculations and use of experimental tools to design, and or do data analysis for the preferred alternative. The final report to be submitted by the team includes project title, description, objectives and constraints, data and assumption; design alternatives and analyses, details of preferred design along with pertinent drawings, abstract, conclusions and recommendations. In addition, the student team should orally present the project to the examining committee. *Prerequisite: CEE 495.*

Electrical Engineering Department

Electrical engineering is a professional engineering discipline that deals with the study and application of electricity, electronics, and electromagnetism. Electrical engineering is divided into a wide range of fields including electronics, digital computers, computer engineering, power engineering, telecommunications, control systems, radio-frequency engineering, signal processing, instrumentation, and microelectronics.

The Department of Electrical Engineering's in King Faisal University offers undergraduate program with emphasis on multidisciplinary approaches to solve complex engineering problems. Bringing together flexible and innovative curricula, world-class teaching and research facilities, as well as faculty members that are well-regarded internationally in their respective areas of research expertise; we equip our graduates to stay relevant in a globalized technology-based economy, able to embark on multiple career pathways.

What Electrical Engineers do?

Electrical engineers investigate, plan, design, develop, construct, test, market and maintain a wide range of products and systems. As an electrical and computer systems engineer, you might design and develop digital products such as smartphones, virtual reality systems or maybe robotic medical devices to assist in surgery and rehabilitation. They work with all kinds of electronic devices, from the smallest pocket devices to large supercomputers.

As an electrical engineer you could work locally or internationally in a wide range of industries, including:

- power generation
- industrial and power electronics
- wireless communications
- optical communications

- the ‘internet of things’
- embedded systems
- robotics
- healthcare
- Computer programming

As an electrical engineer, you could find yourself working on the following activities:

- Design new ways to use electrical power to develop or improve products
- Direct the manufacturing, installation and testing of electrical equipment
- Manage the production of electrical projects to ensure work is completed well, on time and within budget
- Design, test, and oversee the development of electronic systems and the manufacture of electrical and electronic equipment and devices.
- Develop and supervise the manufacture of electrical equipment and electrical systems for automobiles and aircraft including:
    - Electric motors
    - Machinery control
    - Lighting and wiring in buildings
    - Radar and navigation systems
    - Communications systems
    - Power generation, control, and transmission devices used by electric utilities.
- Work on applications of electricity in order to control systems or signal processing.
- Design, develop, test, and supervise the manufacture of electronic equipment, such as broadcast and communications systems.

Note from the Program Chair

On behalf of the Electrical Engineering Department at King Faisal University, we are pleased to welcome you. The department is growing with a strong team of research-active faculty members with great expertise and experience covering the areas of Telecommunications, Power Electronics, Renewable Energy Systems, Power Systems and Signal Processing and Fiber Optics. Our students have very good track-record in competitions and events at local and regional levels. The successful relationship with our industrial partners allows our students and graduates to find excellent internship and employment opportunities.

The electrical engineering program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. Currently, the Department is joining hand with the College of Engineering and the university to earn the NCAAA Accreditation. In addition, the Department is planning to start the Graduate Program in Electrical Engineering. We look forward to sharing our excitement about the growth and activities of the department. Whether you are a current or prospective student, a parent, an academic colleague, a potential employer of Electrical Engineering graduates, a prospective research sponsor, or interested in our program or in collaboration, feel free to contact us.

Program Mission

The Electrical Engineering Department is committed, through close partnership with the community, to providing quality education that prepares graduates through a project-based learning to be professionals and to pursue graduate studies and research. The department is also committed to research that leads to better solutions to electrical engineering-related problems

with emphasis on issues of national significance by working closely with industry and research centers.

Program Educational Objectives (PEOs):

The EE graduates are expected to attain the following program educational objectives within a few years of graduation:

PEO 1: Graduates will apply their knowledge and skills to lead a successful career in Electrical Engineering and advance to the position of leadership in their profession.

PEO 2: Graduates will demonstrate effective communication and teamwork skills and recognize ethical and professional responsibilities in a diverse work environment.

PEO 3: Graduates will pursue their professional development through continuous self-learning, research work, and graduate studies.

Student Outcomes (SOs):

The graduates of the Electrical Engineering Department, College of Engineering at King Faisal University are expected to demonstrate:

1. Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. Ability to communicate effectively with a range of audiences.
4. Ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. Ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. Ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Program Description

Electrical Engineering is a diverse, fast growing and exciting field of engineering. Electrical Engineering is a wide field and is in virtually all sectors of modern industry. This includes very small applications, such as nanotechnology and implanted biomedical devices, and large applications such as the exploration of outer space and study of remote stars. Electrical Engineering has been and continues to be a corner stone in every new technical development in our life. Electrical Engineering includes power generation, transmission and distribution, control, communication systems, electronics, instrumentation, robotics, and many others. Electrical engineers are involved in almost every aspect of day to day life.

The Profession of Electrical Engineering is the main driver behind generation and delivery of electricity to homes, telecommunications systems, mining, factories, offices, hospitals, schools and streets. Radio, TV, cellular phones, computers, wireless communication and medical

equipment such as CT and MRI scanners, are just few areas electrical engineering has helped flourish. The technology that surrounds us will continue to expand and electrical engineers are leading the way.

Electrical engineering offers a wide range of employment opportunities. The job of an Electrical Engineer usually involves design, feasibility studies, cost analysis studies, installation, operation, and maintenance of plants, processes or equipment. All these areas are in great need for electrical engineers in the fast-growing economy of the Kingdom. Electrical engineering graduates find employment in booming industries such as power generation and distribution, gas and petroleum industry, chemical and steel companies, consumer electronics, telecommunications, biomedicine and many others. Companies like SABIC, ARAMCO, Siemens, Nokia, ABB, General Electric, Nokia, CISCO, Intel, Sony, and many more whose primary business is Electrical Engineering.

Program Study Plan:

The EE program requires the undertaking the following courses.

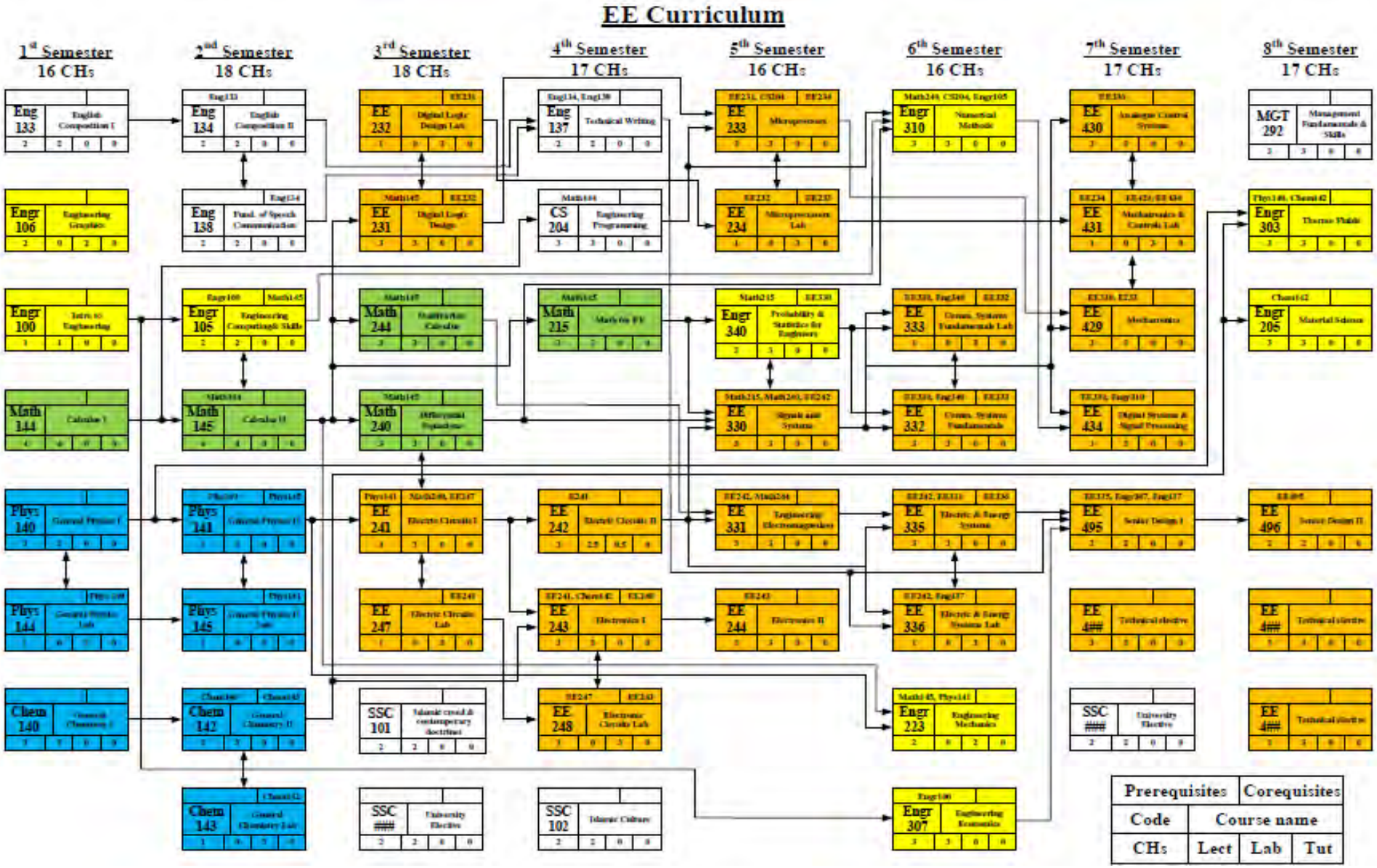
First Year/First Semester				
Course Code	**Course Title**	**CH**	**Pre-Requisites**	**Co-Requisites**
Chem 140	General Chemistry I	3		
Eng 133	English Composition I	2		
Engr 100	Introduction to Engineering	1		
Engr 106	Engineering Graphics	2		
Math 144	Calculus I	4		
Phys 140	General Physics I	3		Math 144, Phys 144
Phys 144	General Physics I Lab.	1		Phys 140
Total		**16 CH**		
First Year/Second Semester				
Course Code	**Course Title**	**CH**	**Pre-Requisites**	**Co-Requisites**
Chem 142	General Chemistry II	3	Chem 140	Chem 143
Chem 145	General Chemistry Lab	1		Chem 142
Eng134	English Composition II	2	Eng133	
Eng138	Fundamentals of Speech Communication	2		Eng 134
Engr105	Engineering Computing & Skills	2	Engr 100	Math 145
Math 145	Calculus II	4	Math 144	
Phys 141	General Physics II	3	Phys 140	Phys 145
Phys 145	General Physics II Lab.	1		Phys 141
Total		**18 CH**		
Second Year/First Semester				
Course code	**Course title**	**CH**	***Pre-requisites***	***Co-requisites***
EE 231	Digital Logic Design	3	Math 145	EE 232
EE 232	Digital Logic Design Lab	1		EE 231
EE 241	Electric Circuits I	3	Phys 141	Math240, EE247
EE 247	Electric Circuits Lab	1		EE 241
Math 240	Differential Equations	3	Math145	
Math 244	Multivariate Calculus	3	Math145	
SSC 101	Islamic Creed and Contemporary Doctrines	2		
SSC xxx	University Elective	2		
Total		**18 CH**		

Second Year/Second Semester				
Course code	**Course title**	**CH**	***Pre-requisites***	***Co-requisites***
CS 204	Engineering Programming	3	Math 144	
EE 242	Electric Circuits II	3	Phys 141	Math240, EE247
EE 243	Electronics I	3	EE241, Chem142	EE 248
EE 248	Electronic Circuits Lab	1	EE 247	EE 243
Eng 137	Technical Writing	2	Eng134 Eng138	
Math 215	Math for EE	3	Math145 Math141	
SSC 102	University Elective	2		
Total		**17 CH**		
Third Year/First Semester				
Course code	**Course title**	**CH**	***Pre-requisites***	***Co-requisites***
EE 233	Microprocessors	3	EE 231, CS 204	EE 234
EE 234	Microprocessors Lab	1	EE 232	EE 233
EE 244	Electronics II	3	EE 243	
EE 330	Signals and Systems	3	Math240, Math215, EE242	
EE 331	Engineering Electromagnetics	3	Math 244, EE242	
Engr 340	Probability & Statistics for Engineers	3	Math215	EE 330
Total		**16 *CH***		
Third Year/Second Semester				
Course code	**Course title**	**CH**	***Pre-requisites***	***Co-requisites***
EE 332	Communication Systems Fundamentals	3	EE 330, Engr 340	EE 333
EE 333	Communication Systems Fundamentals Lab	1	EE 330, Engr 340	EE 332
EE 335	Electric Energy & Power Systems	3	EE331, EE242	EE 336
EE 336	Electric Energy & Power Systems Lab	1	EE242	EE 335 Eng 137
Engr 223	Engineering Mechanics	3	Math145, Phys140	
Engr 307	Engineering Economics	3	Engr100	
Engr 310	Numerical Methods	3	Math240 CS204 Engr105	
Total		**17 *CH***		
Third Year/Summer				
Course code	**Course title**	**CH**	***Pre-requisites***	***Co-requisites***
Engr 399	Engineering Training	0	Senior Level, Eng 137	
Fourth Year/First Semester				
Course code	**Course title**	**CH**	***Pre-requisites***	
EE 429	Mechatronics	3	EE 330 EE 233	
EE 430	Analogue Control Systems	3	EE 330	
EE 431	Mechatronics & Controls Lab	1	EE 234	
EE 434	Digital Systems & Signal Processing	3	EE 330 Engr 310	
EE 495	Senior Design I	2	EE335 Engr 307 Eng 137	
EE 4xx	Technical Elective I	3		
SSC ###	University Elective	2		
Total		**17 *CH***		
Fourth Year/Second Semester				
Course code	**Course title**	**CH**	***Pre-requisites***	
EE 496	Senior Design II	2	EE 495	
EE 4xx	Technical Elective II	3		
EE 4xx	Technical Elective III	3		
Engr 205	Materials Science	3	Chem 142	
Engr 303	Thermo-Fluids	3	Phys140, Chem142	
Mgt 292	Management Fundamentals & Skills	3		
Total		**17 *CH***		

Electives: (Students must select 3 courses only)				
Course Code	**Course Title**	**CH**	**Pre-requisite**	**Co-requisite**
EE 480	Electric Machines	3	EE 335, EE 336	
EE 481	Power Systems	3	EE 335, EE 336	
EE 482	Power Electronics	3	EE 335, EE 336, EE 244	
EE 483	Modern Control Systems	3	EE 430	
EE 484	Industrial Controls	3	EE 429, EE 232	
EE 485	Digital Control Systems	3	EE 430, EE 248	
EE 486	Digital Communication Systems	3	EE 332, EE 333	
EE 487	Communication Electronics	3	EE 332, EE 244, EE 333	
EE 488	Wireless and Cellular Communications	3	EE 486, EE 333	
EE 489	Special Topics	3	Dept. approval	
EE 490	Undergraduate Research	3	Dept. approval	
EE 493	Optical Fiber Communication	3	EE 331, EE 243	
Total		**9 CH**		

University Electives (Before Fall 2018/2019)				
Course code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**
Deic 102	Fiqh Biography	2	Elective	None
Deic 302	Islam and Science and Technology Issues	2	Elective	None
Deic 317	Islamic Morals and Ethics	2	Elective	None
Deic 318	Economic System in Islam	2	Elective	None
Deic 401	Islamic Social System	2	Elective	None
Deic 418	Political System and Human Rights in Islam	2	Elective	None

University Courses (For Batch 2018 & above): From Supporting Studies Center				
Course code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**
SSC101	Creed and doctrines	2	Required	None
SSC102	Islamic culture	2	Required	None
SSC103	Islamic Morals and Ethics	2	Elective	None
SSC104	Studies in the Biography of the Prophet	2	Elective	None
SSC105	Medical jurisprudence	2	Elective	None
SSC106	Economics & Politics in Islam	2	Elective	None
SSC107	Islamic Social & Family Behaviour	2	Elective	None
SSC108	Management & Entrepreneurship	2	Elective	None
SSC109	Health & Fitness	2	Elective	None
SSC110	Research skills	2	Elective	None
SSC111	Volunteer work	2	Elective	None
SSC112	Medicine: Type and use	2	Elective	None
SSC113	Human Rights in Islam	2	Elective	None
SSC114	Food and Nutrition	2	Elective	None


EE Curriculum
1st Semester
16 CHs
2nd Semester
18 CHs
3rd Semester
18 CHs
4th Semester
17 CHs
5th Semester
16 CHs
6th Semester
16 CHs
7th Semester
17 CHs
8th Semester
17 CHs
Eng 133
Eng 134
EE 232
Eng 137
EE 233
Engr 310
EE 430
MGT 292
Engr 106
Eng 138
EE 231
CS 204
EE 234
EE 431
Engr 303
Engr 100
Engr 105
Math 244
Math 215
Engr 340
EE 333
EE 429
Engr 205
Math 144
Math 145
Math 240
EE 330
EE 332
EE 434
Phys 140
Phys 141
EE 241
EE 242
EE 331
EE 335
EE 495
EE 496
Phys 144
Phys 145
EE 247
EE 243
EE 244
EE 336
EE 4##
Chem 140
Chem 142
SSC 101
EE 248
Engr 223
SSC ###
Chem 143
SSC 102
Engr 307
Prerequisites
Corequisites
Code
Course name
CHs
Lect
Lab
Tut

Courses Description (Catalog)

SSC 101 Islamic creed & contemporary doctrines 2(2,0,0)

Creed: definition, importance, sources, characteristics, study methodology, pillars of faith, influence of creed on individuals and society, belief nullifiers, thought constraints, Study of some contemporary doctrines: secularism, Satan worshipers, Baha'ism, Zionism, Misoneism, Christian fundamentalism. Student is required to memorize part of the holy Quran. Two one-hour lecture periods per week.

SSC 301 Contemporary Culture Issues 2(2,0,0)

Moderation, Islam globalism and human ties, discrimination and nationalism, Arabic as the medium of education and culture, science and religion, interfaith dialogue, Orientalism and Christianization, Colonialism, Westernization, modernity in literature, Globalization, Terrorism, Development of Moslem nations. Student is required to memorize part of the holy Quran. Two one-hour lecture periods per week.

SSC 317 Islamic Morals and Ethics 2(2,0,0)

Morals (Ethics: definition and foundations, characteristics, study of model samples of the Prophets' morals and ethics, tools of moral/ethical education in Islam. Concept of profession and its importance in human life, constituents of professional morals/ethics and its constraints, model samples of professional morals/ethics in Islam. Student is required to memorize part of the holy Quran. Two one-hour lecture periods per week.

SSC 318 Economic System in Islam 2(2,0,0)

Islamic Economy: (its nature and principles, development, and characteristics), the economic problem and how to face it, contemporary economic systems (capitalism, socialism), economic globalism, World Bank and its goals, World Trade Organization and its goals, ownership in Islam: definition, types, constraints. Islam and economic freedom, Production, distribution, expenditure, economic policies in contracts and transactions. Student is required to memorize part of the holy Quran. Two one-hour lecture periods per week

SSC 401 Social System in Islam 2(2,0,0)

Society: definition, building blocks of society in Islam, Islamic society attributes, Family in Islam: definition, status, importance, building blocks, marriage and its purposes, spouses' rights, parents, siblings, and relatives' rights, women's status and rights in Islam, Family controversial issues about family system in Islam and responding to those issues (polygamy, inheritance, veil, divorce,…), Family problems and remedies (women's work, alimony, stewardship, etc.). Student is required to memorize part of the holy Quran. Two one-hour lecture periods per week.

SSC 418 Political System & Human Rights in Islam 2(2,0,0)

Political system: definition, characteristics, State building blocks: homeland, society, authority, goals of state, foundations of state, principles of ruling in Islam, ruler selection, ruler duties, state authority, rights of Moslems and non-Moslems in the Islamic state, Manifestations of implementing the political system in KSA: Governance statute, Shura, judiciary system, security, Hisbah. Human rights in Islam: definition, significance, sources, constraints, Basic rights: (equality, freedom, life, justice, safety), Universal/International Declaration of Human Rights and position of KSA from it, Students are required to memorize part of the holy Quran.

Eng 133 – English Composition I 2 (2,0,0)

This is an intermediate level writing class. Students are guided through the stages of the writing process to write paragraphs that are both meaningful and organized and include a topic sentence with a controlling idea and conclusion. Students write multi-draft compositions from a variety of practical and academic purposes. They improve their writing by studying model sentences and paragraphs, basic

sentence patterns, mechanics, coordinating conjunctions, transitions and vocabulary**.** Two hours lecture per week.

Eng 134 – English Composition II 2 (2,0,0)

This course develops writing skills from the paragraph level to the level of the essay. It concentrates on the essential form and function of the writing unit (paragraph or essay) in order to prepare the ground for the academic essay. Specific types of composition are practiced: chronological, cause-effect, comparison/contrast and argumentation. In addition, work on paraphrase and summarizing is undertaken, along with back-up work in some specific structure areas. Two hours lecture per week. Pre-requisite: Eng 133

Eng 137 – Technical Writing 2(2,0,0)

This course introduces students to the fundamentals of writing, designing and conveying technical information to different audiences. Students will learn about technical writing conventions, such as organization, style and tone and illustration and layout as they work through the writing process to produce a variety of common technical documents that they will encounter in their academic work. Two hours lecture per week. Pre-requisite: **Eng 134, Eng 138**

Eng 138 – Fundamentals of Speech Communication 2(2,0,0)

A study of communication theories as applied to speech: practical communicative experiences ranging from interpersonal communication and small-group process through problem identification and solution in discussion, to informative and persuasive speaking in standard speaker-audience situations. Two one-hour lecture periods per week. **Co-requisite: Eng 134**

Mgt 292 Management fundamentals & Skills 3(3,0,0)

The course covers Management fundamentals & Skill, such as, Global Management, Change and Innovation, Appendix: Managing Entrepreneurial Ventures, Decision Making, Strategic Management, Module Planning Tools and Techniques, In class discussion: Ethics Dilemma, Operations Management, Marketing Management, E Business, Marketing Plan, Human Resource Management, Team Building, Foundations of Individual Behaviour, Communication. Three one-hour lecture periods per week.

Math 144- Calculus I 4(4,0,0)

This is an introductory course of mathematics for college of engineering students. The course covers the basic concepts and methods of calculus. At the beginning of the course the instructor will provide students the knowledge of the number systems, algebraic operations and functions of single variable with domain and range so that students can learn differentiation of the functions. The main topics to be covered in this course include: Limits, Continuity, Differentiation of functions of a single variable, Exponential, Logarithmic, Trigonometric, Inverse trigonometric functions, Applications of derivatives, Differentials, Curve Sketching, L'Hospital Rule, Mean value theorems, Area and estimating with finite sums, Introduction to integrals and definite integrals. Four one-hour lecture periods per week.

Math 145– Calculus II 4(4,0,0)

This is an intermediate level calculus course designed for undergraduate Engineering students. This course covers mainly the integration and basic principles of Vectors and their applications. At the beginning of this course, the instructor will give the review of differentiation and integration. In depth, the students will learn the methods of integration and vectors. The topic covered include, Techniques of Integration, Improper Integration, Applications of Integration, Infinite Sequences and Series, (Power series and Taylor series), Polar coordinates, Transcendental Functions, Vectors, Vector Valued Functions**.** Four one-hour lecture periods per week. Pre-requisite: Math 144**.**

Math 215- Math for EE 3(3,0,0)

This course is designed for undergraduate students of electrical engineering. It is an advanced course which covers the principles and methods of Mathematics that are useful to electrical

engineering. At the beginning of the course, the Instructor will give a review of complex numbers and their algebra. Complex analysis is then covered in depth, and its application in electrical engineering is emphasized. The remaining topics covered in the course include: System of linear equations; matrices and determinants; Vector Spaces; Linear Transformations; and Eigenvalues and Eigenvectors with strong emphasis on applications to systems of differential equations. Three one-hour lecture periods per week. Pre-requisite: Math 145.

Math 240 -Differential Equations 3(3,0,0)

This course is an introductory course of differential equations for college of engineering students. The course covers different methods and concepts to solve first and second order differential equations. At the beginning of the course we discuss some definitions and terminology about differential equations. Then we move to solving first and second order differential equations. The topics in this course include, linear differential equations, solving first order differential equations, solving second order differential equations, series solutions of second order linear differential equations, solving systems of linear differential equations, Laplace transform and its applications in solving differential equations. Three one-hour lecture periods per week. Pre-requisite: Math 145.

Math 244 - Multivariate Calculus 3(3,0,0)

This course is an advanced course in calculus, designed for undergraduate students of engineering. The course covers the basic principles and methods of differentiation and integration of two or more variables. At the beginning of the course, the Instructor will give a review of functions of one variable and its differentiation and integration. Then, the functions of two or more variables with domain and range will be discussed. Throughout the course, the following main topics will be covered: solid analytic geometry; vector calculus; partial derivative; and multiple integrals. The coverage will also include relevant and important applications in the sciences and engineering. Three one-hour lecture periods per week. Pre-requisite: Math 145.

Phys 140 – General Physics I 3(3,0,0)

The course is an introduction to units, measurements, motion in one and two dimensions, kinematics and dynamics, Newton's laws, work and energy, rotational dynamics, linear and angular momentum, torque, and collisions. Basic calculus and multi-variable algebra will be used. Three one-hour lecture periods per week. Co-requisite: Math 144, Phys 144.

Phys 141 – General Physics II 3(3,0,0)

This course introduces students to the physics of electricity and magnetism and the connections between them. The concepts of electric charge, electric field, electric potential, Kirchhoff Law, Gauss Law, electric and magnetic fluxes, capacitance, resistivity and resistance, connections in series and in parallel, RC-circuit, magnetic field, magnetic force, magnetic and electric torques, Ampere Law, electromagnetic induction, and Faraday Law and Lenz Law will be taught. Three one-hour lecture periods per week. Pre-requisite: Phys 140, Co-requisite: Phys 145.

Phys 144 - General Physics I Lab 1(0,3,0)

Measure basic constants such as length, weight and time, value of acceleration due to gravity. Design and conduct experiments in mechanics. Analyze and interpret experiment data. Write a scientific report. Draw and interpret a graph. Apply experimental principles and error calculations to mechanics. Three hours lab per week. Co-requisite: Phys 140

Phys 145 – General Physics II Lab 1(0,3,0)

This course introduces students to the basic electrical measurement techniques and to the physics of electricity and magnetism. The concepts of basic measurements, Resistors in series and in parallel, Verifying Ohm's law, Wheatstone Bridge, Verifying Kirchhoff's Laws, Resistivity, Capacitors in series and in parallel, RC circuit, Introduction to Oscilloscope, the Mechanical Equivalent of Heat, the Negative Temperature Coefficient of Resistance (Thermistor), Galvanometer, and the Magnetic Moment will be taught**.** Three hours lab per week. Co-requisite: Phys 141

Chem 140 – General Chemistry I 3(3,0,0)

Matter properties and measurement, Atoms and the Atomic Theory, Chemical Compounds, Chemical Reactions, Reactions in Aqueous Solutions, Liquids Solids and Intermolecular Forces, Electrons in Atoms, Periodic Table and Atomic Properties, Chemical Bonding, Valence-Bond, Hybridization of Atomic Orbital, Multiple Covalent Bonds, Molecular Orbital Th., Liquids and Solids. Three one-hour lecture periods per week.

Chem 142 – General Chemistry II 3(3,0,0)

Properties of Gases: Kinetic-molecular theory of gases, Ideal gas law, Mixtures of gases, Thermo-chemistry, Principles of Chemical Equilibrium, Acids and Bases, Buffer Solutions, Neutralization Reactions and Titration Curves, Solubility and Complex-Ion Equilibria, Spontaneous Change: Entropy and Free Energy, Thermodynamic, Solutions and Their Physical Properties, Chemical Kinetics and Electrochemistry**.** Three one-hour lecture periods per week. Pre-requisite: Chem 140, Co-requisite: Chem 143

Chem 143 - General Chemistry Lab 1(0,3,0)

Laboratory safety rules and Evaluation of analytical data, Definition and determination of density, explanation and determination of specific heat, concept of Acids, bases and Heat of Neutralization Reaction and its determination, reversible reactions, concept of equilibrium constant and its determination, Le Chatelier principle and its verification, principle involved in Acid base titrations, indicators, Ionization of electrolytes, determination of dissociation constant of weak acid(Ka), principle involved in complexometric titrations, hardness of water and its determination**.** Three hours lab per week. Co-requisite: Chem 142.

CS 204 – Engineering Programming 3(3,0,0)

Introduction to computer systems; problem solving methodology; testing and debugging of programs; variables, declarations, and assignments; input and output; data types; control flow and looping; functions and overloading; streams and input/output; one-dimensional arrays; two-dimensional arrays; pointers and dynamic arrays; structures; abstract data types and classes; inheritance; friends, overloaded operators, and arrays in classes; recursive functions. Three lectures per week. Projects that will require lab work will be assigned weekly. Three one-hour lecture periods per week. Pre-requisite: Math 145**.**

Engr 100- Introduction to Engineering 1(1,0,0)

This course introduces engineering to students, particularly those who are interested in an engineering profession. It covers engineering ethics, teamwork, communication skills, engineering topics, and engineering problem solving skills and design methodology. One-hour lecture per week.

Engr 105- Engineering Computing Skills 2 (2,0,0)

Problem solving skills and computing using Matlab. Three hours lecture per week. Pre-requisite: Engr 100, Co-requisite: Math 145.

Engr 106 Engineering Graphics 2(1,3,0)

An introductory course in engineering graphics focuses on graphical communication. Topics include descriptive geometry elements, visualization, engineering drawing techniques, orthographic projection,

pictorial representation, section views, and basic dimensioning. The course incorporates computer aided drafting (CAD) with engineering applications using 2-D drawing. This course is divided in to two sections: drafting (sketching) and CAD. The course begins by teaching the basics of engineering graphics using sketching. Freehand sketching using only a pencil and paper is an important skill for any engineer. It is a means of quickly conveying technical information to others. Through sketching the concepts of pictorial projections, section views, auxiliary views and dimensioning are taught. Once the foundation of engineering graphics is known, these concepts can be applied using computer aided design (CAD) software. AutoCAD is a drawing software package used to create two-dimensional engineering drawings. Two hours lab/tutorial per week.

Engr 205 Materials Science 3(3,0,0)

Mechanical, electrical and chemical properties of engineering materials, fundamentals of crystallography, crystal defects, Impurities and imperfections in solids. Atomic diffusion. Single-phase metals and alloys; elastic and plastic deformation, recrystallization and grain growth. Multi-phase materials: phase diagrams and equilibrium microstructural development, Heat treatment process, Studies of the widely used engineering metals, alloys, polymers, composites & ceramics. Three one-hour lecture periods per week. Pre-requisite: Chem 142

Engr 223 Engineering Mechanics 3(3,0,0)

Engineering Mechanics, covering both statics and dynamics. Topics include vector algebra, force systems, free-body diagrams, equilibrium of particles and rigid bodies, kinematics of particles and rigid bodies, Newton's laws applied to particles and rigid bodies, friction. Three one-hour lecture periods per week. Pre-requisite: Math 145 & **Phys 140**.

Engr 303 Thermo Fluids 3 (3,0,0)

Basic concepts of thermodynamics, properties of pure substances, energy transfer by heat, work, and mass, first and second laws of thermodynamics, basic principles and concepts of fluid mechanics including fluid statics, momentum analysis of flow structures, Bernoulli and energy equations, flow in pipes, basic principles of heat transfer including modes of heat transfer, steady heat transfer. Three one-hour lecture periods per week. Pre-requisite: Phys 140 & Chem 142

Engr 307 Engineering Economics 3(3,0,0)

The course covers the following topics: Engineering Economic Decisions; Understanding Financial Statements; Cost Concepts and Behaviors; Time is Money; Understanding Money and Its Management; Principles of Investing; Present Worth Analysis; Annual Equivalent Worth Analysis; Rate of Return Analysis; Depreciation; Taxes; Break-Even Analysis, Cost Estimation; Developing Project Cash Flows; Inflation; Replacement Decisions. Three one-hour lecture periods per week. Pre-requisite: Engr 100

Engr 310 Numerical Methods 3(3,0,0)

Introduction to Numerical Methods, Solution of Nonlinear Equations, Solution of Simultaneous Linear Algebraic Equations, Solution of Matrix Eigenvalues Problem, Curve Fitting and Interpolation, Numerical Differentiation, Numerical Integration, Ordinary Differential Equations: Initial-Value Problems, Ordinary Differential Equations: Boundary-Value Problems**.** Three one-hour lecture periods per week. Pre-requisite: Math 240, CS 204, Engr 105

Engr 340 Probability & Statistics for Engineers 3(3,0,0)

Introduction to Descriptive Statistics; Fundamentals of probability theory; Single and multiple discrete and continuous random variables; Probability density function; Gaussian and other distributions; Joint and conditional probabilities; Moments and statistical averages; Central-limit theorem; Random processes; Stationarity and ergodicity; Correlation function and power-spectral-density; Response of linear systems to random signals. Three one-hour lecture periods per week. Pre-requisite: Math 215.

Engr 399 Engineering Training (0 CH)

All engineering students are required to undergo a comprehensive "Engineering Training Program" with a reputable and specialized industrial firm. The firm can be in or outside Saudi Arabia relevant to his major area of interest in engineering analysis, design, or construction. The main purpose of this summer training is to enhance the students' practical experience and career abilities. Also, it deepens their engineering knowledge acquired during their academic years in the field of practical experience in real-life engineering projects. Additionally, such a program improves the relationship between the College of Engineering and the governmental and private industrial firms. Also, it can provide the industry with well-trained professionals in the near future. The qualifying student should spend at least eight weeks in a governmental organization, a reputable industrial firm, or a research center that is involved with engineering activities. Two months of full-time training. Pre-requisite(s): Department Approval.

EE 231 Digital Logic Design 3(3,0,0)

Introductory course in Digital logic Design; Boolean algebra; Combinational circuit analysis and design; Sequential circuit analysis and design that includes counters, registers, etc. Introduction to Microprocessors. Software for simulation and design will be used. Three one-hour lecture periods per week. Pre-requisite: Math 145. Co-requisite: EE 232.

EE 232 Digital Logic Design Lab 1(0,3,0)

Lab experiments for EE 231 that will include combinational and sequential logic. In addition to hardware, circuit simulation software will be used. Three hours lab per week. Co-requisite: EE 231.

EE 233 Microprocessors 3(3,0,0)

This course provides a comprehensive introduction to Microcomputer architecture, programming and system design concepts; Design of computer instruction set and CPU; Memory, I/O, and parallel processing; Focus will be on Intel 8086 chip set hardware architecture, and instruction sets. Software will be used in assignments and projects. Three one-hour lecture periods per week. Pre-requisite: EE 231, CS 204. Co-requisite EE 234.

EE 234 Microprocessors Lab 1(0,3,0)

Lab experiments for EE 233 that will include the use of hardware and software. Different types of Microprocessors will be used. One three-hour lab per week. Pre-requisite: EE 232. Co-requisite: EE 233.

EE 241 Electric Circuits I 3(3,0,0)

Linear circuit analysis and design course. Topics include fundamental topics of charge, current, voltage and power; passive circuit elements; mesh and nodal analysis, Thevenin's and Norton's theorems, source transformation; transient analysis in time. Three one-hour lecture periods per week. Pre-requisites: Phys 141 Co-requisite: Math 240 & EE 247.

EE 242 Electric Circuits II 3(2.5,1.5,0)

A continuation of Electric Circuits I. Additional topics includes AC sinusoidal analysis; power calculations; balanced three-phase circuits, Laplace Transform, Circuit analysis using Laplace Transform ; passive and active filter analysis and design; Bode diagram, Two port circuits. 5 hours of lecture and 1 three-hour lab every 2 weeks**.** Pre-requisite: EE 241.

EE 243 Electronics I 3(3,0,0)

Diodes: Models in Circuits, Characteristics, and Applications, Full-Wave rectifiers, Half-Wave rectifiers, Switching; Metal Oxide Field Effect Transistors (MOSFET); Bipolar Junction Transistors (BJT); Models in Circuits, Characteristics, Applications, Biasing, DC Analysis, Small Signal Analysis;

Three one-hour lecture periods per week. Three one-hour lecture periods per week. Pre-requisite: EE 241, Chem142. Co-requisite: EE 248.

EE 244 Electronics II 3(3,0,0)

Theory and applications of linear integrated circuits. Topics include ideal and real operational amplifiers with applications; Power amplifiers; feedback oscillator circuits; power supplies; voltage regulators; frequency response and compensation; active filters; comparators; waveform generators; Three one-hour lecture periods per week. Pre-requisite: EE 243.

EE 247 Electric Circuits Lab 1(0,3,0)

Lab experiments for EE 241 using resistors, inductors, capacitors, function generators, DC supplies Multimeters, and Oscilloscopes. Focus will be on DC inputs. Software circuit simulations will be used. Three hours lab per week. Co-requisite: EE 241.

EE 248 Electronic Circuits Lab 1(0,3,0)

Lab experiments for EE 243 using diodes, BJTs and MOSFETs. Software circuit simulations will be used. Three hours lab per week. Pre-requisite: EE 247. Co-requisite: EE 243.

EE 330 Signals and Systems 3(3,0,0)

Course in continuous systems only; signal representations; stability; response due to various inputs. block diagrams; linear and nonlinear systems; Fourier series; Fourier transforms; Laplace transforms; state space; analogue filters. MATLAB is used for the course projects and assignments. Three one-hour lecture periods per week. Pre-requisite: Math 215 & Math 240 & EE 242.

EE 331 Engineering Electromagnetism 3(3,0,0)

Vector calculus, Static electric and magnetic fields, solutions to static field problems, Maxwell's equations, electromagnetic waves, boundary conditions; engineering applications. Three one-hour lecture periods per week. Pre-requisite: Math 244, EE242.

EE 332 Communication Systems Fundamentals 3(3,0,0)

Spectral analysis and signal transmission channel design; amplitude, frequency, phase, and pulse-modulation systems; frequency - division and time -division multiplexes systems; digital communication; noise and its effects in modulation systems. MATLAB is used for the course projects and assignments. Three one-hour lecture periods per week. Pre-requisite: EE 330 & Engr 340. Co-requisite EE 333.

EE 333 Communication Systems Fundamentals Lab 1(0,3,0)

Lab experiments for EE 332. It includes experiments on AM, FM, PM, ASK, FSK, PSK, PAM, and PCM communication systems using hardware and software. Three hours lab per week. Pre-requisite: EE 330 and Engr 340. Co-requisite: EE 332.

EE 335 Electric Energy and Power Systems 3(3,0,0)

Mechanical and Electromagnetic Fundamentals; Three-Phase Circuits; Transformers performance & design; AC Machinery Fundamentals; Synchronous Machines; Parallel Operation of Synchronous Generators; Induction Motors performance & design ; DC Motors; Transmission Lines; Power System Representation and Equations; Introduction to Power-Flow Studies; case study on renewable energy

resources, Computer-based projects will be assigned. Three one-hour lecture periods per week. Pre-requisites: EE242, EE331. Co-requisite: EE 336.

EE 336 Electric Energy and Power Systems Lab 1(0,3,0)

Experiments for EE 335. Experiments will cover transformers, DC machines, AC machines, transmission lines, and generation and synchronization. Software and hardware will be used. Three hours lab per week. Pre-requisite: EE 242, Eng137. Co-requisite: EE 335.

EE 429 Mechatronics 3(3,0,0)

The mechatronics course provides the student with a general overview of an integrated electromechanical system, which employs analog and/or digital electronics for sensing, actuation and control. Microprocessor based control systems are given special attention and are covered in detail. An important objective of the course is to demonstrate the integration of measurement systems, control, electronics, programming, and mechanics in designing competitive systems. The practical assignments and the project work are designed to enhance planning and team skills. Three one-hour lecture periods per week. Pre-requisite: EE 330 and EE 233.

EE 430 Analogue Control Systems 3(3,0,0)

Control systems analysis and design: classical control; transfer functions; time-domain analysis and design; frequency-domain analysis and design; stability analysis; prototyping. Computer projects will be assigned. Three one-hour lectures per week. Pre-requisite: EE 330.

EE 431 Mechatronics and Controls Lab 1(0,3,0)

General overview of an integrated mechanical-electrical system, which employs analog and/or digital electronics for sensing, actuation and control; Microprocessor- based control systems; measurement systems, control, electronics, programming and mechanics. The practical assignments and the project work are designed to enhance planning and teamwork skills. One Three-hour lab per week. Pre-requisite EE 234. Co-requisite: EE 429 & EE 430.

EE 434 Digital Systems and Signal Processing 3(3,0,0)

Course in discrete signals and systems only; signal representations; stability; response due to various inputs; Fourier series; Fourier transforms; FFT, Z transforms; State Space; FIR and IIR Digital filter design. MATLAB is used for the course projects and assignments. Three one-hour lecture periods per week. Pre-requisite: EE 330 & Engr 310.

EE 480 Electric Machines 3(2.5,1.5,0)

A continuation of EE 335 and more in-depth treatment of electrical machinery; electromechanical energy conversion; solid understanding and knowledge of the principles of operation of power transformers, DC motors and generators, synchronous machines and induction motors; basic principles of electric machine design. Students will be expected to demonstrate their level of understanding through laboratory work. Three lectures per week and 5 to 6 labs per semester. Pre-requisite: EE 335 & EE 336.

EE 481 Power Systems 3(2.5,1.5,0)

Basic Principles of power Systems; Generator and Transformer Models and the Per Unit System; Transmission Line Parameters; Line Model and Performance; Power Flow Analysis; Optimal Dispatch of Generation; Synchronous Machine Transient Analysis; Balanced Fault; Symmetrical Components and Imbalanced Fault; Stability; Power System Control. Five one-hour lectures and one three-hour lab every two weeks. Pre-requisites: EE 335 & EE 336.

EE 482 Power Electronics 3(2.5,1.5,0)

Power electronics devices analysis, simulation and control; AC to DC converters; DC to DC converters; AC to AC converters; DC to AC converters; DC Drives. 5 one-hour lectures and 1 three-hour lab every 2 weeks. Pre-requisites: EE335, EE 244 & EE 336.

EE 483 Modern Control Systems 3(3,0,0)

Control system analysis and design: Modern control; state-space equations; time-domain analysis and design; frequency-domain analysis and design; stability analysis; Controllability, Observability, observer design, intro to optimal control and LQR problem. Pre-requisite: EE 430, Math 215.

EE 484 Industrial Controls 3(2.5, 1.5,0)

Programmable Logic Controllers (PLCs), ladder logic programming, advanced PLC operation and related topics. Three one-hour lectures per week and 5 to 6 labs per semester. Pre-requisite: EE 429 & EE 231.

EE 485 Digital Control Systems 3(2.5,1.5,0)

Introduction to Discrete-Time Control Systems; The z Transform; z-Plane Analysis of Discrete-Time Systems; Design of Discrete-Time Control Systems by Conventional Methods; State Space Analysis; Pole Placement and Observer Design; Quadratic Optimal Control. Three lectures per week, and 5 to 6 labs per semester. Pre-requisite: EE 430 & EE 483.

EE 486 Digital Communication Systems 3(2.5,1.5,0)

Pulse-Code-Modulation (PCM) and M-ary modulation. Analysis of modulation, demodulation and detection of baseband and band-pass signals. Analysis of the parameters that affects binary signals and M-ary pulse waveforms such as error probability, additive white Gaussian noise (AWGN), inter-symbol interference, and distortion. Comparison between Amplitude, Frequency and Phase Shift-Keying modulations. Analysis of binary encoding formats. Three lectures per week and 5 to 6 labs per semester. Pre-requisite: EE 332 & EE 333.

EE 487 Communication Electronics 3(2.5,1.5,0)

Principles of electronic circuits used in the generation, transmission, and reception of signal waveforms; Nonlinearity and distortion; Review of single-transistor and differential stages; Harmonic, inter-modulation, and cross-modulation distortion; Power amplifier stages; Resonant circuits and transformers; Single-stage and multi-stage RF amplifiers; Neutralization. Impedance matching. Oscillator fundamentals. The Van Der Pol oscillator. Oscillator circuit types. Colpitts oscillators; Crystal oscillators; Relaxation oscillators; Mixers; AM and FM modulators and demodulators; Phase-locked loops. Three lectures per week and 5 to 6 labs per semester**.** Pre-requisite: EE 332 & EE 244 & EE 333.

EE 488 Wireless and Cellular Communications 3(2.5,1.5,0)

Integration of the fundamental concepts of wireless communication systems such as personal communication systems (PCS), cellular, wireless networks, call processing, frequency reuse, propagation loss, CDMA systems, methods of reducing fades, error correction techniques and multipath. Discussion of multiple access techniques such as: FDMA, TDMA and CDMA. Simulations of different modulation techniques using computer applications. Three lectures per week and 5 to 6 labs per semester. Pre-requisite: EE 486 & EE 333.

EE 489 Special Topics 3(3,0,0)

Topics determined by the course instructor in consultation the department chair. Three one-hour lecture periods per week. Pre-requisite: Dept. Approval.

EE 490 Undergraduate Research 3(3,0,0)

Individual research projects for students. Requires prior approval of, and arrangement with, a faculty research advisor. Three one-hour lecture periods per week. Pre-requisite: Department Approval.

EE 493 Optical Fiber Communication 3(3,0,0)

Fundamentals of light. Introduction to optical fibers. Step and graded index fibers, multi-modes and single mode fibers, transmission characteristics of fibers (attenuation, dispersion, polarization). Light sources and detectors, optical amplifiers and modulators. Introduction to photonic networks. Three one-hour lecture periods per week. Pre-requisite: EE 243 & EE 331

EE 495 Senior Design I 2(1,1,0)

This is the first course of a two-semester sequence of senior capstone design. It provides students with experience in the process and practice of electrical component/system design from concept through final design and implementation. Emphasis on teamwork, project management, testing through simulation or prototype and oral and written communications. Pre-requisites: EE335, Engr 307, Eng 137.

EE 496 Senior Design II 2(0,2,0)

This is the second course of a two-semester sequence of senior capstone design. It provides students with experience in the process and practice of an electrical component/system design from concept through final design and implementation. Emphasis is on teamwork, project management, testing through simulation or prototype, oral and written communications. Pre-requisite: EE 495.

Mechanical Engineering Department

Mechanical engineering is the discipline that applies engineering, physics, engineering mathematics, and materials science principles to design, analyze, manufacture, and maintain mechanical systems. It is one of the oldest and broadest of the engineering disciplines.

The mechanical engineering field requires an understanding of core areas including mechanics, dynamics, thermodynamics, materials science, structural analysis, and electricity. In addition to these core principles, mechanical engineers use tools such as computer-aided design (CAD), computer-aided manufacturing (CAM), and product life cycle management to design and analyze manufacturing plants, industrial equipment and machinery, heating and cooling systems, transport systems, aircraft, watercraft, robotics, medical devices, weapons, and others. It is the branch of engineering that involves the design, production, and operation of machinery.

The Department of Mechanical Engineering's in King Faisal University offers undergraduate program with emphasize on multidisciplinary approaches to solve complex engineering problems. Bringing together flexible and innovative curricula, world-class teaching and research facilities, as well as faculty members that are well-regarded internationally in their respective areas of research expertise; we equip our graduates to stay relevant in a globalised technology-based economy, able to embark on multiple career pathways.

What Mechanical Engineers do?

Mechanical engineers design and develop everything from door locks to space shuttles. In fact, think of anything that moves and you will find mechanical engineering in its design. Mechanical engineers work on power plants, renewable energy systems, electrical generators, robots, propulsion systems, computer systems, climate control systems, engine cooling, respiratory and air conditioning systems, aircraft engines and cars.

New areas of investigation include prosthetic limb and joint design, noise and vibration restriction, high performance composite materials development, flexible manufacturing, mechanical design automation and industrial pollution control.

As a mechanical engineer, you could find yourself working on the following activities:

- Design materials and structures to meet the demands of supersonic and hypersonic space travel
- Design electrical power plants with reactors, heat exchangers and other specialized components for the provision of nuclear energy
- Design robots and automatic control systems
- Work alongside medical professionals to design aids and instruments for medicine
- Work with trainers, coaches and athletes to design advanced sporting equipment
- Research mechanical and thermal design for modern computers and other electronic equipment.

Note from the Program Chair

It is established that Mechanical Engineering is the broadest and most versatile among all engineering disciplines and that no other program offers as comprehensive job opportunities as mechanical engineering. The Mechanical Engineering program at King Faisal University (KFU) has been since its inception a few years ago, working hard to achieve internationally recognized high quality academic standards. Our program is highly competitive and demanding and, as such, our teaching staff and students are among the most achieving of their peers. With only three batches of graduates so far, the feedback from our major employers has been so fulfilling and thrilling.

The mechanical engineering program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

Program Mission

The Mechanical Engineering program strives for providing quality services through close partnership with the community by demonstrating commitment to

- quality education that prepares graduates through a project-based learning with broad basic engineering knowledge to be professionals and to pursue postgraduate studies and research.
- quality research that leads to better solutions to mechanical engineering-related problems with emphasis on issues of national significance by working closely with industry and research centers.

Program Educational Objectives (PEOs):

The ME graduates are expected to attain the following program educational objectives within a few years of graduation:

PEO 1: Become technically competent engineers for a successful and productive career in the mechanical engineering profession.

PEO 2: Pursue graduate studies, research and design in mechanical engineering.

PEO 3: Demonstrate effective communication and teamwork skills in a diverse environment with an integrative perspective to solving mechanical engineering problems.

PEO 4: Engage in life-long learning for the purpose of continuous improvement.

Student Outcomes (SOs):

The graduates of the Mechanical Engineering Department, College of Engineering at King Faisal University are expected to demonstrate:

1. Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. Ability to communicate effectively with a range of audiences.
4. Ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. Ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. Ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Program Study Plan:

1 First Semester					
Course Code	**Course Title**	**CH**	**Required /Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Math 144	Calculus I	4	Required		Math and Basic Sciences
Phys 140	General Physics I	3	Required	C: Phys. 144 C: Math. 144	Math and Basic Sciences
Phys 144	General Physics I Lab	1	Required	C: Phys. 140	Math and Basic Sciences
Chem 140	General Chemistry I	3	Required		Math and Basic Sciences
Engr 100	Introduction to Engineering	1	Required		General Engineering
Engr 106	Engineering Graphics	2	Required		General Engineering
Eng 133	English Composition I	2	Required		General Education
Semester Credit Hours		**16**			
2 Second Semester					
Course Code	**Course Title**	**CH**	**Required /Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Math 145	Calculus II	4	Required	P: Math 144	Math and Basic Sciences
Phys 141	General Physics II	3	Required	P: Phys. 140 C: Phys. 145	Math and Basic Sciences
Phys 145	General Physics II Lab	1	Required	C: Phys. 141	Math and Basic Sciences
Chem 142	General Chemistry II	3	Required	P: Chem. 140 C: Chem. 143	Math and Basic Sciences
Chem 143	General Chemistry Lab	1	Required	C: Chem. 142	Math and Basic Sciences
Engr 105	Engineering Computing & Skills	2	Required	P: Engr. 100 C: Math 145	General Engineering
Eng 134	English Composition II	2	Required	P: Eng. 133	General Education
Eng 138	Fundamentals of Speech Communication	2	Required	C: Eng. 134	General Education
Semester Credit Hours		**18**			
3 Third Semester					
Course Code	**Course Title**	**CH**	**Required /Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Math 244	Multivariate Calculus	3	Required	P: Math. 145	Math and Basic Sciences
Math 246	Linear Algebra	3	Required	P: Math 145	Math and Basic Sciences
Engr. 201	Statics	3	Required	P: Phys. 140	General Engineering
Engr. 206	Electric Circuits	3	Required	P: Phys. 141	General Engineering
ME 102	Mechanical Drawing	1	Required	P: Engr. 106	Core Mechanical Engineering
SSC101	Islamic Creed & Con. Doct.	2	Required		General Education
Semester Credit Hours		**15**			
4 Fourth Semester					
Course Code	**Course Title**	**CH**	**Required /Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Math 240	Differential Equations	3	Required	P: Math. 145	Math and Basic Sciences
CS 204	Engineering Programming	3	Required	P: Math 144	General Engineering
Engr. 202	Strength of Materials	3	Required	P: Engr. 201	General Engineering
Engr. 203	Dynamics	3	Required	P: Engr. 201	General Engineering

ME 202	Thermodynamics I	3	Required	P: Chem. 140 P: Phys. 141 P: Math 145	Core Mechanical Engineering
ME 206	Measurements & Instrumentations	2	Required	P: Engr. 206 C: Eng. 137	Core Mechanical Engineering
Eng. 137	Technical Writing	2	Required	P: Eng. 134 P: Eng. 138	General Education
Semester Credit Hours		**19**			
5 Fifth Semester					
Course Code	**Course Title**	**CH**	**Required /Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Engr. 205	Materials Science	3	Required	P: Chem. 142	General Engineering
Engr. 209	Strength of Materials Lab	1	Required	P: Engr. 202	General Engineering
Engr. 309	Fluid Mechanics	3	Required	P: Engr. 203 P: Math 240	General Engineering
Engr. 310	Numerical Methods	3	Required	P: Math 240 P: Engr. 105 P: CS 204	Math and Basic Sciences
ME 203	Thermodynamics II	3	Required	P: ME 202	Core Mechanical Engineering
ME 331	Theory of Machines	3	Required	P: Engr. 203 P: Math 240	Core Mechanical Engineering
Semester Credit Hours		**16**			
6 Sixth Semester					
Course Code	**Course Title**	**CH**	**Required /Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Mgt. 292	Management Fundamentals & Skills	3	Required		General Education
Engr. 307	Engineering Economics	3	Required	P: Engr. 100	General Engineering
Engr. 312	Fluid Mechanics Lab	1	Required	P: Engr. 309	General Engineering
ME 204	Thermodynamics Lab	1	Required	P: ME 203 P: ME 206	Core Mechanical Engineering
ME 312	Mechanical Vibrations	3	Required	P: Engr. 203 P: Math 240 P: Math 246	Core Mechanical Engineering
ME 325	Heat Transfer	3	Required	P: Engr. 309 P: Engr. 310 P: Math 244	Core Mechanical Engineering
ME 332	Design of Machine Elements	3	Required	P: Engr. 205 P: Engr. 202 P: ME 331 P: ME 102	Core Mechanical Engineering
Semester Credit Hours		**17**			
Summer Semester					
Course Code	**Course Title**	**CH**	**Required /Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Engr. 399	Engineering Training	0	Required	P: Eng. 137	Core Mechanical Engineering
Semester Credit Hours		**0**			
7 Seventh Semester					
Course Code	**Course Title**	**CH**	**Required /Elective**	**Pre-& Co-requisite**	**Curriculum Category**
ME 333	System Dynamics	3	Required	P: ME 312	Core Mechanical Engineering
ME 425	Mechanical Systems Lab	1	Required	P: ME 325 P: ME 312	Core Mechanical Engineering
ME 460	Manufacturing Processes	3	Required	P: Engr. 205	Core Mechanical Engineering
ME 4xx	Technical Elective	3	Required		Mechanical Engineering Elective
ME 4xx	Technical Elective	3	Required		Mechanical Engineering Elective
ME 495	Senior Design I	2	Required	P: ME 325 P: ME 332 P: Engr. 307 C: ME 460	Core Mechanical Engineering
SSC102	Islamic Cultural Issues	2	Required		General Education
Semester Credit Hours		**17**			
8 Eighth Semester					
Course Code	**Course Title**	**CH**	**Required /Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Deic xxx Before Fall 2018	General Education Elective I	2	Required		University Elective
Deic xxx Before Fall 2018	General Education Elective II	2	Required		University Elective

SSC xxx After Fall 2018	General Education Elective I	2	Required		University Elective
SSC xxx After Fall 2018	General Education Elective II	2	Required		University Elective
ME 422	Air conditioning & Refrigeration Systems	3	Required	P: ME 203 P: ME 325	Core Mechanical Engineering
ME 441	Control Systems	3	Required	P: ME 333	Core Mechanical Engineering
ME 442	Mechatronics	3	Required	P: ME 206	Core Mechanical Engineering
ME 4xx	Technical Elective	3	Required		Mechanical Engineering Elective
ME 496	Senior Design II	2	Required	P: ME 495	Core Mechanical Engineering
Semester Credit Hours		**18**			
Total Credit Hours of the Program		**136**			

Department Technical Electives

Course Code	Course Title	CH	Required/Elective	Pre-& Co-requisite	Curriculum Category
ME 420	Design of Thermal Systems	3	Elective	P: ME 325 P: ME 203	Mechanical Engineering Elective
ME 421	Internal Combustion Engine	3	Elective	P: ME 325 P: ME 203	Mechanical Engineering Elective
ME 423	Renewable & Solar Energy	3	Elective	P: ME 325 P: ME 203	Mechanical Engineering Elective
ME 426	Energy Conversion	3	Elective	P: ME 325 P: ME 203	Mechanical Engineering Elective
ME 427	Turbo machinery	3	Elective	P: ME 325	Mechanical Engineering Elective
ME 430	Computer Aided Design	3	Elective	P: ME 332	Mechanical Engineering Elective
ME 431	Finite Element Methods	3	Elective	P: ME 332 P: ME 325	Mechanical Engineering Elective
ME 445	Robotics	3	Elective	P: Engr. 203 P: Engr. 310	Mechanical Engineering Elective
ME 467	Nanotechnology	3	Elective		Mechanical Engineering Elective
ME 481	Undergraduate Research I	3	Elective		Mechanical Engineering Elective
ME 482	Undergraduate Research II	3	Elective		Mechanical Engineering Elective
ME 484	Special Topics I	3	Elective		Mechanical Engineering Elective
ME 485	Special Topics II	3	Elective		Mechanical Engineering Elective

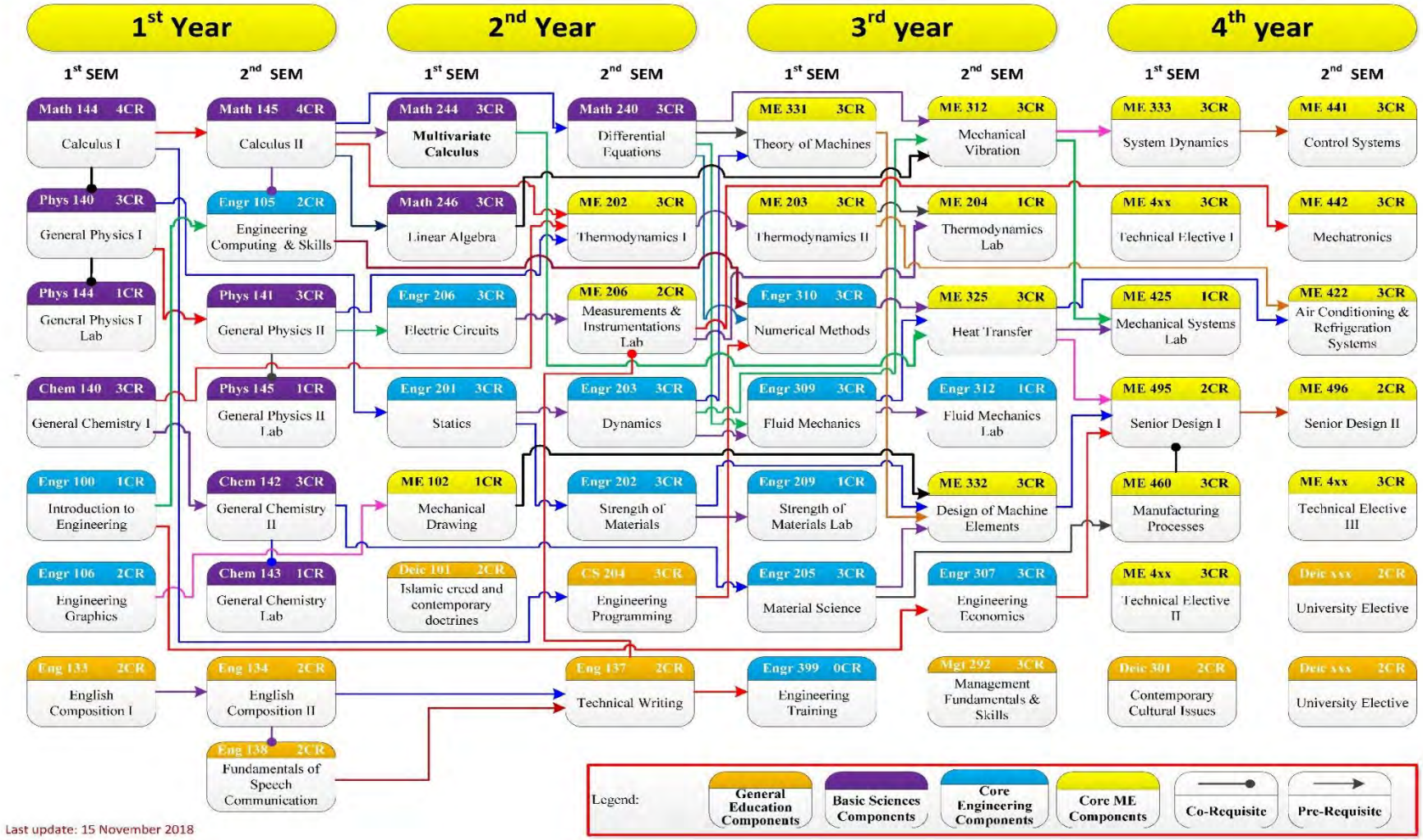
University Electives (Before Fall 2018/2019)

Course Code	Course Title	CH	Required/Elective	Pre-& Co-requisite	Curriculum Category
Deic 102	Fiqh Biography	2	Elective	None	University Elective
Deic 302	Islam and Science and Technology Issues	2	Elective	None	University Elective
Deic 317	Islamic Morals and Ethics	2	Elective	None	University Elective
Deic 318	Economic System in Islam	2	Elective	None	University Elective
Deic 401	Islamic Social System	2	Elective	None	University Elective
Deic 418	Political System and Human Rights in Islam	2	Elective	None	University Elective

University Courses (For Batch 2018 & above): From Supporting Studies Center

Course Code	Course Title	CH	Required/Elective	Pre-& Co-requisite	Curriculum Category
SSC101	Creed and doctrines	2	Required	None	General Education
SSC102	Islamic culture	2	Required	None	General Education
SSC103	Islamic Morals and Ethics	2	Elective	None	University Elective
SSC104	Studies in the Biography of the Prophet	2	Elective	None	University Elective
SSC105	Medical jurisprudence	2	Elective	None	University Elective
SSC106	Economics & Politics in Islam	2	Elective	None	University Elective
SSC107	Islamic Social & Family Behaviour	2	Elective	None	University Elective
SSC108	Management & Entrepreneurship	2	Elective	None	University Elective
SSC109	Health & Fitness	2	Elective	None	University Elective
SSC110	Research skills	2	Elective	None	University Elective
SSC111	Volunteer work	2	Elective	None	University Elective
SSC112	Medicine: Type and use	2	Elective	None	University Elective
SSC113	Human Rights in Islam	2	Elective	None	University Elective
SSC114	Food and Nutrition	2	Elective	None	University Elective

Mechanical Engineering Program



Last update: 15 November 2018

Courses Description (Catalog)

Math 144–Calculus I 4(4-0-0): This is an introductory course of mathematics for college of engineering students. The course covers the basic concepts and methods of calculus. At the beginning of the course the instructor will provide students the knowledge of the number systems, algebraic operations and functions of single variable with domain and range so that students can learn differentiation of the functions. The main topics to be covered in this course include: Limits, Continuity, Differentiation of functions of a single variable, Exponential, Logarithmic, Trigonometric, Inverse trigonometric functions, Applications of derivatives, Differentials, Curve Sketching, L'Hospital Rule, Mean value theorems, Area and estimating with finite sums, Introduction to integrals and definite integrals. Four 1-hour lectures per week. Co-requisite: None.

Phys 140–General Physics I 3(3-0-0): The course is an introduction to units, measurements, motion in one and two dimensions, kinematics and dynamics, Newton's laws, work and energy, rotational dynamics, linear and angular momentum, torque, and collisions. Basic calculus and multi-variable algebra will be used. Three 1-hour lectures per week. Co-requisite: Math 144 & Phys 144.

Phys 144–General Physics I Lab. 1(0-0-3): Measure basic constants such as length, weight and time, value of acceleration due to gravity. Design and conduct experiments in mechanics. Analyze and interpret experiment data. Write a scientific report. Draw and interpret a graph. Apply experimental principles and error calculations to mechanics. Three hours Lab. per week. Co-requisite: Phys 140.

Chem 140-General Chemistry I 3(3-0-0): Matter properties and measurement, Atoms and the Atomic Theory, Chemical Compounds, Chemical Reactions, Reactions in Aqueous Solutions, Liquids Solids and Intermolecular Forces, Electrons in Atoms, Periodic Table and Atomic Properties, Chemical Bonding, Valence-Bond, Hybridization of Atomic Orbital, Multiple Covalent Bonds, Molecular Orbital Theory, Liquids and Solids. Three 1-hour lectures per week. Co-requisite: None.

Engr 100-Introduction to Engineering 1(1-0-0): This course introduces engineering to students, particularly those who are interested in an engineering profession. It covers engineering ethics, teamwork, communication skills, engineering topics, and engineering problem solving skills and design methodology. One 1-hour lecture per week. Co-requisite: None.

Engr 106–Engineering Graphics 2(1-0-3): An introductory course in engineering graphics focuses on graphical communication. Topics include descriptive geometry elements, visualization, engineering drawing techniques, orthographic projection, pictorial representation, section views, and basic dimensioning. The course incorporates computer aided drafting (CAD) with engineering applications using 2-D drawing. This course is divided in to two sections: sketching and AutoCAD. The course begins by teaching the basics of engineering graphics using sketching. Freehand sketching using only a pencil and paper is an important skill for any engineer. It is a means of quickly conveying technical information to others. Through sketching the concepts of pictorial projections, section views, auxiliary views and dimensioning are taught. Once the foundation of engineering graphics is known, these concepts can be applied using computer aided design (CAD) software. AutoCAD is taught first. AutoCAD is a drawing software package used to create two dimensional engineering drawings. One 2-hours lecture per week. Co-requisite: None.

Eng 133–English Composition I 2(2-0-0): This is an intermediate level writing class. Students are guided through the stages of the writing process to write paragraphs that are both meaningful and organized and include a topic sentence with a controlling idea and conclusion. Students write multi-draft compositions from a variety of practical and academic purposes. They improve their writing by studying model sentences and paragraphs, basic sentence patterns, mechanics, coordinating conjunctions, transitions and vocabulary. Two 1-hour lectures per week. Co-requisite: None.

Math 145–Calculus II 4(4-0-0): This is an intermediate level calculus course designed for undergraduate Engineering students. This course covers mainly the integration and basic principles of Vectors and their applications. At the beginning of this course, the instructor will give the review of differentiation and integration. In depth, the students will learn the methods of integration and vectors. The topic covered include, Techniques of Integration, Improper Integration, Applications of Integration, Infinite Sequences and Series, (Power series and Taylor series), Polar coordinates, Transcendental Functions, Vectors, Vector Valued Functions. Four 1-hour lectures per week. Pre-requisite: Math 144.

Phys 141–General Physics II 3(3-0-0): This course introduces students to the physics of electricity and magnetism and the connections between them. The concepts of electric charge, electric field, electric potential, Kirchhoff Law, Gauss Law, electric and magnetic fluxes, capacitance, resistivity and resistance, connections in series and in parallel, RC-circuit, magnetic field, magnetic force, magnetic and electric torques, Ampere Law, electromagnetic induction, and Faraday Law and Lenz Law will be taught. Three 1-hour lectures per week. Pre-requisite: Phys 140. Co-requisite: Phys 145.

Phys 145–General Physics II Lab. 1(0-0-3): This course introduces students to the basic electrical measurements' techniques and to the physics of electricity and magnetism. The concepts of basic measurements, Resistors in series and in parallel, Verifying Ohm's law, Wheatstone Bridge, Verifying Kirchhoff's Laws, Resistivity, Capacitors in series and in parallel, RC circuit, Introduction to Oscilloscope, the Mechanical Equivalent of Heat, the Negative Temperature Coefficient of Resistance (Thermistor), Galvanometer, and the Magnetic Moment will be taught. Three hours Lab. per week. Co-requisite: Phys 141.

Chem 142-General Chemistry II 3(3-0-0): Properties of Gases: Kinetic-molecular theory of gases, Ideal gas law, Mixtures of gases, Thermo- chemistry, Principles of Chemical Equilibrium, Acids and Bases, Buffer Solutions, Neutralization Reactions and Titration Curves, Solubility and Complex-Ion Equilibria, Spontaneous Change: Entropy and Free Energy, Thermodynamic, Solutions and Their Physical Properties, Chemical Kinetics and Electrochemistry. Three 1-hour lectures per week. Pre-requisite: Chem 140. Co-requisite: Chem 143.

Chem 143–General Chemistry Lab. 1(0-0-3): Laboratory safety rules and Evaluation of analytical data, Definition and determination of density, explanation and determination of specific heat, concept of Acids, bases and Heat of Neutralization Reaction and its determination, reversible reactions, concept of equilibrium constant and its determination, LeChatelier principle and its verification, principle involved in Acid base titrations, indicators, Ionization of electrolytes, determination of dissociation constant of weak acid(Ka), principle involved in complex metric titrations, hardness of water and its determination. Three hours Lab. per week. Co-requisite: Chem 142.

Engr 105-Engineering Computing & Skills 2(2-0-0): Problem solving skills and computing using MATLAB. Two 1-hour lectures per week. Pre-requisite: Engr 100. Co-requisite: Math 145.

Eng 134–English Composition II 2(2,0,0): This English course is designed to take learners from the paragraph level of writing in English to the Essay level. It concentrates of the essential form and function of the essay and prepares the ground for the academic essay. Particular importance is given to tasks of description and argumentation, including work on comparison, definition, cause-effect and expression of opinion in essay writing. Thus, students are taken through the major stages of the essay composition process. Two 1-hour lectures per week. Pre-requisite: Eng 133.

Eng 138–Fundamentals of Speech Communication 2(2-0-0): A study of communication theories as applied to speech: practical communicative experiences ranging from interpersonal communication and small-group process through problem identification and solution in discussion, to informative and persuasive speaking in standard speaker-audience situations. One 2-hour lecture per week. Co-requisite: Eng 134.

Math 244–Multivariate Calculus 3(3-0-0): This course is an advanced course in calculus, designed for undergraduate students of engineering. The course covers the basic principles and methods of differentiation and integration of two or more variables. At the beginning of the course, the Instructor will give a review of functions of one variable and its differentiation and integration. Then, the functions of two or more variables with domain and range will be discussed. Throughout the course, the following main topics will be covered: solid analytic geometry; vector calculus; partial derivative; and multiple integrals. The coverage will also include relevant and important applications in the sciences and engineering. Three 1-hour lectures per week. Pre-requisite: Math 145.

Math 246–Linear Algebra 3(3-0-0): Linear transformations, finite dimensional vector spaces, matrices, determinants, systems of linear equations, and applications to areas such as linear programming. Markov chains and differential equations. Three 1-hour lectures per week. Pre-requisite: Math: 145.

Engr. 206–Electric Circuits 3(3-0-0): Resistors, capacitors, inductors, currents; voltages; power and energy; circuit analysis techniques; DC and AC analysis; magnetic circuits and transformers; Introduction to DC and AC machines. Three 1-hour lectures per week. Pre-requisite(s): Phys. 141.

Engr. 201-Statics 3(3-0-0): The subject of Statics deals with forces acting on rigid bodies at rest covering coplanar and non-coplanar forces, concurrent and non-concurrent forces, friction forces, hydrostatic forces, centroid and moments of inertia. Much time will be spent finding resultant forces for a variety of force systems, as well as analyzing forces acting on bodies to find the reacting forces supporting those bodies. This course also shows how to find the internal forces in structural elements and how to get the centroid and inertia for areas. Students will develop critical thinking skills necessary to formulate appropriate approaches to problem solutions. Three 1-hour lectures per week. Pre-requisite(s): Phys. 140.

ME 102-Mechanical Drawing 1(0-0-3): Computer-aided solid modeling concepts, Modeling 3D geometries using solid modeling techniques, Combination of solid modeling techniques to create complex parts, Assembly of 3D parts to form a machine or complete mechanical system, Generating multi-view engineering drawings for 3D parts or assemblies. 1-three hour drafting session per week. Pre-requisite(s): Engr. 106.

SSC 101-Islamic Creed and Contemporary Doctrines 2(2-0-0): Creed: definition, importance, sources, characteristics, study methodology, pillars of faith, influence of creed on individuals and society, belief nullifiers, thought constraints, study of some contemporary doctrines: secularism, Satan worshipers, Baha'ism, Zionism, Misoneism, Christian fundamentalism. Student is required to memorize part of the holy Quran. One 2-hour lecture per week. Pre-requisite(s): None.

Math 240–Differential Equations 3(3-0-0): This course is an introductory course of differential equations for college of engineering students. The course covers different methods and concepts to solve first and second order differential equations. At the beginning of the course we discuss some definitions and terminology about differential equations. Then we move to solving first and second order differential equations. The topics in this course include, linear differential equations, solving first order differential equations, solving second order differential equations, series solutions of second order linear differential equations, solving systems of linear differential equations, Laplace transform and its applications in solving differential equations. Three 1-hour lectures per week. Pre-requisite: Math 145.

Engr. 202–Strength of Materials 3(3-0-0): The course covers strength of materials in depth including the followings: Basic Concepts in Strength of Materials, Direct Stress, Strain, Axial Deformation and Thermal Stress, Torsion, Transverse Shearing Forces, Bending Moments in Beams and Stress Due to Bending, Shearing Stresses in Beams, Combined Stresses and Pressure Vessels, Stress Transformations, Deflection of Beams, Columns. Three 1-hour lectures per week. Pre-requisite(s): Engr. 201.

Engr. 203-Dynamics 3(3-0-0): Fundamentals of particle and rigid body dynamics. Kinematics and kinetics of a single particle and system of particles. Application of Newton's laws and energy and moment principles in solving problems involving particles or rigid bodies in planar motion. Introduction to kinetics of rigid bodies in three dimensions, angular acceleration, angular momentum, instantaneous centre, mechanical vibrations of simple spring-mass systems. Three 1-hour lectures per week. Pre-requisite(s): Engr. 201.

ME 202-Thermodynamics I 3(3-0-0): Thermodynamics concepts and definitions, states, properties, systems, control volume, processes, cycles, units, tables of properties, work and heat, first law, internal energy and enthalpy, conservation of mass, steady–state and uniform state processes, second law, reversible processes, entropy, Clausius inequality, principle of the increase of entropy, efficiencies, irreversibility and availability, power and refrigeration cycles. Three 1-hour lectures per week. Pre-requisite(s): Math 145 & Phys. 141 & Chem. 140.

ME 206-Measurements and Instrumentations 2(1-0-3): Introduction to measurement systems and experimental methods, basic concepts, calibration, dynamic response, analysis of experimental data, basic electrical measurements and sensing devices, displacement measurements, pressure measurement, flow measurement, temperature measurement, force, torque and strain measurements. Also, some experiments will be conducted. Three 1-hour lectures per week. Pre-requisite: Engr. 206. Co-requisite: Eng. 137.

CS 204–Engineering Programming 3(3-0-0): Introduction to computer systems; problem solving methodology; testing and debugging of programs; variables, declarations, and assignments; input and output; data types; control flow and looping; functions and overloading; streams and input/output; one-dimensional arrays; two-dimensional arrays; pointers and dynamic

arrays; structures; abstract data types and classes; inheritance; friends, overloaded operators, and arrays in classes; recursive functions.. Projects that will require lab work will be assigned weekly. Three 1-hour lectures per week. Prerequisite: Math 144.

Eng. 137-Technical Writing 2(2-0-0): This course introduces students to the fundamentals of writing, designing and conveying technical information to different audiences. Students will learn about technical writing conventions, such as organization, style and tone and illustration and layout as they work through the writing process to produce a variety of common technical documents that they will encounter in their academic work. Two 1-hour lectures per week. Two 1-hour lectures per week. Pre-requisite(s): Eng. 134 & Eng. 138.

Engr. 205-Material Science 3(3-0-0): Mechanical, electrical and chemical properties of engineering materials, fundamentals of crystallography, crystal defects, Impurities and imperfections in solids. Atomic diffusion. Single phase metals and alloys; elastic and plastic deformation, recrystallization and grain growth. Multi-phase materials; phase diagrams and equilibrium microstructural development, Heat treatment process, Studies of the widely-used engineering metals, alloys, polymers, composites & ceramics. Three 1-hour lectures per week. Pre-requisite(s): Chem. 142.

Engr. 209-Strength of Materials Lab 1(0-0-3): Strength of materials lab contains several equipment that can be utilized to introduce the most important concepts of materials and its ability to withstand external loads without failure which is the base of machine and components design. On the other hand, strength of material lab will support student information in materials and its properties and strength of materials and types of loadings and types of stresses induced in members due to this loading. The most important experiments in the field of strength of materials like tensile test, compression test, torsion test, Fatigue test, Hardness test, impact test, and creep test will be discussed. 1-three hour lab per week. Pre-requisite(s): Engr. 202.

Engr. 309-Fluid Mechanics 3(3-0-0): The course addresses flow classification, fluid properties, fluid in statics, pressure measurements, buoyancy, fluids in motion, continuity equation, pressure gradient in fluid flow, Bernoulli's, Reynold's transport theorem, momentum and energy equations, dimensional analysis and similitude, and an introduction to the hydrodynamic boundary layer. Three 1-hour lectures per week. Pre-requisite(s): Engr. 203 & Math 240.

Engr 310-Numerical Methods 3(3-0-0): Introduction to Numerical Methods, Solution of Nonlinear Equations, Solution of Simultaneous Linear Algebraic Equations, Solution of Matrix Eigenvalue Problem, Curve Fitting and Interpolation, Numerical Differentiation, Numerical Integration, Ordinary Differential Equations: Initial-Value Problems, Ordinary Differential Equations: Boundary-Value Problems. Three 1-hour lectures per week. Prerequisite: Math 240, CS 204 & Engr 105.

ME 203–Thermodynamics II 3(3-0-0): Basic laws and principles applications to gas power and refrigeration cycles, vapor and combined power cycles, mixtures of gases and vapors, psychrometry, chemical reactions, thermodynamic property relations, and exergy analysis. Three 1-hour lectures per week. Pre-requisite: ME 202.

ME 331-Theory of Machines 3(3-0-0): Theory of Machines & Mechanisms is a study of linear & angular displacements, velocities, accelerations of points & bodies, and the static and dynamic forces required for the proper design of mechanical linkages, cams systems. The course covers both static force analysis of mechanisms and dynamic analysis of linkages. Mechanisms and applications, vector method of analysis of plane mechanisms, mobility and linkages, cams, position, velocity and acceleration analysis in mechanisms. Static and dynamic balancing and balancing machines, flywheels, & reciprocating engines.. Three 1-hour lectures per week. Pre-requisite(s): Engr. 203 & Math. 240.

Engr. 312-Fluid Mechanics Lab 1(0-0-3): Conduct experiments to understand the basic concepts of fluid mechanics such as Hydrostatic Bench, Orifice and Jet Flow Apparatus, Bernoulli's Theorem Apparatus, Impact of Jet Apparatus, Piping Loss Test Panel, Open Circuit Wind Tunnel, Pump Test Set, Turbine Service Unit, Series/ Parallel Pumps, Variable Slope Channel. 1-three hour lab per week. Pre-requisite(s): Engr. 309.

ME 204-Thermodynamics Lab 1(0-0-3): The course covers a wide range of experiments related to thermodynamics concepts. First law of thermodynamics and some thermodynamic relations are investigated. Measure of some fuels properties like calorific value. Thermodynamics cycles will be investigated like Refrigeration, Rankine, Brayton, and Sterling cycle. Compression and expansion of air will be studied. The performance of the solar collector will be investigated. Many parameters will be measured in the internal combustion engines. 1-three hour lab per week. Pre-requisite(s): ME 203 & ME 206.

ME 312-Mechanical Vibrations 3(3-0-0): This course covers fundamentals of theory and analysis of mechanical vibrations, simple harmonic oscillator, complex phasor representation of harmonic motion, elements of a vibrating system, review of model formulation using Newton's laws and work-energy method, equivalent inertia, spring and damper for lumped parameter and continuous systems, natural frequency and damping ratio, undamped and viscous and dry friction damped free vibrations of SDOF oscillators, Rayleigh-Ritz method, static and dynamic stability vibration of mechanical systems, logarithmic decrement, response of SDOF oscillators to direct harmonic , rotating unbalance, base motion, periodic, transient l and non-periodic loads, vibration instrumentation and isolation. Free and forced vibrations of Two DOF systems. Lagrange's equation. Normal modes and principal coordinates, tuned vibration absorber, introduction to vibration of continuous systems, wave equation and Euler-Bernoulli beam bending vibrations. Three 1-hour lectures per week. Pre-requisite(s): Engr. 203, Math 240 & Math. 246.

ME 325-Heat Transfer 3(3-0-0): The course addresses the mechanism of heat transfer modes, introduction to conduction, thermal conductivity of solids, diffusion equation, heat transfer in fins & extended surfaces, multi-dimensional steady-state conduction, transient conduction, lumped capacitance method, introduction to convection, forced convection, natural convection, hydrodynamic & thermal boundary layers, forced convection external flow, heat exchangers, an introduction to basic radiation. Three 1-hour lectures per week. Pre-requisite(s): Engr. 309, Engr. 310 & Math. 244.

ME 332-Design of Machine Elements 3(3-0-0): Theory of Machines & Mechanisms is a study of linear & angular displacements, velocities, accelerations of points & bodies, and the static and dynamic forces required for the proper design of mechanical linkages, cams systems. The course covers both static force analysis of mechanisms and dynamic analysis of linkages. Mechanisms and applications, vector method of analysis of plane mechanisms, mobility and linkages, cams, position, velocity and acceleration analysis in mechanisms. Static and dynamic balancing and balancing machines, flywheels, & reciprocating engines. Three 1-hour lectures per week. Pre-requisite(s): Engr. 205, Engr. 202, ME 331, & ME 102.

Engr 307–Engineering Economics 3(3-0-0): The course covers the following topics: Engineering Economic Decisions; Understanding Financial Statements; Cost Concepts and Behaviors; Time is Money; Understanding Money and Its

Management; Principles of Investing; Present Worth Analysis; Annual Equivalent Worth Analysis; Rate of Return Analysis; Depreciation; Taxes; Break-Even Analysis, Cost Estimation; Developing Project Cash Flows; Inflation; Replacement Decisions. Three 1-hour lectures per week. Pre-requisite(s): Engr 100.

Mgt 292–Management Fundamentals & Skill 3(3-0-0): The course covers Management fundamentals & Skill, such as, Global Management - Change and Innovation - Appendix: Managing Entrepreneurial Ventures - Decision Making - Strategic Management - Module Planning Tools and Techniques - In class discussion: Ethics Dilemma - Operations Management - Marketing Management - E Business - Marketing Plan - Human Resource Management - Team Building - Foundations of Individual Behaviour - Communication. Three 1-hour lectures per week. Pre-requisite(s): None.

Engr 399-Engineering Training 0(0-0-0): All engineering students are required to undergo a comprehensive "Engineering Training Program" with a reputable and specialized industrial firm. The firm can be in or outside Saudi Arabia relevant to his major area of interest in engineering analysis, design, or construction. The main purpose of this summer training is to enhance the students' practical experience and career abilities. Also, it deepens their engineering knowledge acquired during their academic years in the field of practical experience in real-life engineering projects. Additionally, such a program improves the relationship between the College of Engineering and the governmental and private industrial firms. Also, it can provide the industry with well-trained professionals in the near future. The qualifying student should spend at least eight weeks in a governmental organization, a reputable industrial firm, or a research center that is involved with engineering activities. Two months of full time training. Pre-requisite: Eng. 137 & (Level 7 or above).

ME 333-System Dynamics 3(3-0-0): This course introduces students to basic theory and practices of formulation, simulation and analysis of approximate linear discrete mathematical models for mechanical, electrical, fluid, thermal and electromechanical systems, identification of elements of mechanical, electrical, fluid and thermal systems, elements constitutive relations and governing physical laws. Analytical solutions of first and second order systems, simulations using MATLAB and SIMULINK, Laplace Transforms applications, transfer function state space representations, and frequency response. Three 1-hour lectures per week. Pre-requisite(s): ME 312.

ME 425-Mechanical Systems Lab 1(0-0-3): The course covers experiments to understand some basic concepts of heat transfer, refrigeration systems, special humidity sensor and vibration module. and make students familiar as much as possible with the devices by getting readings, analyzing the results then comparing with the theoretical calculations for each experiment, and find the differences between the results of the experiments and the theoretical values, then trying to find the basic technical reasons of these differences. 1-three hour lab. per week. Pre-requisite(s): ME 312 & ME 325.

ME 460-Manufacturing Processes 3(3-0-0): Metal casting, forming and chip removal processes, cutting tools, cutting fluids, forces and power. Consumption. Investigation of conventional and non-conventional manufacturing processes Three 1-hour lectures per week. Pre-requisite(s): Engr 205.

ME 495-Senior Design I 2(2-0-0): Planning, design, construction and/or management of an engineering project that handles contemporary engineering problems under the supervision of one or more faculty members. The course allows the student to apply the knowledge attained from the various courses of the undergraduate program to prepare the proper approach of solution to his project problem. Two 1-hour lectures per week. Pre-requisite(s): Senior Standing, ME 332, ME 325 & Engr. 307. Co-requisite(s): ME 460.

SSC 102-Islamic Culture 2(2-0-0): Moderation, Islam globalism and human ties, discrimination and nationalism, Arabic as the medium of education and culture, science and religion, interfaith dialogue, Orientalism and Christianization, Colonialism, Westernization, modernity in literature, Globalization, Terrorism, Development of Moslem nations. One 2-hour lectures per week. Pre-requisite(s): None.

ME 422-Refrigeration & Air conditioning Systems 3(3-0-0): Review of psychometry. Air conditioning processes. Thermal comfort, inside and outside design conditions. Ventilation and infiltration. Heating load calculations. Cooling load calculations. Water heating systems layout and design. Air systems design. Refrigeration systems classification. Theoretical and actual vapor compression cycles. Description of different types of expansion valves. Refrigeration load calculations. Absorption chillers. Three 1-hour lectures per week. Pre-requisite(s): ME 203 & ME 325.

ME 441-Control Systems 3(3-0-0): This course introduces the basics of theory of analysis and design of linear feedback control systems, reviews of formulation of linear lumped parameters mathematical models of mechanical , electrical , fluid, thermal and combined systems, block diagrams and state space representations, poles and zeros of transfer function, Block diagram reduction, Mason's gain formula, solution of state equations and state transition matrix, 1st and 2nd order systems response specifications, time constants, overshoot, rise and settling times and steady state errors, Routh-Hurwitz stability criterion, system types and static error coefficients, PID control actions and lag-lead compensators frequency response function and Bode plots, Nyquist stability criterions, phase and gain margins, Root Locus design, simulation using MATLAB tool boxes. Three 1-hour lectures per week. Pre-requisite(s): ME 333.

ME 442-Mechatronics 3(3-0-0): The mechatronics course provides the student with a general overview of an integrated electro-mechanical system, which employs analog and/or digital electronics for sensing, actuation and control. Microprocessor based control systems are given special attention and are covered in detail. An important objective of the course is to demonstrate the integration of measurement systems, control, electronics, programming and mechanics in designing competitive systems. The practical assignments and the project work are designed to enhance planning and team skills. Three 1-hour lectures per week. Pre-requisite(s): ME 206.

ME 496- Senior Design II 2(2-0-0): Completion of Senior Design I in planning, design, construction and/or management of an engineering project that handles contemporary engineering problems under the supervision of one or more faculty members. Like ME 495 the course allows the student to apply the knowledge attained from the various courses of the undergraduate program to prepare the proper approach of solution and completion to his engineering project. Two 1-hour lectures per week. Pre-requisite(s): ME 495.

Deic 101- Islamic Creed & Contemporary Doctrines 2(2-0-0): Definition, importance, sources, characteristics, study methodology, pillars of faith, the influence of creed on individuals and society, belief nullifiers, thought constraints, Study of

some contemporary doctrines: secularism, Satan worshipers, Baha'ism, Zionism, Misoneism, Christian fundamentalism. One 2-hours lectures per week. Pre-requisite(s): None.

Deic 102-Islamic Morals and Ethics 2(2-0-0): Moderation, Islam globalism and human ties, discrimination and nationalism, Arabic as the medium of education and culture, science and religion, interfaith dialogue, Orientalism and Christianization, Colonialism, Westernization, modernity in literature, Globalization, Terrorism, Development of Moslem nations. One 2-hours lectures per week. Pre-requisite(s): None.

Deic 102-Fiqh Biography 2(2-0-0): Definition, importance, sources, characteristics, study methodology, pillars of faith, the influence of creed on individuals and society, belief nullifiers, thought constraints, Study of some contemporary doctrines: secularism, Satan worshipers, Baha'ism, Zionism, Misoneism, Christian fundamentalism. One 2-hours lectures per week. Pre-requisite(s): None.

Deic 302-Islam and Science and Technology Issues 2(2-0-0): Moderation, Islam globalism and human ties, discrimination and nationalism, Arabic as the medium of education and culture, science and religion, interfaith dialogue, Orientalism and Christianization, Colonialism, Westernization, modernity in literature, Globalization, Terrorism, Development of Moslem nations. One 2-hours lectures per week. Pre-requisite(s): None.

Deic 317-Islamic Morals and Ethics 2(2-0-0): Morals (Ethics: definition and foundations, characteristics, study of model samples of the Prophets' morals and ethics, tools of moral/ethical education in Islam. Concept of the profession and its importance in human life, constituents of professional morals/ethics and its constraints, model samples of professional morals/ethics in Islam. One 2-hours lectures per week. Pre-requisite(s): None.

Deic 318-Economic System in Islam 2(2-0-0): Islamic Economy: (its nature and principles, development, and characteristics), the economic problem and how to face it, contemporary economic systems (capitalism, socialism), economic globalism, World Bank and its goals, World Trade Organization and its goals, ownership in Islam: definition, types, constraints. Islam and economic freedom, Production, distribution, expenditure, economic policies in contracts and transactions. Student is required to memorize part of the holy Quran. One 2-hours lectures per week. Pre-requisite(s): None.

Deic 401- Islamic Social System 2(2-0-0): Society: definition, building blocks of society in Islam, Islamic society attributes, Family in Islam: definition, status, importance, building blocks, marriage and its purposes, spouses' rights, parents, siblings, and relatives' rights, women's status and rights in Islam, Family controversial issues about family system in Islam and responding to those issues (polygamy, inheritance, veil, divorce, etc.), Family problems and remedies (women's work, alimony, stewardship, etc.). Student is required to memorize part of the holy Quran. One 2-hours lectures per week. Pre-requisite(s): None.

Deic 418- Political System & Human Rights in Islam 2(2-0-0): Political system: definition, characteristics. Country building blocks: homeland, society, authority, goals, foundations, principles of ruling in Islam, ruler selection, ruler duties, state authority, rights of Moslems and non-Moslems in the Islamic state, Manifestations of implementing the political system in KSA: Governance statute, Shura, judiciary system, security, Hisbah. Human rights in Islam: definition, significance, sources, constraints, Basic rights: (equality, freedom, life, justice, safety), Universal/International Declaration of Human Rights and position of KSA from it. Students are required to memorize part of the holy Quran. One 2-hours lectures per week. Pre-requisite(s): None.

SSC 103-Islamic Morals and Ethics 2(2-0-0): Ethics: its definition, importance, swearing, and stature in Islam. Characteristics of Islamic morals. Moral obligation, moral responsibility, and moral sanction. Pictures of the manners of the Prophet Mohammed, peace and blessings be upon him. Pictures of the morals of his companions. Ethics and ethics of the profession. The Kingdom of Saudi Arabia's efforts in the field of protecting integrity and combating professional corruption, while mentioning ethical applications from Saudi professional systems. Introduction to the National Anti-Corruption Commission "integrity". The role of the National Anti-Corruption Commission "integrity" in protecting the integrity and combating professional corruption. One 2-hours lectures per week. Pre-requisite(s): None.

SSC 104- Studies in the Biography of the Prophet 2(2-0-0): The importance of studying the Prophet Mohammed's biography. A glimpse into Arab life before Islam: religious, moral, social, and political life. The scientific method in the study of the Prophet's biography. Stages of the Prophet's Biography and the values learned from them. The Characteristics of the Prophet. Prophetic merits: the characteristics of the Prophet, both moral and ethical. The role of the Kingdom of Saudi Arabia in serving the prophetic biography. The personal efforts of some scholars of the Kingdom of Saudi Arabia to defend the Sunnah of the Prophet. One 2-hours lectures per week. Pre-requisite(s): None.

SSC 105-Medial Jurisprudence 2(2-0-0): Medical jurisprudence. Treatment in Islamic law. Prophetic Medicine: preventive commandments, and treatment models. Examples of the scientific miracle of prophetic medicine. Legitimate Ruqyah and its evidence. Provisions of acts of worship related to the patient and the medical practitioner. Authorization and medical responsibility. Responsibility for a medical error. Applications of legal rules and intentions on medical provisions. Examples of contemporary medical issues: plastic surgery, fertilization outside the body, birth control and its regulation, milk bank, sperm freezing, miscarriage, gender determination, HIV/AIDS, organ and cell transplantation, resuscitation devices, and weight loss. One 2-hours lectures per week. Pre-requisite(s): None.

SSC 106-Economics & Politics in Islam 2(2-0-0): Political system: definition, and characteristics. Characteristics of the Islamic political system. The pillars of the state: the nation, and society. Manifestations of application of the political system in the Kingdom of Saudi Arabia. The Islamic economic system: definition, origin and development, importance, basics, and the characteristics of the economic system in Islam. Contemporary economic systems. Economic globalization. Property in Islam. Areas of intellectual property. Legitimate methods of ownership. Islam and economic freedom. Socioeconomic solidarity. One 2-hours lectures per week. Pre-requisite(s): None.

SSC 107-Islam Social & Family Behavior 2(2-0-0): The social system in Islam. Social security and its role in preserving society. The importance of the family in Islam. Family protection factors in Islam. The role of the family in achieving community security. The response to the most prominent suspicions raised about the family. The most important social problems and ways to prevent. A study of some contemporary issues in the social system. Development and its impact on social renaissance. The relationship between the individual and society in Islam and positive systems. Study of contemporary

issues related to women. The role of women towards their societies. The psychological characteristics of men and women, and their effect on family coexistence. One 2-hours lectures per week. Pre-requisite(s): None.

SSC 108-Management & Entrepreneurship 2(2-0-0): In the first part of this course, students from various disciplines will get acquainted with the most important basic concepts related to management and administrative decision, in addition to the most important traditional administrative functions of planning, organizing, directing and controlling, as well as what the knowledge and capabilities required by modern and future management come in the forefront of, Likewise leadership, participatory management, posterior leadership, technology management.

In the other part of this course, students will have a solid foundation on the concept of entrepreneurship, its strategies, and its role in developing the national economy through small-scale projects. In this part, students will learn how to discover opportunities, understand, evaluate, and then transform them into sustainable business. Each student will also be able to learn the features and characteristics of entrepreneurs and the difficulties associated with entrepreneurship. One 2-hours lectures per week. Pre-requisite(s): None.

SSC 109-Health & Fitness 2(2-0-0): What is health? Physical fitness. Textures. Healthy nutrition. Weight control. Infectious and non-infectious diseases. Smoking. Drug. First aid. Car Accidents. Psychological stress. One 2-hours lectures per week. Pre-requisite(s): None.

SSC 110-Research Skills 2(2-0-0): Research: concept, goals, fields, types, and steps. Research Methods: Descriptive Approach, Experimental Approach, and Historical Approach. Elements of a scientific research plan: Introduction, its problem; Its goals, importance, assumptions, and questions. Review of previous studies: How to critically analyze previous studies. Research hypotheses: definition, types, and formulation. References: books, periodicals, scientific theses, bulletins, and manuscripts. How to obtain information from global databases, and the skills of using the library electronically. Methods for writing references and quotations. Samples: their types and methods of selection. Research tools: (questionnaire - interview - observation - tests and measurements) and checking their suitability for the application. Scientific writing for research (abstract in Arabic and foreign languages - introduction - discussion - conclusion). Research ethics: Scientific honesty in quoting and avoiding scientific plagiarism. One 2-hours lectures per week. Pre-requisite(s): None.

SSC 111-Volunteer Work 2(2-0-0): The concept of volunteering from a social perspective. The importance, fields, and sources of volunteer work. Voluntary work in Islam. Volunteering in international and Arabic legislations. Theoretical foundations for volunteer efforts. Obstacles to volunteer, with a statement of volunteering culture and the ethics of volunteering in Saudi society. Management and organizations of volunteer work (administrative organization of charitable societies and social institutions in the Kingdom of Saudi Arabia). Evaluating the reality of volunteer work in society, with an indication of the relationship between civil and governmental social bodies. Voluntary work and its relationship to community security. Examples of voluntary work organizations at the Arabic level in general and the Kingdom of Saudi Arabia in particular. Voluntary field exercise for four weeks. Reviewing and evaluating the student's voluntary experience. One 2-hours lectures per week. Pre-requisite(s): None.

SSC 112-Medicine: type & use 2(2-0-0): The main objective of this course is to introduce students to medicine and its various types and forms. This course also aims to provide the student with some special skills for optimal interaction with some common types of drugs such as antibiotics and medications in some famous physiological situations such as pregnancy, lactation, and some chronic diseases. This approach deals with describing known drug interactions, especially when using medicines with some types of foods, herbs, and nutritional supplements. One 2-hours lectures per week. Pre-requisite(s): None.

SSC 113-Human Rights in Islam 2(2-0-0): Human rights: definition and importance. The basic premises of human rights. Principles of human rights in Islam, philosophy, and thought. The history of human rights. The Universal Declaration of Human Rights: legal value and criticism. Islamic Declaration of Human Rights, the Kingdom of Saudi Arabia's concern for human rights. The legal framework for human rights in the Kingdom. Basic human rights: the right to life, the right to justice, the right to freedom, the right to religion, and the right to work. One 2-hours lectures per week. Pre-requisite(s): None.

SSC 114-Food & Nutrition: type & use 2(2-0-0): Introduction to food science and nutrition. Food and nutritional terminologies. The global food security problem. Fields of the food industry in the Kingdom. Main food groups (dairy - meat - vegetables and fruits - grains). Nutrients (food ingredients): moisture, carbohydrates (starch) sugars, dietary fiber, proteins, oils and fats, vitamins, and minerals. Food additive. Food corruption, and the authorities concerned with food control in the Kingdom. Methods of food preservation: drying, packaging, cooling, and freezing. Nutrition and its importance for the human body. Food physiology. Daily needs of nutrients. Nutrition and general health of the body. Nutritional status sections. An example of obese malnutrition diseases. Dietary energy, production, and use in the body - the body's energy needs. One 2-hours lectures per week. Pre-requisite(s): None.

ME 420-Design of Thermal Systems 3(3-0-0): Designing of a workable thermal system, modelling of thermal equipment, system simulation and optimization, thermodynamic properties and steady-state simulation of large systems. Thermal systems and other related topics in the Saudi Arabian industry. Three 1-hour lectures per week. Pre-requisite(s): ME 203 & ME 325.

ME 421-Internal Combustion Engines 3(3-0-0): Engine classifications and terminology. Engine operating characteristics and performance parameters. Air standard engine cycles including: Otto, Diesel, Dual and two-stroke cycles. Common fuels used in IC engines, combustion reactions and the associated thermochemical calculations. Engine emissions and their control technologies and strategies. Air and fuel induction methods and technologies, the physics of the combustion phenomena. Friction losses, lubricants and lubrication systems. Three 1-hour lectures per week. Pre-requisite(s): ME 203 & ME 325.

ME 423-Renewable & Solar energy 3(3-0-0): Introduction to energy use and renewable energy sources, Non-conventional energy sources such as nuclear, hydrogen, renewable: solar, wind, wave, fuel-cell and advanced energy systems. Three 1-hour lectures per week. Pre-requisite(s): ME 203 & ME 325.

ME 426-Energy Conversion 3(3-0-0): Energy classification, sources and utilization, energy growth and economics, fossil fuels, combustion, power plants and steam generators, boiler's performance, pollution, energy conversion systems and energy storage. Three 1-hour lectures per week. Pre-requisite(s): ME 203 & ME 325.

ME 427-Turbo machinery 3(3-0-0): Turbo machinery classifications and terminology. Implementation of dimensional analysis for predicting performance of turbo machines and designing engineering systems. Understand the fundamentals of

energy transfer between rotating rotors and fluid flow. Demonstrate the ability to construct velocity diagrams for various turbo machines (axial-flow compressors and turbines, radial-flow compressors and turbines, pumps, fans, blowers, hydraulic turbines) and their relation to design. Perform elementary analysis for determining input/output work of various turbo devices. Turbo machinery emissions and their control technologies and strategies. Design and selection of turbo machines for various engineering applications. Three 1-hour lectures per week. Pre-requisite(s): ME 325.

ME 430- Computer Aided Design 3(3-0-0): This is a senior-level mechanical engineering course. It exploits the general experience that the students have accumulated throughout the course of their studies. It also introduces students to the analytical basis to CAD software and the three main ways to represent an entity, namely wireframe, surface and solid modelling. The course can be broken down into three main stages. The first stage of the course aims at introducing the concept and importance of CAD as part of the design process. The second stage focuses on mathematical representation and manipulation of geometrical entities. The final stage discusses current applications of CAD in academic and industrial fields, especially ones related to the instructor's field of expertise. Three 1-hour lectures per week. Pre-requisite(s): ME 332.

ME 431–Finite Element Methods 3(3-0-0): Definitions and simple finite element formulation, truss, beam, quadrilateral elements, modelling principles and mesh specification, some computer applications in mechanical engineering. Familiarities with windows operating system are essential. Knowledge of numerical methods is strongly recommended. Three 1-hour lectures per week. Pre-requisite(s): ME 332 & ME 325.

ME 445-Robotics 3(3-0-0): Kinematics modelling and simulation of various robot manipulators, rotation matrix, direct/inverse kinematics and dynamics modelling of robotic systems. Introduction to motion control systems, different control schemes and comparison, stability analysis, joint/configuration spaces; interaction control, impedance/compliance/force control, trajectory planning and control, actuators and sensors for robotics applications. Three 1-hour lectures per week. Pre-requisite(s): Engr. 203 & Engr. 310.

ME 467-Nanotechnology 3(3-0-0): Nanotechnology is a course that deals with Nano-materials, which is an interdisciplinary introduction to processing, structure, and properties of materials at the Nano-meter length scale. The course will cover recent breakthroughs and assess the impact of this promising field. Specific nanofabrication topics include epitaxy, beam lithography, self-assembly, bio-catalytic synthesis, atom optics, and scanning probe lithography. The unique size-dependent properties (mechanical, thermal, chemical, optical, electronic, and magnetic) that result from nanoscale structure will be explored in the context of technological applications including computation, magnetic storage, sensors & actuators. Three lectures per week. Pre-requisite(s): Senior Standing.

ME 481-Undergraduate Research I 3(3-0-0): This course is designed to enhance an undergraduate curriculum in mechanical engineering by providing students with the opportunity to engage in research activities. Requires progress reports and a comprehensive written report. Three 1-hour lectures per week. Pre-requisite(s): Senior Standing.

ME 482-Undergraduate Research II 3(3-0-0): This course is designed to enhance an undergraduate curriculum in mechanical engineering by providing students with the opportunity to engage in research activities. Requires progress reports and a comprehensive written report. Three 1-hour lectures per week. Pre-requisite(s): Senior Standing.

ME 484-Special Topics I 3(3-0-0): The course covers special topics in an area of mechanical engineering. Given on demand. Three 1-hour lectures per week. Pre-requisite(s): Senior Standing.

ME 485-Special Topics II 3(3-0-0): The course covers special topics in an area of mechanical engineering. Given on demand. Three 1-hour lectures per week. Pre-requisite(s): Senior Standing.

Biomedical Engineering Department

Note from the Program Chair

Welcome to the Biomedical Engineering (BME) department at King Faisal University (KFU). During the last two decades, biomedical engineering has been rapidly growing with the increasing demand to biomedical engineers. This branch of engineering is an interdisciplinary field that applies the concepts of engineering and technology to solve medical and biological problems and to improve the performance of healthcare communities. The biomedical industry and healthcare organization are continuously seeking highly qualified biomedical engineers. Upon that significant demand to biomedical engineers, KFU launched the BME department in 1435 H (2014 AD) to offer a bachelor's degree in BME for female students. The number of students admitted to BME program is multiplied year after the other which enforces the college of engineering board to continuously improve the department and keep in line with higher education quality standards. The department is currently well-equipped with recent labs and other teaching facilities. Also, highly qualified faculty members are happy to teach excellent students in our department and guide them to get started in their careers after graduation. As a part of KFU, BME department is very keen to contribute verifying the KFU vision. Our department aims to be one of the leading BME departments locally and internationally through distinct KFU-graduated BM engineers and planned researchers. The BME department at KFU is currently adding research facilities and planning to offer a master's degree in biomedical engineering next years.

Program Description

The bachelor program of BME at KFU is 136 credit hours distributed over basic, engineering and humantic courses with focusing on the learning outcomes of biomedical equipment

courses. So, the curriculum starts from basic courses in physics, math and chemistry and proceed through electrical and electronic engineering courses. Basic courses from medicine, especially in anatomy and physiology, are offered to provide students with the medical background required to finally study the BME professional courses related to medical devices, medical imaging systems and clinical engineering. Also, this curriculum offers other courses in mechanical and computational engineering, materials, and molecular biology that are required in analyzing medical problems and providing appropriate biomedical engineering solutions. A number of elective courses are also offered in different tracks of biomedical engineering. From these elective courses, students can select an extra track to study such as prosthetic device and artificial limbs, medical informatics, and ICT in medicine and bionanomems.

Program Mission

The Department of Biomedical Engineering is committed to improving healthcare technology outcomes and offering quality community services by:

- Providing quality education of biomedical engineering through project-based and problem-solving teaching and learning.
- Producing research that leads to better solutions to biomedical engineering-related problems with emphasis on issues of national significance by working closely with industry and research centers.

Program Educational Objectives (PEOs):

The BME graduates are expected to attain the following program educational objectives within a few years of graduation:

PEO 1: Become technically competent biomedical engineers.
PEO 2: Demonstrate effective leadership skills in a diverse environment.
PEO 3: Engage in life-long learning for the purpose of professional development.
PEO 4: Pursue graduate studies and research in biomedical engineering.

Student Outcomes (SOs):

The graduates of the Biomedical Engineering Department, College of Engineering at King Faisal University are expected to demonstrate:

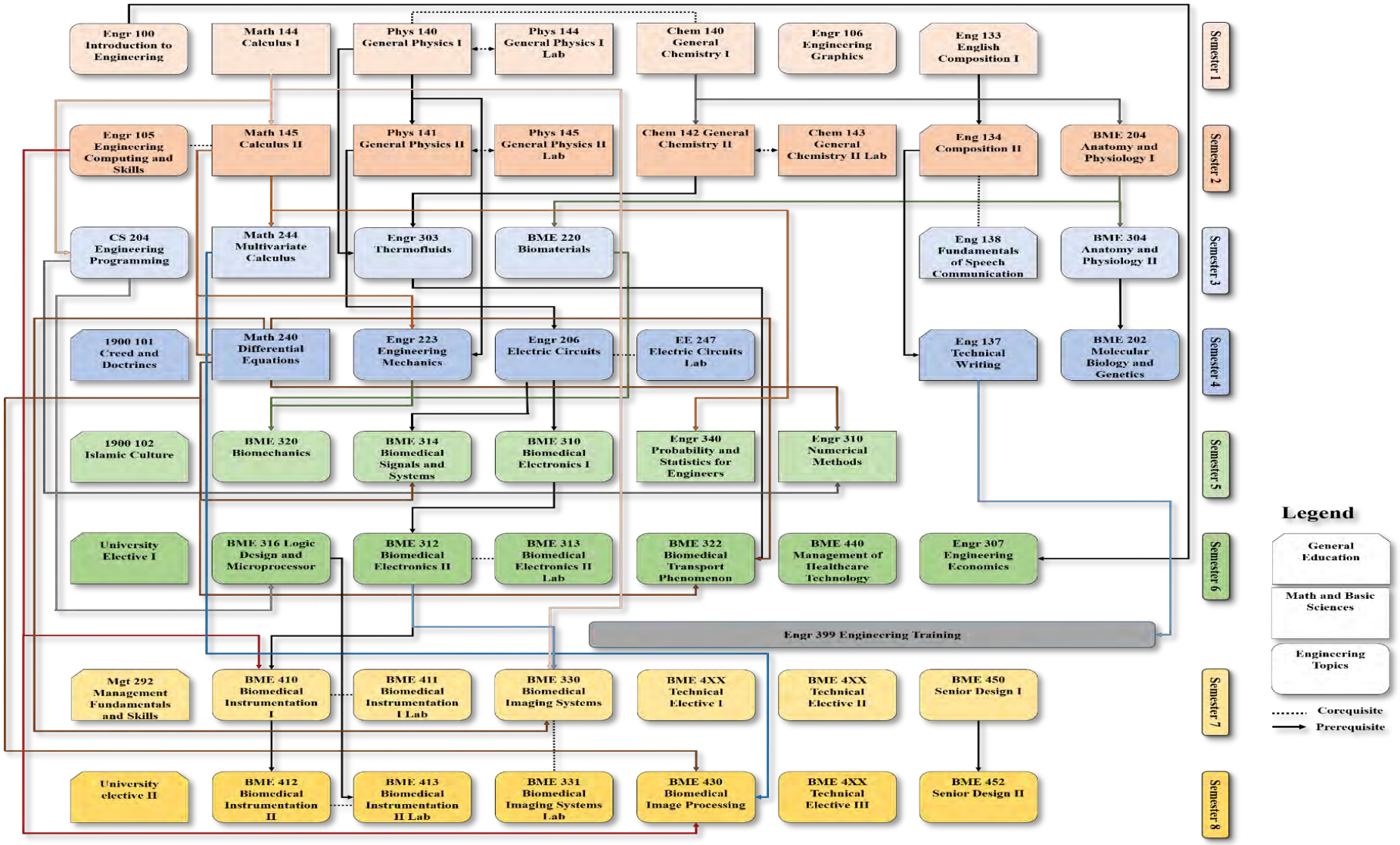
1. Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. Ability to communicate effectively with a range of audiences.
4. Ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. Ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. Ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Program Study Plan

① First Semester					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Math 144	Calculus I	4	Required	None	Math
Chem 140	General Chemistry I	3	Required	None	Basic Science
ENG 133	English Composition I	2	Required	None	General Education
Engr 100	Introduction to Engineering	1	Required	None	Engineering Topics
Engr 106	Engineering Graphics	2	Required	None	Engineering Topics
Phys 140	General Physics I	3	Required	C: Math 144 & Phys 144	Basic Science
Phys 144	General Physics I Lab	1	Required	C: Phys 140	Basic Science
Semester Credit Hours		**16**			
② Second Semester					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Engr 105	Engineering Computing & Skills	2	Required	C: Math 145	Engineering Topics
Math 145	Calculus II	4	Required	P: Math 144	Math
BME 204	Anatomy and Physiology l	3	Required	P: Chem 140	Engineering Topics
Chem 142	General Chemistry II	3	Required	P: Chem 140 & C: Chem 143	Basic Science
ENG 134	English Composition II	2	Required	P: Eng 133	General Education
Chem 143	General Chemistry Lab	1	Required	C: Chem 142	Basic Science
Phys 141	General Physics II	3	Required	P: Phys 140 & C: Phys 145	Basic Science
Phys 145	General Physics II Lab	1	Required	C: Phys 141	Basic Science
Semester Credit Hours		**19**			
③ Third Semester					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
BME 304	Anatomy and Physiology ll	3	Required	P: BME 204	Engineering Topics
BME 220	Biomaterials	3	Required	P: BME 204	Engineering Topics
CS 204	Engineering Programming	3	Required	P: Math 144	Engineering Topics
Engr 303	Thermofluids	3	Required	P: Phys 140 & Chem 142	Engineering Topics
Math 244	Multivariate Calculus	3	Required	P: Math 145	Math
Eng 138	Fundamentals of Speech Communication	2	Required	C: Eng 134	General Education
Semester Credit Hours		**17**			
④ Fourth Semester					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Eng 137	Technical Writing	2	Required	P: Eng 134	General Education
Math 240	Differential Equations	3	Required	P: Math 145	Math
BME 202	Molecular Biology and Genetics	3	Required	P: BME 304	Engineering Topics
Engr 206	Electric Circuits	3	Required	P: Phys 141	Engineering Topics
EE 247	Electric Circuits Lab	1	Required	C: Engr 206	Engineering Topics
Engr 223	Engineering Mechanics	3	Required	P: Math 145 & Phys 140	Engineering Topics
SSC 101	Creed and doctrines	2	Required	None	General Education
Semester Credit Hours		**17**			
⑤ Fifth Semester					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
BME 320	Biomechanics	3	Required	P: Engr 223 & BME 220	Engineering Topics
BME 310	Biomedical Electronics l	3	Required	P: Engr 206	Engineering Topics
BME 314	Biomedical Signals and Systems	3	Required	P: Math 240 & Engr 206	Engineering Topics
Engr 340	Probability & Statistics for Engineers	3	Required	P: Math 145	Math

Engr 310	Numerical Methods	3	Required	P: Math 240 & CS 204	Math
SSC 102	Islamic culture	2	Required	None	General Education
Semester Credit Hours		**17**			
⑥ Sixth Semester					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
SSC xxx	University Elective	2	Elective	None	General Education
Engr 307	Engineering Economics	3	Required	P: Engr 100	Engineering Topics
BME 312	Biomedical Electronics ll	3	Required	P: BME 310	Engineering Topics
BME 313	Biomedical Electronics Lab	1	Required	C: BME 312	Engineering Topics
BME 322	Biomedical Transport Phenomena	3	Required	P: Engr 303 & Math 240	Engineering Topics
BME 440	Management of Healthcare Technology	3	Required	P: Level six or above	General Education
BME 316	Logic Design and Microprocessors for BME	3	Required	P: CS 204	Engineering Topics
Semester Credit Hours		**18**			
Summer Semester					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
Engr 399	Engineering Training	0	Required	P: Level seven or above & Eng 137	
Semester Credit Hours		**0**			
⑦ Seventh Semester					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
BME 410	Biomedical Instrumentation l	3	Required	P: Engr 105 & BME 312	Engineering Topics
BME 411	Biomedical Instrumentation l Lab	1	Required	C: BME 410	Engineering Topics
BME 330	Biomedical Imaging Systems	3	Required	P: Phys 141 & Math 240 & BME 312	Engineering Topics
BME 450	Senior Design I	2	Required	P: Level 7 or above	Engineering Topics
BME 4xx	Technical Elective	3	Elective		Engineering Topics
BME 4xx	Technical Elective	3	Elective		Engineering Topics
Mgt 292	Management Fundamentals & Skills	3	Required	None	General Education
Semester Credit Hours		**18**			
⑧ Eighth Semester					
Course Code	**Course Title**	**CH**	**Required/Elective**	**Pre-& Co-requisite**	**Curriculum Category**
BME 4xx	Technical Elective	3	Elective		Engineering Topics
BME 412	Biomedical Instrumentation ll	3	Required	P: BME 410	Engineering Topics
BME 413	Biomedical Instrumentation ll Lab	1	Required	P: BME 316 & C: BME 412	Engineering Topics
BME 452	Senior Design II	2	Required	P: BME 450	Engineering Topics
BME 430	Biomedical Image Processing	2	Required	P: Engr -105 Math 240 & Math 244	Engineering Topics
BME 331	Biomedical Imaging Systems Lab	1	Required	C: BME 330	Engineering Topics
SSC xxx	University Elective	2	Required	None	General Education
Semester Credit Hours		**14**			
Total Credit Hours of the Program		**136**			

BME Curriculum



Courses Description (Catalog)

General Education

Eng 133–English Composition I 2(2-0-0): This is an intermediate level writing class. Students are guided through the stages of the writing process to write paragraphs that are both meaningful and organized and include a topic sentence with a controlling idea and conclusion. Students write multi-draft compositions from a variety of practical and academic purposes. They improve their writing by studying model sentences and paragraphs, basic sentence patterns, mechanics, coordinating conjunctions, transitions and vocabulary. Two 1-hour lectures per week. Pre-requisite: None.

Eng 134–English Composition II 2(2,0,0): This English course is designed to take learners from the paragraph level of writing in English to the Essay level. It concentrates of the essential form and function of the essay and prepares the ground for the academic essay. Particular importance is given to tasks of description and argumentation, including work on comparison, definition, cause-effect and expression of opinion in essay writing. Thus, students are taken through the major stages of the essay composition process. Two 1-hour lectures per week. Pre-requisite: Eng 133.

Eng 137–Technical Writing 2(2-0-0): This course introduces students to the fundamentals of writing, designing and conveying technical information to different audiences. Students will learn about technical writing conventions, such as organization, style and tone and illustration and layout as they work through the writing process to produce a variety of common technical documents that they will encounter in their academic work. Two 1-hour lectures per week. Pre-requisite: Eng 134.

Eng 138–Fundamentals of Speech Communication 2(2-0-0): A study of communication theories as applied to speech: practical communicative experiences ranging from interpersonal communication and small-group process through problem identification and solution in discussion, to informative and persuasive speaking in standard speaker-audience situations. One 2-hours lectures per week. Co-requisite: Eng 134.

Mgt 292–Management Fundamentals & Skill 3(3-0-0): The course covers Management fundamentals & Skill, such as, Global Management - Change and Innovation - Appendix: Managing Entrepreneurial Ventures - Decision Making - Strategic Management - Module Planning Tools and Techniques - In class discussion: Ethics Dilemma - Operations Management - Marketing Management - E Business - Marketing Plan - Human Resource Management - Team Building - Foundations of Individual Behaviour - Communication. Three 1-hour lectures per week. Pre-requisite(s): None.

SSC 101-Islamic Creed and Contemporary Doctrines 2(2-0-0): Creed: definition, importance, sources, characteristics, study methodology, pillars of faith, influence of creed on individuals and society, belief nullifiers, thought constraints, study of some contemporary doctrines: secularism, Satan worshipers, Baha'ism, Zionism, Misoneism, Christian fundamentalism. Student is required to memorize part of the holy Quran. One 2-hours lectures per week. Pre-requisite(s): None.

Deic 317-Islamic Morals and Ethics 2(2-0-0): Morals (Ethics: definition and foundations, characteristics, study of model samples of the Prophets' morals and ethics, tools of moral/ethical education in Islam. Concept of profession and its importance in human life, constituents of professional morals/ethics and its constraints, model samples of professional morals/ethics in Islam. Student is required to memorize part of the holy Quran. One 2-hours lectures per week. Pre-requisite(s): None.

Deic 318-Economic System in Islam 2(2-0-0): Islamic Economy: (its nature and principles, development, and characteristics), the economic problem and how to face it, contemporary economic systems (capitalism, socialism), economic globalism, World Bank and its goals, World Trade Organization and its goals, ownership in Islam: definition, types, constraints. Islam and economic freedom, Production, distribution, expenditure, economic policies in contracts and transactions. Student is required to memorize part of the holy Quran. One 2-hours lectures per week. Pre-requisite(s): None.

Deic 401- Islamic Social System 2(2-0-0): Society: definition, building blocks of society in Islam, Islamic society attributes, Family in Islam: definition, status, importance, building blocks, marriage and its purposes, spouses' rights, parents, siblings, and relatives' rights, women's status and rights in Islam, Family controversial issues about family system in Islam and responding to those issues (polygamy, inheritance, veil, divorce, etc.), Family problems and remedies (women's work, alimony, stewardship, etc.). Student is required to memorize part of the holy Quran. One 2-hours lectures per week. Pre-requisite(s): None.

SSC 102-Contemporary Cultural Issues 2(2-0-0): Moderation, Islam globalism and human ties, discrimination and nationalism, Arabic as the medium of education and culture, science and religion, interfaith dialogue, Orientalism and Christianization, Colonialism, Westernization, modernity in literature, Globalization, Terrorism, Development of Moslem nations. One 2-hour lectures per week. Pre-requisite(s): None.

Math and Basic Sciences

Math 144–Calculus I 4(4-0-0): This is an introductory course of mathematics for college of engineering students. The course covers the basic concepts and methods of calculus. At the beginning of the course the instructor will provide students the knowledge of the number systems, algebraic operations and functions of single variable with domain and range so that students can learn differentiation of the functions. The main topics to be covered in this course include: Limits, Continuity, Differentiation of functions of a single variable, Exponential, Logarithmic, Trigonometric, Inverse trigonometric functions, Applications of derivatives, Differentials, Curve Sketching, L'Hospital Rule, Mean value theorems, Area and estimating with finite sums, Introduction to integrals and definite integrals. Four 1-hour lectures per week. Pre-requisite: None.

Math 145–Calculus II 4(4-0-0): This is an intermediate level calculus course designed for undergraduate Engineering students. This course covers mainly the integration and basic principles of Vectors and their applications. At the beginning of this course, the instructor will give the review of differentiation and integration. In depth, the students will learn the methods of integration and vectors. The topic covered include, Techniques of Integration, Improper Integration, Applications of Integration, Infinite Sequences and Series, (Power series and Taylor series), Polar coordinates, Transcendental Functions, Vectors, Vector Valued Functions. Four 1-hour lectures per week. Pre-requisite: Math 144.

Math 240–Differential Equations 3(3-0-0): This course is an introductory course of differential equations for college of engineering students. The course covers different methods and concepts to solve first and second order differential equations. At the beginning of the course we discuss some definitions and terminology about differential equations. Then we move to solving first and second order differential equations. The topics in this course include, linear differential equations, solving

first order differential equations, solving second order differential equations, series solutions of second order linear differential equations, solving systems of linear differential equations, Laplace transform and its applications in solving differential equations. Three 1-hour lectures per week. Pre-requisite: Math 145.

Math 244–Multivariate Calculus 3(3-0-0): This course is an advanced course in calculus, designed for undergraduate students of engineering. The course covers the basic principles and methods of differentiation and integration of two or more variables. At the beginning of the course, the Instructor will give a review of functions of one variable and its differentiation and integration. Then, the functions of two or more variables with domain and range will be discussed. Throughout the course, the following main topics will be covered: solid analytic geometry; vector calculus; partial derivative; and multiple integrals. The coverage will also include relevant and important applications in the sciences and engineering. Three 1-hour lectures per week. Pre-requisite: Math 145.

Phys 140–General Physics I 3(3-0-0): The course is an introduction to units, measurements, motion in one and two dimensions, kinematics and dynamics, Newton's laws, work and energy, rotational dynamics, linear and angular momentum, torque, and collisions. Basic calculus and multi-variable algebra will be used. Three 1-hour lectures per week. Co-requisite: Math 144 & Phys 144.

Phys 144–General Physics I Lab. 1(0-0-3): Measure basic constants such as length, weight and time, value of acceleration due to gravity. Design and conduct experiments in mechanics. Analyze and interpret experiment data. Write a scientific report. Draw and interpret a graph. Apply experimental principles and error calculations to mechanics. Three hours Lab. per week. Co-requisite: Phys 140

Phys 141–General Physics II 3(3-0-0): This course introduces students to the physics of electricity and magnetism and the connections between them. The concepts of electric charge, electric field, electric potential, Kirchhoff Law, Gauss Law, electric and magnetic fluxes, capacitance, resistivity and resistance, connections in series and in parallel, RC-circuit, magnetic field, magnetic force, magnetic and electric torques, Ampere Law, electromagnetic induction, and Faraday Law and Lenz Law will be taught. Three 1-hour lectures per week. Pre-requisite: Phys 140. Co-requisite: Phys 145.

Phys 145–General Physics II Lab. 1(0-0-3): This course introduces students to the basic electrical measurements' techniques and to the physics of electricity and magnetism. The concepts of basic measurements, Resistors in series and in parallel, Verifying Ohm's law, Wheatstone Bridge, Verifying Kirchhoff's Laws, Resistivity, Capacitors in series and in parallel, RC circuit, Introduction to Oscilloscope, the Mechanical Equivalent of Heat, the Negative Temperature Coefficient of Resistance (Thermistor), Galvanometer, and the Magnetic Moment will be taught. Three hours Lab. per week. Co-requisite: Phys 141.

Chem 140-General Chemistry I 3(3-0-0): Matter properties and measurement, Atoms and the Atomic Theory, Chemical Compounds, Chemical Reactions, Reactions in Aqueous Solutions, Liquids Solids and Intermolecular Forces, Electrons in Atoms, Periodic Table and Atomic Properties, Chemical Bonding, Valence-Bond, Hybridization of Atomic Orbital, Multiple Covalent Bonds, Molecular Orbital Theory, Liquids and Solids. Three 1-hour lectures per week. Pre-requisite: None.

Chem 142-General Chemistry II 3(3-0-0): Properties of Gases: Kinetic-molecular theory of gases, Ideal gas law, Mixtures of gases, Thermo- chemistry, Principles of Chemical Equilibrium, Acids and Bases, Buffer Solutions, Neutralization Reactions and Titration Curves, Solubility and Complex-Ion Equilibria, Spontaneous Change: Entropy and Free Energy, Thermodynamic, Solutions and Their Physical Properties, Chemical Kinetics and Electrochemistry. Three 1-hour lectures per week. Pre-requisite: Chem 140. Co-requisite: Chem 143.

Chem 143–General Chemistry Lab. 1(0-0-3): Laboratory safety rules and Evaluation of analytical data, Definition and determination of density, explanation and determination of specific heat, concept of Acids, bases and Heat of Neutralization Reaction and its determination, reversible reactions, concept of equilibrium constant and its determination, LeChatelier principle and its verification, principle involved in Acid base titrations, indicators, Ionization of electrolytes, determination of dissociation constant of weak acid(Ka), principle involved in complex metric titrations, hardness of water and its determination. Three hours Lab. per week. Co-requisite: Chem 142.

Common Engineering Courses

Engr 100-Introduction to Engineering 1(1-0-0): This course introduces engineering to students, particularly those who are interested in an engineering profession. It covers engineering ethics, teamwork, communication skills, engineering topics, and engineering problem solving skills and design methodology. One 1-lecture per week. Pre-requisite: None.

Engr 105-Engineering Computing & Skills 2(2-0-0): Problem solving skills and computing using MATLAB. Two 1-hour lectures per week. Pre-requisite: Engr 100. Co-requisite: Math 145.

Engr 106–Engineering Graphics 2(1-0-3): An introductory course in engineering graphics focuses on graphical communication. Topics include descriptive geometry elements, visualization, engineering drawing techniques, orthographic projection, pictorial representation, section views, and basic dimensioning. The course incorporates computer aided drafting (CAD) with engineering applications using 2-D drawing. This course is divided in to two sections: sketching and AutoCAD. The course begins by teaching the basics of engineering graphics using sketching. Freehand sketching using only a pencil and paper is an important skill for any engineer. It is a means of quickly conveying technical information to others. Through sketching the concepts of pictorial projections, section views, auxiliary views and dimensioning are taught. Once the foundation of engineering graphics is known, these concepts can be applied using computer aided design (CAD) software. AutoCAD is taught first. AutoCAD is a drawing software package used to create two-dimensional engineering drawings. One 2-hours lecture per week. Pre-requisite: None.

Engr 206-Electric Circuits 3(3-0-0): Resistors, capacitors, inductors, currents; voltages; power and energy; circuit analysis techniques; DC and AC analysis; magnetic circuits and transformers; Introduction to DC and AC machines. Three 1-hour lectures per week. Pre-requisite: Phys 141.

EE 247 Electric Circuit Lab 1(0-0-3): Lab experiments using resistors, inductors, capacitors, function generators, DC supplies Multimeters, and Oscilloscopes. Focus will be on DC inputs. Software circuit simulations will be used. Three hours Lab. per week. Co-requisite: Engr 206.

Engr 223-Engineering Mechanics 3(3-0-0): Engineering Mechanics, covering both statics and dynamics. Topics include vector algebra, force systems, free-body diagrams, equilibrium of particles and rigid bodies, kinematics of particles and rigid

bodies, Newton's laws applied to particles and rigid bodies, friction. Three 1-hour lectures per week. Pre-requisite(s): Math 145 & Phys 140.

Engr 303–Thermofluids 3(3-0-0): Basic concepts of thermodynamics, properties of pure substances, energy transfer by heat, work, and mass, first and second laws of thermodynamics, basic principles and concepts of fluid mechanics including fluid statics, momentum analysis of flow structures, Bernoulli and energy equations, flow in pipes, basic principles of heat transfer including modes of heat transfer, steady heat transfer. Three 1-hour lectures per week. Pre-requisite(s): Phys 140 & Chem 142.

Engr 307–Engineering Economics 3(3-0-0): The course covers the following topics: Engineering Economic Decisions; Understanding Financial Statements; Cost Concepts and Behaviors; Time is Money; Understanding Money and Its Management; Principles of Investing; Present Worth Analysis; Annual Equivalent Worth Analysis; Rate of Return Analysis; Depreciation; Taxes; Break-Even Analysis, Cost Estimation; Developing Project Cash Flows; Inflation; Replacement Decisions. Three 1-hour lectures per week. Pre-requisite(s): Engr 100.

Engr 310-Numerical Methods 3(3-0-0): Introduction to Numerical Methods, Solution of Nonlinear Equations, Solution of Simultaneous Linear Algebraic Equations, Solution of Matrix Eigenvalue Problem, Curve Fitting and Interpolation, Numerical Differentiation, Numerical Integration, Ordinary Differential Equations: Initial-Value Problems, Ordinary Differential Equations: Boundary-Value Problems. Three 1-hour lectures per week. Prerequisite: Math 240, CS 204.

Engr 340-Probability and Statistics for Engineers 3(3-0-0): This course provides a comprehensive introduction to those models and methods most likely to be encountered and used by students in their careers in engineering and the natural sciences. Some homework requires use of computers. The course will cover: Introduction to Statistics and Data Analysis, Probability, Random Variables and Probability Distributions, Mathematical Expectations, Some Discrete Probability Distributions, Functions of Random Variables, Fundamental Distributions and Data Description, Simple Linear Regression, Multiple Linear Regression, and Bayesian Statistics. The students can use Microsoft Excel or any other statistical software in their projects. Three 1-hour lectures per week. Prerequisite: Math 145.

CS 204–Engineering Programming 3(3-0-0): Introduction to computer systems; problem solving methodology; testing and debugging of programs; variables, declarations, and assignments; input and output; data types; control flow and looping; functions and overloading; streams and input/output; one-dimensional arrays; two-dimensional arrays; pointers and dynamic arrays; structures; abstract data types and classes; inheritance; friends, overloaded operators, and arrays in classes; recursive functions.. Projects that will require lab work will be assigned weekly. Three 1-hour lectures per week. Prerequisite: Math 144.

Engr 399-Engineering Training 0(0-0-0): All engineering students are required to undergo a comprehensive "Engineering Training Program" with a reputable and specialized industrial firm. The firm can be in or outside Saudi Arabia relevant to his major area of interest in engineering analysis, design, or construction. The main purpose of this summer training is to enhance the students' practical experience and career abilities. Also, it deepens their engineering knowledge acquired during their academic years in the field of practical experience in real-life engineering projects. Additionally, such a program improves the relationship between the College of Engineering and the governmental and private industrial firms. Also, it can provide the industry with well-trained professionals in the near future. The qualifying student should spend at least eight weeks in a governmental organization, a reputable industrial firm, or a research center that is involved with engineering activities. Two months of full-time training. Pre-requisite: Eng 137 & (Level 7 or above).

BME Courses

BME 202-Molecular Biology and Genetics 3(3-0-0): This is an introductory course in molecular biology and genetics. Students will learn the nomenclature and current knowledge about the cell and its structures. Topics include chemical bonds; macromolecules; protein structure and function; enzymes; cell structure and function; cellular respiration; cell signaling; cellular reproduction and life cycle; cellular communication; structure and nature of DNA and genetics. Three 1-hour lectures per week. Prerequisite: BME 304.

BME 204-Anatomy and Physiology I 3(3-0-0): The objective of this course is to present the concepts of human anatomy and physiology that are most pertinent to the field of biomedical engineering. Concepts from the following topics will be covered: homeostasis; cell membrane potentials and transport mechanisms; nerves; muscular, cardiovascular and circulatory systems. Modeling of living systems will be covered as well. Three 1-hour lectures per week. Prerequisite: CHEM 140.

BME 220-Biomaterials 3(3-0-0): This course introduces the science of materials with emphasis on materials used in biomedical applications such as surgical implants, medical devices, dental restoration, drug delivery systems, etc. Students shall learn the classes of biomaterials and their properties, characteristics, biological response, and clinical applications. Other topics include biocompatibility, biodegradation, and performance and design requirements of materials for medical applications. Three 1-hour lectures per week. Prerequisite: BME 204.

BME 304-Anatomy and Physiology II 3(3-0-0): The objective of this course is to present the concepts of human anatomy and physiology that are most pertinent to the field of biomedical engineering. It is a continuation of Anatomy and Physiology I course. Concepts from the following topics will be covered: autonomic nervous system; blood; lymphatic and immunity; respiratory, urinary, endocrine and digestive systems. Three 1-hour lectures per week. Prerequisite: BME 204.

BME 310-Biomedical Electronics I 3(3-0-0): Diodes characteristics, models and applications (rectification, clipping, regulation, etc); Bipolar Junction Transistors (BJT) and Field Effect Transistors (FET): states and modes of operation of these devices; BJT and FET amplifiers; multistage amplifiers; frequency response of amplifiers. Three 1-hour lectures per week. Prerequisite: ENGR 206.

BME 312-Biomedical Electronics II 3(3-0-0): Operational amplifiers, power amplifiers, differential & multistage amplifiers and their medical applications; passive and active filters; comparators; oscillator circuits and applications; functional integrated circuits (*V/f* converters, *A/D* converters… etc); frequency response; control systems; analysis and design of feedback control systems and applying these principles to solve biological feedback control problems. Three 1-hour lectures per week. Prerequisite: BME 310.

BME 313-Biomedical Electronics Lab 1(0-0-3): The goal of this laboratory is to study electronics through experimentation. Upon completion of this lab course, students should be able to use standard laboratory equipments to analyze the behavior of

basic electronic devices and to design and construct simple circuits containing these devices. Three hours Lab. per week. Co-requisite(s): BME 312.

BME 314-Biomedical Signals and Systems 3(3-0-0): Biosignals and their Non-deterministic properties. Models for Biomedical systems. System response and Stability, Fundamentals of continuous-time signal processing as applied to biomedical instrumentation. Random noise and signal processes. Time Domain and Frequency Domain Analysis of Signals and System, Sampling theory, Applications of Fourier transforms and Laplace transforms, Transfer functions. Analog filter design methods for biomedical instrumentations. Discrete-time signal processing and Digital filter design will be introduced in this course. Projects and software will be used. Three 1-hour lectures per week. Pre-requisite(s): Math 240 & Engr 206.

BME 316-Logic Design and Microprocessors for BME 3(3-0-0): This is an introductory course in digital logic design and microprocessor systems. The course shall include introduction to digital systems; Boolean algebra; Combinational circuit analysis; Sequential circuit analysis and design that includes counters, registers and timers… etc. The fundamental principles of digital logic design shall be applied to understand Microprocessor organization and architecture; assembly language programming; CPU; Memory, I/O, and parallel processing. Biomedical Engineering applications shall be discussed wherever applicable. Three 1-hour lectures per week. Pre-requisite(s): CS 204.

BME 320-Biomechanics 3(3-0-0): This course applies the principles of solid mechanics to musculoskeletal system. Topics include kinematics, kinetics, and biomechanics of locomotion. Students will learn the microstructure and mechanical properties of biological tissues such as bones, joints, blood vessels, muscle, heart…etc. The learned concepts of biomechanics will be applied to those body tissues. Design and analysis projects will be assigned. Three 1-hour lectures per week. Pre-requisite(s): Engr 223 & BME 220.

BME 322-Biomedical Transport Phenomena 3(3-0-0): Topics include reaction-diffusion processes; transport across membranes; fluid flow in the circulatory system and other tissues; oxygen transport in lungs and tissues; pharmacokinetics; biomedical engineering applications and devices: extracorporeal devices (e.g. hemodialysis, blood oxygenators, etc) and artificial organs. Three 1-hour lectures per week. Pre-requisite(s): Engr 303 & Math 240.

BME 330-Biomedical Imaging Systems 3(3-0-0): This course covers the fundamentals of different types of medical imaging modalities. Topics include the physics, mathematics, instrumentation and clinical applications of different imaging modalities including X-rays, Computed Tomography (CT), Fluoroscopy, Ultrasound Imaging, Optical Imaging, Nuclear Imaging (SPECT, PET) and Magnetic Resonance Imaging (MRI). Three 1-hour lectures per week. Pre-requisite(s): Phys 141, Math 240 & BME 312.

BME 331-Biomedical Imaging Systems Lab 1(0-0-3): This laboratory focuses on the main medical imaging modalities in BME 330 and provides a hands-on experience for students to practically apply the knowledge they have learned in BME 330. Medical images will be acquired using different modalities, analyzed, reconstructed, and archived. Three hours Lab. per week. Co-requisite(s): BME 330.

BME 410-Biomedical Instrumentation I 3(3-0-0): This is the first course in bioinstrumentation covering clinical measurements. Topics include the origin of Biopotentials: cell, nerve, and muscle potentials; Biopotential electrodes; Biosensors and Transducers; Basic Theories of Measurements and concepts of Medical Instrumentation; Modular Block and System Integration; electrocardiogram (ECG); electroneurogram; electromyogram (EMG); electroretinogram; electroencephalogram (EEG); Cardiovascular system and associated measurements; Blood pressure and Blood flow Measurements; Measurements of the respiratory System; Pulmonary Function Analyzers; Audiometery; Introduction to Biomedical Virtual instrumentation. The Course shall explore the design, operation, safety aspects and calibration of the respective instrumentations. Three 1-hour lectures per week. Pre-requisite(s): Engr 105 & BME 312.

BME 411 Biomedical Instrumentation I Lab 1(0-0-3): This laboratory-based course is designed to develop hands-on experimental skills to the selection and application of various sensors and transducers, and develop practical experience to designing, using and testing analog instrumentation used to acquire and process biomedical signals. Students shall develop skills in writing Matlab programs and employing LabView to perform signal processing on biomedical signals such as ECG and testing electrical equipment against safety standards. It will inculcate the safety issues involved in bioelectrical measurement and medical instrumentation.

Team work and written communication skills are emphasized through laboratory report organization, documentation of results, error analysis and interpretation of findings. Three hours Lab. per week. Co-requisite(s): BME 410.

BME 412-Biomedical instrumentation II 3(3-0-0): Students shall explore the design, operation, safety aspects and calibration of the respective instrumentation: Patient Monitoring Systems, Bedside Monitors and Central Monitors, Arrhythmia and Ambulatory Monitoring, Biomedical Wireless Telemetry, Introduction to networking concepts in Medical Devices. Clinical Laboratory Instrumentation (types and principle of operation): Electrophoresis, ELISA, Hematology, Chromatography, Spectroscopy and Spectrophotometry, Blood gas analyzers, Electrolytes analyzers. Therapeutic and Prosthetic Devices: pacemakers and defibrillators, Pacemaker analyzers cardiac assist devices, Hemodialysis, Lithotripsy, Ventilators, Anesthesia Machines, Infant Incubators, Drug Delivery Devices, Instruments for Surgery. Three 1-hour lectures per week. Pre-requisite(s): BME 410.

BME 413-Biomedical Instrumentation II Lab 1(0-0-3): This laboratory-based course is designed to develop hands-on experimental skills relevant to the design and construction of biomedical instrumentation commonly used to acquire biomedical signals including aspects of signal processing, micro-computer interfacing, and simple software development. Teamwork and written communication skills are emphasized through laboratory report organization, documentation of results, error analysis and interpretation of findings. Three hours Lab. per week. Pre-requisite(s): BME 316. Co-requisite(s): BME 412.

BME 414-Biomedical Digital Signal Processing 3(3-0-0): This course is designed for senior level students. The objective of this course is to introduce the main techniques for the analysis of continuous and discrete signals including Laplace, Fourier and *Z* Transforms and apply them to analyze biological signals. Topics covered include signal acquisition and sampling; Nyquist rate; signal averaging; noise removal and signal compensation; discrete-time system analysis; *Z* transform; discrete and fast Fourier transform; transfer functions and digital filtering; Infinite Impulse Response (IIR) and Finite Impulse Response

(FIR) systems. Computer programming software such as Matlab will be used for the course assignments to analyze biological systems and design different types of filters. Three 1-hour lectures per week. Pre-requisite(s): Engr 105 & BME 314.

BME 416-Introduction to BioMEMS and Bionanotechnology 3(3-0-0): The objective of the course is to expose students to biomedical MicroElectroMechanical Systems (MEMS) and Nanotechnology, and to teach them fundamental principles of MEMS applications in biology and medicine. Topics covered include MEMS and nanotechnology, its application to biotechnology/biomedicine. Introduction to scaling laws as applied toward living systems and artificial devices; micro- and nanofabrication; biosensors and actuator principles; drug delivery; implantable systems; micro-total- analysis systems and lab-on-a-chip devices; minimally invasive surgery; detection and measuring systems; DNA, and protein microarrays; emerging applications in medicine. Three 1-hour lectures per week. Pre-requisite(s): BME 202 & BME 220.

BME 420-Prosthetic Systems for Biomedical Engineering 3(3-0-0): Applying biomechanics of human movement to design and evaluate artificial devices intended to restore or improve movement loss due to disease or injury. Topics include motion analysis; gait analysis and electromyogram (EMG) and their measurement techniques. Artificial limbs; joint replacement & models of muscle and tension will be covered as well with the biomaterials used and their biocompatibility. Matlab projects will be assigned to demonstrate the concepts learned in this course. Three 1-hour lectures per week. Pre-requisite(s): Engr 105, BME 304 & BME 320.

BME 430-Biomedical Image Processing 2(2-0-0): Medical image processing and analysis techniques: image enhancement and filtering in spatial and frequency domains, image restoration, image compression and archiving, segmentation, and registration. Common image characteristics such as Signal-to-Noise Ratio (SNR), resolution, contrast and Contrast-to-Noise ratio (CNR) will be covered as well. Concepts learned in this course will be demonstrated throughout projects and assignments utilizing computer programs such as Matlab. Two 1-hour lectures per week. Pre-requisite(s): Engr 105, Math 240 & Math 244.

BME 432-Biomedical Data Processing, Archiving, and Communication 3(3-0-0): Data acquisition, digitization, storage and recovery. Review of image digitization, compression, enhancement and storage (archiving). Introduction to Picture archiving and communication System; Components of PACS; PACS Infrastructure; Network terminology; types of workstations; the relationship of a Radiology Information System (RIS) and/or a Hospital Information System (HIS) to PACS; interfaces and languages such as DICOM and HL-7 will be addressed. Three 1-hour lectures per week. Pre-requisite(s): BME 430.

BME 440-Management of Healthcare Technology 3(3-0-0): Driven by ever-evolving technological advancements, healthcare institutions must continuously adapt them in order to provide optimal patient care. The proliferation of cutting-edge procedures in the Hospital call for the development of expertise in the management of Healthcare Technology. Management of Healthcare Technology ensures that the equipment and systems used in patient care are safe, operational, and properly configured to meet the mission of the healthcare; that the equipment is used in an effective way consistent with the highest standards of care.

***Description*:** Management concepts of Healthcare Technology; Introduction to the codes, standards, ethical issues and regulations governing Healthcare Technology practices; Implications of Safe Medical Device Act (SMDA); Impact of regulatory agencies' (SFDA, JC etc.) requirements on the operations of the Healthcare Technology Management (HTM) program; Development of related policies and procedures govern activities such as the selection, planning, and acquisition of medical devices for their safe use; Patient Safety and Safety programs; infection control; Types of Contracts and contract negotiation; Development and operation of a Healthcare Technology Management/Clinical Engineering Department in a Hospital. Three 1-hour lectures per week. Pre-requisite(s): Level 6 or above..

BME 442-Information Technology for Biomedical Engineer 3(3-0-0): Integration of Information technology and Biomedical Engineering. Introduction to networking, communications, and information infrastructures in medical environment. Exposure to basic concepts related to networking at several levels: low-level (TCP/IP, services), medium-level (network topologies), and high-level (distributed computing, Web-based services) implementations. Commonly used medical communication protocols (HL7, DICOM) and current medical information systems (HIS, RIS, PACS). Advances in networking, such as wireless health systems, peer-to-peer topologies, grid/cloud computing. Introduction to security and encryption in networked environments. Three 1-hour lectures per week. Pre-requisite(s): Engr 105.

BME 444-Medical Device Innovation and Entrepreneurship 3(3-0-0): This course provides a foundation course for those interested in developing medical devices and associated technologies. Topics include: innovation models, risks, costs and rewards; product development and new product management; product failure; introduction to medical devices and their classification and nomenclature; healthcare needs assessment; new medical devices and healthcare delivery: industry, government, hospital and user perspectives; medical device innovation including funding and IP issues and design guidance for manufacturers; medical device regulations including harmonization; essential principles of safety and performance of medical devices; Council Directive 93/42/EC on Medical Devices; ISO13485 and ISO14971 standards; FDA's 510(k) review procedure for medical devices; product liability and non- conformance; reliability and the product development process; biotechnology innovation; engineering entrepreneurship. Three 1-hour lectures per week. Pre-requisite(s): Senior standing in BME.

BME 450-Senior Design I 2(2-0-0): This is the first course of a two-semester sequence of senior capstone design. It provides students with experience in the process and practice of biomedical component/system design from concept through final design. Project management techniques, SFDA requirements for medical device design, intellectual property, ethical and human research subject considerations will also be covered. Emphasis will be on teamwork, project management, testing through simulation or prototype, oral and written communications. Two 1-hour lectures per week. Pre-requisite(s): Senior Standing in BME.

BME 452-Senior Design II 2(2-0-0): Continuation of BME 450 – Senior Design I. Two 1-hour lectures per week. Pre-requisite(s): BME 450.

BME 460-Special Topics in Biomedical Engineering 3(3-0-0): Topics determined by the course instructor in consultation with the department chair. Three 1-hour lectures per week. Pre-requisite(s): Senior standing in BME.

BME 462-Undergraduate Research in Biomedical Engineering 3(3-0-0): Individual research projects for students with honors classification. It requires prior approval of, and arrangement with, a faculty research advisor. Three 1-hour lectures per week. Pre-requisite(s): Senior standing in BME.

III- College Facilities

Labs

Engineering is a practical discipline, therefore experimental work is essential and fundamental to support and understand the theoretical knowledge, and lab courses give students practical experience in the use of equipment, tools, and instruments, and enhance his communication skills and team working skills. The Labs in the College of Engineering is recognized because of its state of art equipment that supports undergraduate programs in its five working academic departments: Mechanical Engineering, Civil Engineering, Electrical Engineering, Chemical Engineering, and Biomedical Engineering. Material engineering program and water desalination program will join the college in the short-term plan.

Laboratory Objectives:

1. To strengthen and reinforce some of the concepts covered in the classroom.
2. To test the validity of the assumptions and approximation that are usually made and the limitation and applicability of such assumptions and approximations.
3. To familiarize the students with different experimental methods, techniques, and devices that can be employed to study engineering concepts and problems.
4. To teach the students how to get the necessary experimental data and identify the proper parameters that can help in the investigation of the problem at hand.
5. To give the student the opportunity to work as a team member.
6. To give the student the opportunity to learn and practice written communication.

Civil Engineering Labs:

Construction Materials Lab.

The Construction Materials Laboratory established to train students to carry out tests on common construction materials such as concrete and its ingredients, cement mortar tests, fresh and hardened concrete testing (destructive and non-destructive tests).

Highway Engineering Lab. (Pavement)

The lab is equipped with most advanced state-of-art instruments, which covers all type of tests on Bitumen, asphalt Mix using modern Super-Pave equipment.

Geotechnical Engineering Lab. (Soil mechanics)

The main purpose of the laboratory of Geotechnical Engineering is to familiarize the basic soil mechanics laboratory techniques to undergraduate students of Civil Engineering program. The laboratory contains equipment to measure / analyze the physical and mechanical properties of soil.

Surveying and GPS Lab.

In Surveying Laboratory Students, apply the fundamentals of surveying to field exercises using modern surveying equipment (digital level, laser level, theodolite, total station and GPS). Field exercises include leveling, topographic mapping, Distance, angular measurement, and areas calculation.

Environmental Engineering Lab.

Environmental engineering laboratory serves both students & staff in the department in education & research purposes. Accomplishment of chemical, physical, & microbiological determinations used in examination of water & wastewater. Laboratory analysis to evaluate water quality will be performed, such as Biochemical Oxygen Demand, Total solids, pH, EC, Alkalinity, Turbidity, Hardness, Coliforms & others.

Mechanical Engineering Labs:

Thermodynamics Lab.

In this laboratory, many concepts related to first law of thermodynamics, processes, cycles, and efficiencies will be studied experimentally. The objective of this laboratory is to enhance the student knowledge in the area of thermodynamics principles and concepts which include energy conversion, cycles, and thermal engineering applications.

Mechanical systems Lab.

In this laboratory, many concepts related to Heat transfer, Solar Energy, refrigeration and air conditioning systems and internal Combustion Engines will be studied experimentally. The objective of this laboratory is to enhance the student knowledge and relates the practical side with the theoretical one.

Fluid Mechanics Lab.

In this laboratory, many concepts related to fluid properties, fluid static and fluid dynamics will be studied experimentally. In addition, energy principle, momentum principle, hydraulics and aerodynamics will be investigated.

The objective of this laboratory is to enhance the student knowledge in the area fluid mechanics, and to support the student information of fluid mechanics principles and concepts and to link the practical side with the theoretical one.

Strength of Materials Lab.

The fundamental principles in the fields of mechanics of materials and strength of structural components were studied throughout conducting fundamental and technological state-of-the art series of experiments. Also, this Lab. provides students with basic knowledge in design of structural components and structures, as well as the analysis of structural failures.

Control and Vibration Lab.

The lab will cover open-loop, closed-loop, proportional, integral, derivative, PI, and PID control modes. Also, the lab covers topics related to: PCS Process Control Systems, Hydraulic concepts, Vibration systems, DC motor control, and stepper motor control.



Measurements and instrumentations Lab

The primary purpose of this lab is to provide fundamental knowledge in the theory and practical experience in the application of mechanical engineering measurements. Experiments in related to pressure, temperature measurement, calibration, strain gauges, and different sensors.


Electrical Engineering Labs:

Electric Energy & Machines Lab.

This laboratory provides the students different experiments on DC and AC machines on both no load and loaded conditions. The data obtained from these experiments are used to find main performance parameters of the machines and are the same time to draw characteristic curves between measured parameters during no load-loaded tests. In addition, this lab provides the student's three-phase circuit's connections, single phase, and three phase transformer efficiency and regulation calculation tests.

Power Systems Lab.

The Power Systems teaching Laboratory provides students hands-on learning tools that teach the many properties of electric generation and use. The three workstations in the lab include test benches to teach power system components, transformers, protection, control. Beside the student experiment sets, the laboratory also has Power world simulation program provides students learn modeling and simulations of the different structure of power systems to understand the load flow, fault and stability analysis.

Microprocessors Lab.

This laboratory focuses on the programming side of hardware; it has training kits that are used for programming microprocessors and microcontrollers through a PC that is connected to these kits. Student work with the MDA8086 kit to program the microprocessors and the Y0037 kit to program PIC microcontrollers. The microprocessor experiments focus on the assembly language and controlling the microprocessor features (stack, interruptions, addressing modes etc), students will also learn how to optimize the code to get a program

working with fewer lines of code, they learn also how to control different electronic components (LED, 7 segment display, Digital to Analog Converter, LCD display).

The mechatronics experiment focus on the PIC programming in assembly and C language using MPLAB and PIC compiler, student will practice how to control different electronic components and how to apply clean code concepts in their program.

Power Electronics &drives Lab.

The hardware laboratory can support several experiments on Thyristor Commutation Techniques, Controlled Rectifiers, AC Voltage Controllers, Closed-loop control of DC drives, DC Choppers, etc. In addition, PSIM software is available in this laboratory to explore the theory, development and analysis of Power Electronics systems, and their applications in various domains.

Electronics and Electrical Circuits Lab.

The purpose of the electric circuits part of this laboratory is to practice essential laboratory measurement and report preparation skills, to reinforce the concepts and circuit analysis techniques, and to gain an increased understanding of some of the practical issues of electrical

engineering circuit analysis and design. It is equipped with various types of resistors, variable rheostats, inductor banks, capacitor banks, dc and ac power supplies, switches, lamp boards, ammeters, voltmeters, analog and digital wattmeters, function generators, oscilloscopes, etc. In the laboratory classes, students are taught how to build electric circuits, safety rules of electric circuits, installation of common household appliances and how to write technical reports. The students also verify different electric circuit and network theorems e.g., KCL, KVL, mesh, node, Y-D and D-Y transformation, Thevenin's, Norton's, maximum power transfer and superposition theorems, etc. They also construct phasor diagram of the circuits from the experimental data, determine mutual inductance for the coupled circuits, find the series and parallel resonance frequency of ac circuits, types of filters and quality factors of the inductance coil, measure the ac power in the single phase and three phase circuits, etc.

As for the electronic circuits part of this laboratory, its main purpose is to study electronics through experimentation. Students will be able to use standard laboratory equipment to analyze the behavior of basic electronic devices and to design and construct simple circuits containing these devices, Such as Diode Characteristics, Half wave and full wave Rectification, BJT Transistors, MOSFET Transistors, etc. In addition, they will have the ability to use electronic test & measurement instruments and software, such as oscilloscopes, function generators, etc.

Beside the student experiment sets, the laboratory also has simulation programs such as (MULTISIM simulation) to help students measure exact results and error.

Communication Systems Fundamental Lab.

Advanced electric circuits' lab that concern of three phase circuits issues and power measurements as well as magnetic circuits (concept and analogy) and DC machines/generators.

Digital Logic Lab.

The Mechatronics and control part let students practice the analogue systems control through experimentation. By using RYC units, they can study the behavior of 1st and 2nd order system and learn how to change its parameters. Student will also practice the implementation of PID controllers and adjust its settings to find the system's best compromise between stability, speed and steady state error. In addition to the available equipment, students can simulate their system using MATLAB Simulink to find the optimal results before implementing them on real equipment's. Students will work also with Programmable Logic Controller PLC to learn how to create ladder programs to control industrial production chains.

Chemical Engineering Labs:

Process Fluid Mechanics Lab.

The process fluid Mechanics laboratory in the chemical engineering department is engaged to enhance understanding of the basics of fluid engineering principles. The experiments are designed to apply various measurement of fluid properties and flow characteristics. The lab is equipped with different units related to fluid mechanics such as flow measurement unit, fluid friction in pipes and fittings test unit, viscometers, pumps and others.

Equipment:

1.	Hydrostatics and Properties of Fluids	2.	Flow Measurement unit
3.	Losses in Piping Systems	4.	Series and Parallel Pump Test Set
5.	fixed and fluidized bed		

Separation Process I Lab.

The separation processes 1 Laboratory is equipped for the study of the various mechanical operations associated with solids particles. Experiments mainly deal with size reduction, size separation, clarification, solid fluid separation etc. All basic experiments for fluid particle mechanics like Jaw Crusher, Plate and Frame Filter press, Froth Flotation, Batch Sedimentation, and Sieve Shaker are available in this laboratory.

Equipment:

1. Plate and frame Filter Press
2. Jaw Crusher
3. Sieve shaker
4. Sedimentation unit
5. Sedimentation unit
6. Aeration tank
7. floatation unit

Heat Transfer Lab.

Heat Transfer Laboratory helps the students to understand the basic concepts of heat transfer: Conduction, Convection and Radiation, which are the three basic modes for heat transfer to take place. To enhance the practical knowledge of industrial equipment, students perform experiments on some common heat transfer equipment such as linear heat conduction, free and forced convection, Double Pipe Heat Exchanger, Shell & Tube Heat Exchanger and Single Effect Evaporator.

Equipment:

1. Linear/Radial heat conduction unit
2. Free and forced convection unit
3. Radiation heat transfer unit
4. Boiling heat transfer unit
5. Shell and tube heat exchanger
6. Parallel tube heat exchanger
7. Thermal conductivity measurement unit

Thermodynamics Lab.

The purpose of Thermodynamics Laboratory is to help the undergraduate students to understand the basic thermodynamic principles by practical applications. The lab includes

Bomb calorimeter, Sterling cycle, Work to heat apparatus Temperature and pressure measurement apparatus.

Equipment:
1- Mechanical Equivalent of heat
2- Bomb Calorimeter
3- Sterling Engine
4-Temperature measurement kit
5- Pressure measurement kit

Reaction Engineering Lab.

Reaction engineering laboratory provides undergraduate students with hands-on acquaintance on chemical reactor operations involved in industrial operations. The reaction laboratory inculcates students' skills to correlate theoretical concepts and practical reactor operations.
The experiments performed by the students in the laboratory are related to chemical kinetics, operation of reactors such as batch reactor, Continuous Stirred Tank Reactor (CSTR), tubular reactor. Experiments related to chemical reactor dynamics are also conducted. Reactors are either operated in manual mode or automatic mode and the data collected is processed and analyzed using soft skills.
Equipment:

1. Batch reactors
2. Tubular reactor
3. Continuous Stirred Tank reactor

Unit Operations Lab.

Unit operations lab is part of Chemical Engineering Lab III – ChE406; it is designed to introduce students to larger scale industrial processes commonly encountered by chemical engineers in industry. In each experiment, students work in teams to collect experimental data followed by thorough analysis using the theoretical principles they learned in previous courses. The laboratory is equipped with top quality learning equipment that cover a wide range of industrial processes ranging from traditional separation processes such as distillation, evaporation, extraction, drying, adsorption and gas absorption, to nontraditional separation processes such as ion exchange and reverse osmosis.

The objective of this laboratory is to introduce the basic principles and methods of experimental engineering to the students. The primary emphasis of the laboratory is on fundamental understanding the underlying principles of the topics that were discussed in the theoretical courses using various experimental techniques, instruments and apparatus designed specifically for the subjects concerned. Additionally, students will learn to conduct a laboratory experiments safely and will have the opportunity to improve their written communication skills through preparation of laboratory reports.

Equipment:

1. Distillation column
2. Packed tower gas absorption
3. Single effect evaporator
4. Liquid-liquid extraction column
5. Tray drier
6. Ion exchange unit

7. Reverse osmosis
8. Cooling tower
9. Adsorption unit

Process Control Lab.

Process control lab is part of Chemical Engineering Lab III – ChE406; it is designed to introduce students to larger scale industrial processes commonly encountered by chemical engineers in industry. In each experiment, students work in teams to collect experimental data followed by thorough analysis using the theoretical principles they learned in previous courses.
The laboratory is equipped with top quality learning equipment that cover a wide range of industrial processes control such as pressure control, temperature control, flow control and level control. In addition, students perform simulation experiments that mimic real industrial processes using specialized software.
The objective of this laboratory is to introduce the basic principles and methods of experimental engineering to the students. The primary emphasis of the laboratory is on fundamental understanding the underlying principles of the topics that were discussed in the theoretical courses using various experimental techniques, instruments and apparatus designed specifically for the subjects concerned. Additionally, students will learn to conduct a laboratory experiments safely and will have the opportunity to improve their written communication skills through preparation of laboratory reports.
Equipment:

1. Level Workstation
2. Flow temperature workstation
3. Pressure Workstation
4. Distillation column controllers

Biomedical Engineering Labs:

There are six laboratories for the Biomedical Engineering Program.

Electric Circuits Lab.

The Circuits Lab is located in Building 59 (Room 1019). The lab is equipped with various types of resistors, variable rheostats, inductor banks, capacitor banks, dc and ac power supplies, switches, lamp boards, ammeters, voltmeters, analog and digital Watt-meters, function generators, oscilloscopes, NI ELVIS electronic devices, etc. In the ***Electric Circuits laboratory (EE 247)*** classes, students are taught how to build electric circuits, safety rules of electric circuits, installation of common household appliances and how to write technical reports. The students also verify different electric circuit and network theorems e.g., KCL, KVL, mesh, node, Y-D and D-Y transformation, Thevenin's, Norton's, maximum power transfer and superposition theorems, etc. They also construct phasor diagram of the circuits from the experimental data, determine mutual inductance for the coupled circuits, find the series and parallel resonance frequency of ac circuits, types of filters and quality factors of the inductance coil, measure the ac power in the single phase and three phase circuits, etc.

Biomedical Electronics Lab.

The Biomedical Electronics Lab is located in Building 59 (Room 1017). In the ***Biomedical Electronics Lab (BME 313)***, the students study electronics through experimentation. Students use standard laboratory equipment to analyze the behavior of basic electronic devices and to design and construct simple circuits containing these devices, such as Diode Characteristics, Half wave and full wave Rectification, BJT Transistors, MOSFET Transistors, etc. In addition, they will have the ability to use electronic test and measurement instruments and software, such as oscilloscopes, function generators, etc.

Computing Labs 1 and 2

There are two rooms in Building 59 dedicated to the computer labs. Room 3118 has 30 PC's with Turbo C++, AutoCAD 2020 and MATLAB 2020. An additional room (number 3120) also has 30 PC's with MATLAB 2020, AUtoCAD 2020, TurboC++ and internet accessibility for the students' use.

Engineering Computing & Skills (Engr 105) gives an introduction of MATLAB programming language. It is designed to give students fluency in MATLAB programming language. Problem-based MATLAB examples have been given in simple and easy way to make the learning fast and effective.

Engineering Graphics (Engr 106) laboratory focuses on the AutoCAD programming. Students are taught on the know how's of Basic geometric constructions. Technical drawing. Computer Aided Design, CAD. Components description and methods of using CAD systems. CAD system tasks. Basics of construction and making documentation using computers.

Biomedical Instrumentation Lab.

The Biomedical Instrumentation Laboratory is in Building 11 (Room B-03). The lab has 19 PCs, a data projector and a copier. This laboratory-based course ***(BME 411 and BME 413)*** is designed to help students develop hands-on experimental skills relevant to the design and construction of biomedical instrumentation commonly used to acquire biomedical signals including aspects of signal processing, microcomputer interfacing, and simple software development. The lab is equipped with ELVIS II or MyDaq.PC and controlled via original virtual instruments (VIs) developed with the LabVIEW programming environment.

Biomedical Imaging Systems Lab.

The Biomedical Imaging Systems Laboratory is in Building 11 (Room B-05). The lab has 10 PCs with MATLAB and a projector. In this laboratory-based course ***(BME 331),*** the students use various image processing tools available in MATLAB software to process, analyze and archive simulated and/or real medical imaging data.

IV- Career Prospects

Mechanical Engineering:

Mechanical Engineering students find jobs in various Petrochemical Industries (such as SABIC, Chevron, Shell, Exxon, Arabian Petchem, etc.), Oil Industries (such as Aramco, Gasco, Shell, Halliburton, etc.), Saudi Electric Company, Irrigation Authority and all the major company's ancillary/supporting units. They can also work in Manufacturing, Process and Power Generation Industries. Many industries are located in Jubail, Saudi Arabia. Oil wells and Process industries are located all over the Gulf Countries.

Mechanical Engineering students find jobs as:

Process engineers	Design engineers	Operations Engineer
Technical engineers	Inspection engineers	Maintenance Engineer
Piping engineers	Reliability Engineer	Manufacturing engineers

Electrical Engineering:

Electrical Engineering students find jobs as:

Power generation industry	Rail industry	Construction industry
Electronics industry	Aerospace industry	Marine industry
Telecoms and Computers	Automotive industry	Materials and metals industry
Control & Utilities industry	Oil and gas industry	Computing industry.

Civil Engineering:

Civil Engineering students find jobs as:

Building control surveyor	Site engineer	Engineering geologist
Consulting civil engineer	Structural engineer	Environmental consultant
Contracting civil engineer	Building services engineer	Quantity surveyor

Biomedical Engineering:

Biomedical Engineering students find jobs as:

Biomedical industries for manufacturing medical devices, instruments and implants.
Clinical engineering: installation, maintenance and management of medical equipment and related issues.
Research institutes for cutting edge research in designing/developing new medical techniques.
Government health regulatory bodies for planning and implementing advanced health care strategies.
Academic (Engineering and Medical) institutions.

Chemical Engineering:

Chemical Engineering students find jobs as:

Chemical Process Industries	Food and Beverages	Environment and safety
Petroleum industry	Fuels	Medical & pharmaceutical applications.
Water industry, paints & dyes	Petrochemical and plastics	Fertilizers & Agriculture products

V- Appendix A – Useful website links

Mechanical Engineering Students:

Scopus	*https://www.scopus.com/home.uri*
Science Direct	*http://www.sciencedirect.com/*
Engineering Toolbox	*http://www.engineeringtoolbox.com/*
Job Opportunities	*https://www.bayt.com/en/saudi-arabia/*
Job Opportunities	*http://sa.indeed.com/Mechanical-Engineer-jobs*
American Society of Mechanical Engineers	*https://www.asme.org*
American Society for Testing and Materials	*https://www.astm.org/*
Occupational Safety and Health Administration Standards	*https://www.osha.gov/law-regs.html*
American Society of Heating, Refrigerating & Air-Conditioning Engineers	*https://www.ashrae.org/*

Chemical Engineering Students:

American Institute of Chemical Engineers	*http://www.aiche.org/*
Institution of Chemical Engineers	*http://www.icheme.org/*
The society of petroleum engineers:	*http://www.spe.org/*
Magazine of chemical engineering	*http://www.chemengonline.com/*
Chemical engineering resources	*http://www.cheresources.com/*
Engineering Toolbox	*http://www.engineeringtoolbox.com/*

Electrical Engineering Students:

ElectroMechanical	*http://electronics.wisc-online.com/*
Electrical for you	*http://www.electrical4u.com/*
All about circuits	*http://www.allaboutcircuits.com/*
Wolfram Demonstrations Project	*http://demonstrations.wolfram.com/*
Virtual Labs	*http://vlab.co.in/*
Instructables	*http://www.instructables.com/*
Makezine	*http://makezine.com/*
Electronics Weekly	*http://www.electronicsweekly.com/*
LYNDA	*https://www.lynda.com/*
Institute of Electrical & Electronics Engineers	*http://www.ieee.org/*
The Institution of Engineering and Technology	*http://www.theiet.org/*
Engineering.com	*http://www.engineering.com*
Electrical Engineering Portal	*http://electrical-engineering-portal.com/*

Civil Engineering Students:

Recent job openings and possible careers	*https://collegegrad.com/careers/civil-engineers*
The responsibilities of civil engineers and available careers	*http://typesofengineeringdegrees.org/civil-engineering-job-description*
Job options and how to build efficient resume	*https://www.prospects.ac.uk/careers-advice/what-can-i-do-with-my-degree/civil-engineering*

Need to find or post-civil engineering jobs or start a civil engineering career	*https://civilengineeringcentral.com/*
The Job Portal for Civil, Environmental and Construction Industry	*https://www.ceecareers.com/*
American Society of Civil Engineers	*https://www.asce.org/*
Saudi Building Code National Committee	*https://sbc.gov.sa/En/Pages/default.aspx*

Biomedical engineering Students

king Fahad Specialist Hospital	*http://www.kfsh.med.sa/KFSH_Website/*
Siemens Saudi Arabia Company	*http://www.siemens.com/entry/sa/en/*
General Electric	*http://www.ge.com/sa/careers*
Security Forces Hospital https	*http://www.sfhd.med.sa/?page_id=11194*
Almana Hospital:	*http://www.almanahospital.com.sa/p/locations/agh_hafouf*
Prince Sultan Military Medical City	*http://www.psmmc.med.sa/en/pages/default.aspx*
Royal Commission for Jubail:	*https://www.rcjy.gov.sa/en-US/Pages/default.aspx*
Philips Healthcare:	*http://www.mea.philips.com/healthcare/about/contact*