جـامعـة الـملـك فيـصل
KING FAISAL UNIVERSITY

STUDENT GUIDE BOOK FOR COLLEGE OF ENGINEERING

ENGINEERING KFU

Introduction and Overview

Dean's Welcoming Word

Vice Dean's Welcoming Word

I- Overview and Important Regulations

1- 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.

2- 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.**

3- 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.

KFU offers four types of transfer as follows:

A) 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.

B) 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).

4- KFU Students Who Want To Study Courses in Other Universities:

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

5- 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 11 CHs (4 courses) from the first semester as in the following table:

Sr.	Course ID	اسم المقرر	Course Name	CHs
1	2200-100	مدخل الى الهندسة	Introduction to Engineering	1
2	0814-140	فيزياء عامة ١	General Physics I	3
3	0815-140	كيمياء عامة ١	General Chemistry I	3
4	0817-144	تفاضل وتكامل ١	Calculus I	4
		Total		11

-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 through KFU main website 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. However, students are now able to select an engineering program online. The following procedure must be followed.

First Year college students who are expected to complete the first year "Basic Courses" should submit Major Declaration through KFU official website and must follow the steps given below:

1. Student must go to KFU official website at (link will be send to the students by email)
2. Student must type his 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** and Click "Save Major Choices" button.

Important Note: (1) if the student completes the "basic courses" and his GPA is top range, then he will be granted Major Choice # 1. Otherwise, his major selection will be fulfilled based on the availability in the respective departments and best GPA.

Major Code Abbreviation

Major	Major Code
Chemical Engineering	**CHE**
Civil and Environmental Engineering	**CEE**
Electrical Engineering	**EE**
Mechanical Engineering	**ME**
Biomedical Engineering	**BME**

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 CoE.

- **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 finished **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.

6- Warnings and Probation

A) 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.

B) 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.

C) 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.

D) 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)

7- 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.

A- 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.

B- Academic Advising at the College of Engineering: 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.

8- 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.

9- 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 followings:

- Student must fulfil the following eligibility requirements to be qualified for Engineering Training :
  i. 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).
  ii. Pass all general engineering courses carrying the code ENGR###.
  iii. 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.

10- Grading System in the College of Engineering

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:

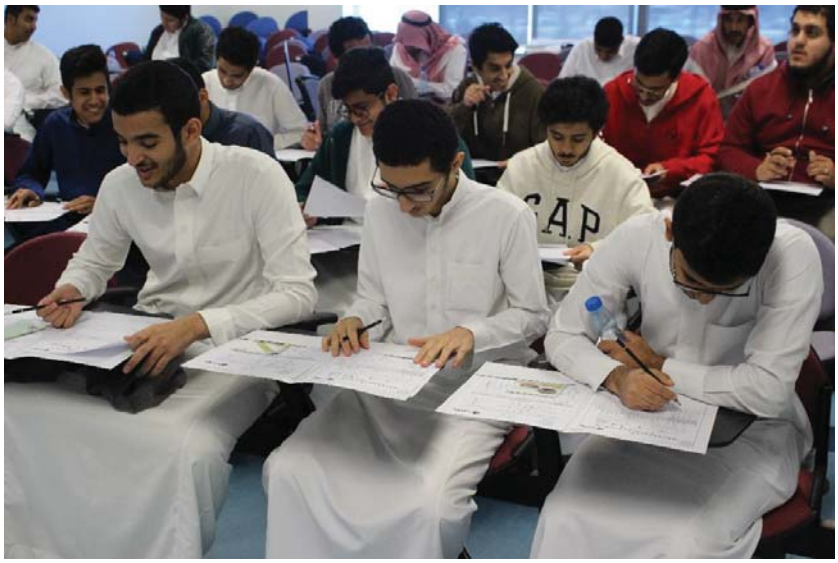
- Quizzes and homework: to assess student gradual understanding of course subjects.
- Projects: to assess technical ability as well as personal interaction and communication skills. These projects are assigned in most Engineering courses since each engineering program has adopted project based learning (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

11- 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 Exam:

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. Please 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. It is your responsibility to check if you can bring a textbook into the exam hall. Unless informed otherwise, textbooks are not permitted. If your instructor allows textbooks to be used in examinations, check if any annotations are allowed.
8. As soon as you enter the exam hall, you must not speak to anyone other than the invigilator. Speaking to friends, even if just wishing them good luck, will be automatic grounds for investigation for cheating.
9. You may take materials into an exam hall such as pens, pencils, erasers, rulers and pencil sharpeners. Electronic calculators can be used only if permitted. Pencil cases are not allowed in the exam hall.
10. You must write your answers legibly in blue pen and pencil may be used for diagrams.
11. You 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. Students must use standard (non-programmable) calculator.
13. The cover of the calculator considered illegal during the exam and you must leave it outside exam's hall.
14. Avoid wearing any suspicious clothing, unless necessary, during exams such as hats, abnormal clothing.
15. Students 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. You must bring your 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. Each student 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.

After 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.

1. Chemical Engineering

1. Department of Chemical Engineering

The Bachelor of Science in Chemical Engineering programme 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.

A. 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
- Optimisation 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.

B. 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 program has been ABET-EAC accredited to September 30, 2021. According to the ABET-PEV, the following points have been addressed:

- The department has a low student-to-faculty ratio, and excellent student-faculty interactions.

- The program is evolving rapidly due to continuous improvement based on the assessment process.
- Laboratory facilities are well equipped & well maintained. Laboratory engineers are very knowledgeable. Students taking these laboratory courses are learning skills that are needed by local industries.

C. 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 first batch of the Chemical Engineering Program was started in September 2010, and the first graduating batch is expected in June 2014.

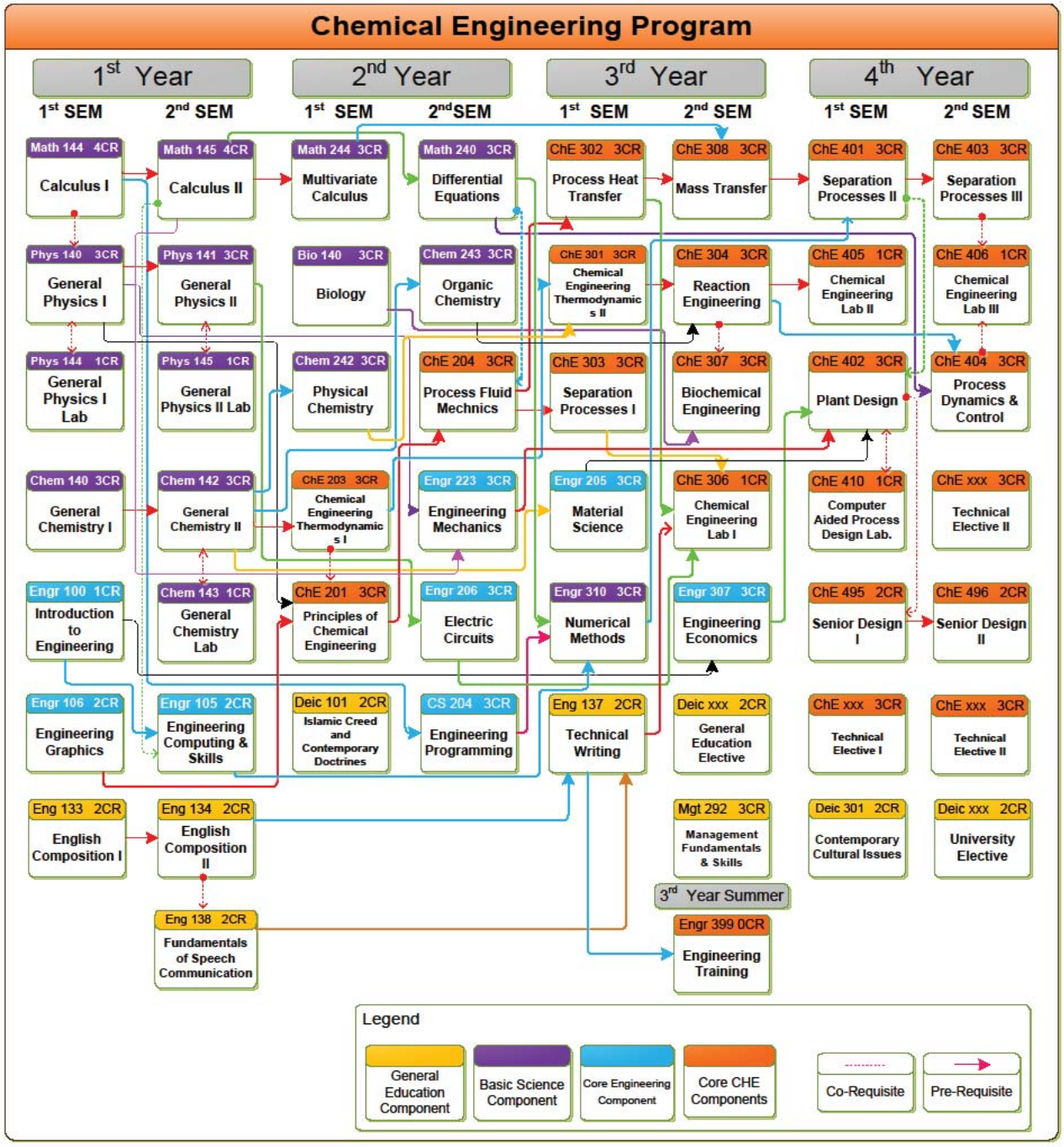
Chemical Engineering program is delivered through 8 full semesters (4 years) after completion of the preparatory year (2 semesters). The program is in-class, in the daytime, and on-campus. The classes are offered 5 days/week (Sunday through Thursday) through traditional lectures, lab work, and tutorial lectures. The 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 class rooms, 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.

D. Program Study Plan:

First Semester				
Course Code	**Course Title**	**CH**	**Pre-Requisites**	**Co-Requisites**
Phys 140	General Physics I	3	None	C: 0817-144 & C: 0814-144
Phys 144	General Physics I Lab	1	None	C: 0814-140
Chem 140	General Chemistry I	3	None	None
Math 144	Calculus I	4	None	None
Eng 133	English Composition I	2	None	None
Engr 100	Introduction to Engineering	1	None	None
Engr 106	Engineering Graphics	2	None	None
Total				**16 CH**
Second Semester				
Course Code	**Course Title**	**CH**	**Pre-Requisites**	**Co-Requisites**
Phys 141	General Physics II	3	P: 0814-140	C: 0814-145
Phys 145	General Physics II Lab	1	None	C: 0814-141
Chem 142	General Chemistry II	3	P: 0815-140	C: 0815-143
Chem 143	General Chemistry Lab	1	None	C: 0815-142
Math 145	Calculus II	4	P: 0817-144	None
Eng 134	English Composition II	2	P: 1722-133	
Eng 138	Fundamentals of Speech Communication	2	None	C : 1722-134
Engr 105	Engineering Computing & Skills	2	P: 2200-100	C: 0817-145
Total				**18 CH**
Third Semester				
Course Code	**Course Title**	**CH**	**Pre-Requisites**	**Co-Requisites**
Chem 242	Physical Chemistry	3	P: 0815-142	None
Bio 140	Biology	3	None	None
Math 244	Multivariate Calculus	3	P: 0817-145	None
ChE 201	Principles of Chemical Engineering	3	P: 0814-140 & P: 2200-106	None
ChE 203	Chemical Engineering Thermodynamics I	3	C: 0815-242 & C: 2204-201	C: 0815-242 & C: 2204-201
Deic 101	Islamic Creed & Con. Doct.	2	None	None
Total				**17 CH**
Fourth Semester				
Course Code	**Course Title**	**CH**	**Pre-Requisites**	**Co-Requisites**
Chem 243	Organic Chemistry	3	P: 0815-142	None
Math 240	Differential Equations	3	P: 0817-145	None
CS 204	Engineering Programming	3	P: 0817-144	None
Engr 206	Electric Circuits	3	P: 0814-141	None
Engr 223	Engineering mechanics	3	P: 0817-145 & P: 0814-140	None
ChE 204	Process Fluid Mechanics	3	P: 2204-201	C: 0817-240
Total				**18 CH**
Fifth Semester				
Course Code	**Course Title**	**CH**	**Pre-Requisites**	**Co-Requisites**
Mgt 290	Management Fundamentals & Skills	3	None	None

Engr 205	Materials Science	3	P: 0815-142	None
Engr 310	Numerical Methods	3	P:0817-240, P: 0901-204, P: 2200-105	None
ChE 301	Chemical Engineering Thermodynamics II	3	P: 2204-203 & P: 0815-242	None
ChE 302	Process Heat Transfer	3	P: 2204-204	None
ChE 303	Separation Processes I	3	P: 2204-204	None
Total				**18 CH**
Sixth Semester				
Course Code	**Course Title**	**CH**	**Pre-Requisites**	**Co-Requisites**
Eng 137	Technical Writing	2	P: 1722-134 & P: 1722-138	None
Engr 307	Engineering Economics	3	P: 2200-100	None
ChE 304	Reaction Engineering	3	P: 2204-301 & P: 0815-243	None
ChE 306	Chem. Eng. Lab. I	1	P: 2204-302 & P: 2204-303 & P: 2200-206	C: 1722-137
ChE 307	Biochemical Engineering	3	P: 0816-140	C: 2204-304
ChE 308	Mass Transfer	3	P: 2204-302 & P: 0817-244	None
Deic xxx	University Elective	2	None	None
Total				**17 CH**
Engr 399 Engineering Training (0 credits)				
Seventh Semester				
Course Code	**Course Title**	**CH**	**Pre-Requisites**	**Co-Requisites**
ChE 401	Separation Processes II	3	P: 2204-308 & P: 2200-310	None
ChE 402	Plant Design	3	P: 2200-307 & P: 2200-223 P: 2200-205	C: 2204-401 & C: 2204-410
ChE 405	Chem. Eng. Lab. II	1	P: 2204-304	None
ChE 410	Computer Aided Process Design Lab.	1	C: 2204-402	None
2204- 4xx	Technical Elective	3	P: مستوى سابع فما فوق	None
ChE 495	Senior Design I	2	P: مستوى سابع فما فوق	C: 2204-402
Deic 301	Contemporary Cultural Issues	2	None	None
Total				**15 CH**
Eighth Semester				
Course Code	**Course Title**	**CH**	**Pre-Requisites**	**Co-Requisites**
ChE 403	Separation Processes III	3	P: 2204-401	None
ChE 404	Process Dynamics & Control	3	P: 0817-240 & P: 2204-304	None
ChE 406	Chem. Eng. Lab. III	1	None	C: 2204-403 & C: 2204-404
ChE4xx	Technical Elective	3	P: مستوى سابع فما فوق	None
ChE4xx	Technical Elective	3	P: مستوى سابع فما فوق	None
ChE 496	Senior Design II	2	P: 2204-495	None
Deic xxx	University Elective	2	None	None
Total				**17 CH**
Grand Total				**136CH**


Chemical Engineering Program
1st Year
2nd Year
3rd Year
4th Year
1st SEM
2nd SEM
1st SEM
2ndSEM
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
ChE 302 3CR
Process Heat Transfer
ChE 308 3CR
Mass Transfer
ChE 401 3CR
Separation Processes II
ChE 403 3CR
Separation Processes III
Phys 140 3CR
General Physics I
Phys 141 3CR
General Physics II
Bio 140 3CR
Biology
Chem 243 3CR
Organic Chemistry
ChE 301 3CR
Chemical Engineering Thermodynamics II
ChE 304 3CR
Reaction Engineering
ChE 405 1CR
Chemical Engineering Lab II
ChE 406 1CR
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 223 3CR
Engineering Mechanics
Engr 205 3CR
Material Science
ChE 306 1CR
Chemical Engineering Lab I
ChE 410 1CR
Computer Aided Process Design Lab.
ChE xxx 3CR
Technical Elective II
Engr 100 1CR
Introduction to Engineering
Chem 143 1CR
General Chemistry Lab
ChE 201 3CR
Principles of Chemical Engineering
Engr 206 3CR
Electric Circuits
Engr 310 3CR
Numerical Methods
Engr 307 3CR
Engineering Economics
ChE 495 2CR
Senior Design I
ChE 496 2CR
Senior Design II
Engr 106 2CR
Engineering Graphics
Engr 105 2CR
Engineering Computing & Skills
Deic 101 2CR
Islamic Creed and Contemporary Doctrines
CS 204 3CR
Engineering Programming
Eng 137 2CR
Technical Writing
Deic xxx 2CR
General Education Elective
ChE xxx 3CR
Technical Elective I
ChE xxx 3CR
Technical Elective II
Eng 133 2CR
English Composition I
Eng 134 2CR
English Composition II
Mgt 292 3CR
Management Fundamentals & Skills
Deic 301 2CR
Contemporary Cultural Issues
Deic xxx 2CR
University Elective
3rd Year Summer
Eng 138 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
Edited by : Mohammad Younes

E. Course Descriptions (Catalog)

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): Course Description (catalog): The course is intended to cover the following subjects: 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. Co-requisite(s): Che 201 & Chem 242

Che 204- Process Fluid Mechanics 3(3-0-0): The course is intended to cover 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, Che 201& Chem 242

Che 302- Process Heat Transfer 3(3-0-0): The course is intended to cover the 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 & Math 244. Co-requisite(s): Engr 310

Che 303- Separation Processes I 3(3-0-0): The course is intended to cover 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. Co-requisite(s): Engr 223

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. Co-requisite(s): ChE 308.

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 306-Chemical Process lab I 1(0-0-3): Experiments selected from fluid mechanics, heat transfer and separation processes I courses. Three hours Lab. per week. Prerequisite(s): Che 303 & Che 302. Co-requisite(s): Eng 137.

Che 307- Biochemical Engineering 3(3-0-0): Introduction of chemical engineers 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 308- Mass Transfer 3(3-0-0)

Course Description (catalog): The course is intended to cover the following subjects: 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.

Che 401- Separation Processes II 3(3-0-0): The course is intended to cover the fundamentals & design-related issues of the following separation techniques: Absorption, Binary & Multi-component distillation, Liquid-liquid Extraction, and Leaching. Three 1-hour lectures per week. Prerequisite(s): Che 308.

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 206 & Che 308. 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, Engr 206 & 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 301& 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): The course covers: 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. Co-requisite(s): Che 304

Che 410-Computer Aided Process Design Lab. 1(0-0-3): Usage of commercial process simulation packages; Aspen One TM, CHEM CAD, Superpose or others in Process flow sheet simulation, Properties estimation, Equipment sizing, Process optimization, Process synthesis. Three 1-hour lectures per week. Co-requisite(s): Che 402.

Che 420 - Experimental Design and Data Analysis 3(3-0-0): The course is intended to cover: 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): The course is intended to cover: 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): The course is intended to cover: 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, Blaw molding, Thermoforming, film blowing. Three 1-hour lectures per week. Prerequisite(s): Chem 243 & Engr 205.

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. This course will cover the 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. The 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, hydrorteating, 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 304

Che 441- Intro. to Environmental Engineering 3(3 -0-0): The course covers the following topics: 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 305.

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 307.

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 302 & Che 308.

Che 452 – Air Pollution and Control 3(3-0-0): Students will learn about the economic, social and health implications of air pollution. Several examples of air pollution will be presented and discussed. Students in this course will learn about the methods of air pollution control and the design techniques used to create these technologies. Students will learn the sources, types and characteristics of air pollution. Students will demonstrate knowledge of air quality standards and other legislation containing air pollution. After completing this course, students should be able to identify the common types of air pollution, the main environmental regulations for air pollution, and the engineering alternatives for the control of air pollution. 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): None, but student's project may have specific pre-requisites that student's research advisor should identify before student enrolls in this class.

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

Che 495- 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 chemical component/system design from concept through final design and implementation. Emphasis on teamwork, project management, testing through simulation or prototype, oral and written communications. 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. Three 1-hour lectures per week. Prerequisite(s): Che 495.

2. Civil & Environmental Engineering

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.

2. Department of Civil Environmental Engineering

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 emphasise 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 globalised technology-based economy, able to embark on multiple career pathways.

1. What Civil Engineers Do?

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

2. 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 continuous hard work was culminated by applying to the accreditation cycle 2014-2015 of the international Accreditation Board for Engineering and Technology (ABET). In August 2015, the CE program received ABET accreditation through September 2021.

3. 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 Degree in Civil Engineering.

4. Program Study Plan:

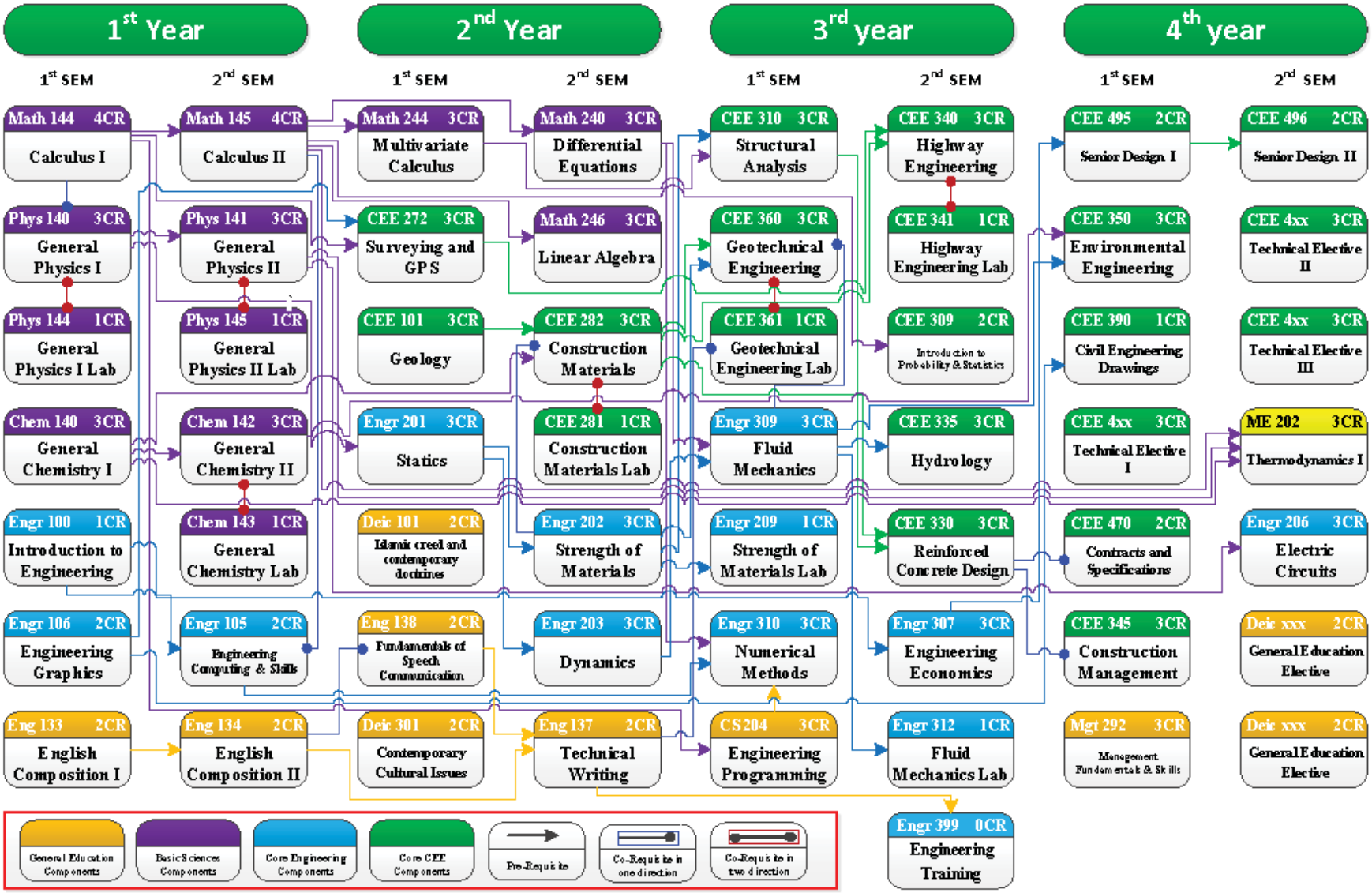
FIRST SEMESTER			
Course Code	Course Title	Credits	Pre-& Co-requisite

Engr 100	Introduction to Engineering	1	None
Engr 106	Engineering Graphics	2	None
Math 144	Calculus I	4	None
Phys 140	General Physics I	3	C: 0817-144, C: 0814-144
Phys 144	General Physics I Lab	1	C: 0814-140
Chem 140	General Chemistry I	3	None
Eng 133	English Composition I	2	None
	Total	16	
SECOND SEMESTER			
Eng 134	English Composition II	2	P: 1722-133
Engr 105	Engineering Computing & Skills	2	C: 0817-145 & P: 2200-100
Math 145	Calculus II	4	P: 0817-144
Chem 142	General Chemistry II	3	P: 0815-140 & C: 0815-143
Phys 141	General Physics II	3	P: 0814-140 & C: 0814-145
Phys 145	General Physics II Lab	1	C: 0814-141
Chem 143	General Chemistry Lab	1	C: 0815-142
Deic 301	Contemporary Cultural Issues	2	None
	Total	18	
Third SEMESTER			
Math 244	Multivariate Calculus	3	P: 0817-145
CEE 101	Geology	3	None
Engr 201	Statics	3	P: 0814-140
CEE 272	Surveying and GPS	3	P: 0817-144 & P: 2200-106
Eng 138	Fundamentals of Speech Communication	2	C: 1722-134
Deic 101	Islamic Creed and Contemporary Doctrines	2	None
	Total	16	
FOURTH SEMESTER			
Math 240	Differential Equations	3	P: 0817-145
Engr 203	Dynamics	3	P: 2200-201
Engr 202	Strength of Materials	3	P: 2200-201
Eng 137	Technical Writing	2	P: 1722-134
CEE 282	Construction Materials	3	P: 0815-140 & C: 2203-281, P:2203-101, C:2200-202
CEE 281	Construction Materials Lab	1	C: 2203-282
CS 204	Engineering Programming	3	P: 0817-144
	Total	18	
FIFTH SEMESTER			
Math 246	Linear Algebra	3	P: 0817-145
Engr 209	Strength of Materials Lab	1	P: 2200-202
Engr 310	Numerical Methods	3	P: 0817-240 & P: 0901-204 & P: 2200-105
Engr 309	Fluid Mechanics	3	P: 2200-203 & P: 0817-240
CEE 360	Geotechnical Engineering	3	P: 2203-282 & P: 2200-202 & C: 2203-361, C: 2200-309
CEE 361	Geotechnical Engineering Lab	1	C: 2203-360, C: 1722-137

CEE 310	Structural Analysis	3	P: 2200-202 & P: 0817-244
	Total	17	
SIXTH SEMESTER			
CEE 340	Highway Engineering	3	P: 2203-272 & P: 2203-282 & C: 2203-341
CEE 341	Highway Engineering Lab	1	C: 2203-340
CEE 309	Introduction to Probability & Statistics	2	P: 0817-145
CEE 335	Hydrology	3	P: 2200-309
CEE 330	Reinforced Concrete Design	3	P: 2203-310 & P: 2203-282
Engr 307	Engineering Economics	3	P: 2200-100
Engr 312	Fluid Mechanics Lab	1	P: 2200-309
Deic xxx	General Education Elective	2	None
Total		18	
SEVENTH SEMESTER			
CEE 345	Construction Management	3	C: 2203-330
CEE 350	Environmental Engineering	3	P: 0815-142 & P: 2200-309
CEE 390	Civil Engineering Drawings	1	P: 2200-106
CEE 4XX	Technical Elective I	3	
CEE 495	Senior Design I	2	P: مستوى سابع فما فوق (level seven or above), P:2200-307
CEE 470	Contracts and Specifications	2	C: 2203-330
Mgt 292	Management Fundamentals & Skills	3	None
	Total	17	
EIGHTH SEMESTER			
Deic xxx	General Education Elective	2	None
Engr 206	Electric Circuits	3	P: 0814-141
CEE 4XX	Technical Elective II	3	
CEE 4XX	Technical Elective III	3	
CEE 496	Senior Design II	2	P: 2203-495
ME 202	Thermodynamics I	3	P:0815-140 & P: 0814-141 & P: 0817-145
	Total	16	
DEPARTMENT ELECTIVE			
CEE 410	Advanced Structural Analysis	3	P: 2203-310
CEE 411	Transportation Engineering	3	P: 2203-272, P:2203-309
CEE 427	Foundation Engineering	3	P: 2203-360 & C: 2203-330
CEE 430	Steel Design	3	P: 2203-310
CEE 436	Bridge Engineering	3	P: 2203-330
CEE 439	Finite Element Method	3	P: 2203-310 & P: 0901-204 & P: 0817-246
CEE 451	Water Supply and Wastewater Treatment	3	P: 2203-335
CEE 452	Air Pollution	3	P: 2203-350
CEE 453	Solid Waste Management	3	P: 2203-350
CEE 460	Rock Mechanics & Underground Structures	3	P: 2203-360
CEE 462	Advanced Concrete Design	3	P: 2203-330
CEE 472	Applications of GIS in Civil Engineering	3	P: 7th level sem., P:2203-272
CEE 480	Advanced Concrete Technology	3	P: 2203-330

CEE 493	Estimating Construction Cost	3	C:2203-390 & P: 2203-282
CEE 494	Safety and Risk Management in Construction	3	P: 2200-307 & P: 2203-345
CEE 485	Special Topics in Civil Engineering	3	P: مستوى سابع فما فوق (level seven or above)
CEE 488	Advanced Asphalt Materials	3	P: 2203-340 & P:2203- 341
CEE 486	Undergraduate Research	3	P: 7th level or above
UNIVERSITY ELECTIVE			
Deci 102	Fiqh Biography	2	None
Deci 302	Science and Technology Issues in Islam	2	None
Deci 317	Islamic Morals and Ethics	2	None
Deci 318	Economic System in Islam	2	None
Deci 401	Social System in Islam	2	None
Deci 418	Political System and Human Rights in Islam	2	None

Civil Engineering Program



5. Course Descriptions (Catalog)

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 centriod 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 this 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.*

CCE 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.*

CCE 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 equipments, determination of the rheological properties of Bitumen using SuperPave equipments, Evaluation of Hot Mix Asphalt (HMA) using SuperPave equipments. *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, 3, 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-rerequisite: CEE 330.*

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

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 & (7^{th} 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: 7^{th} 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: 7^{th} 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)

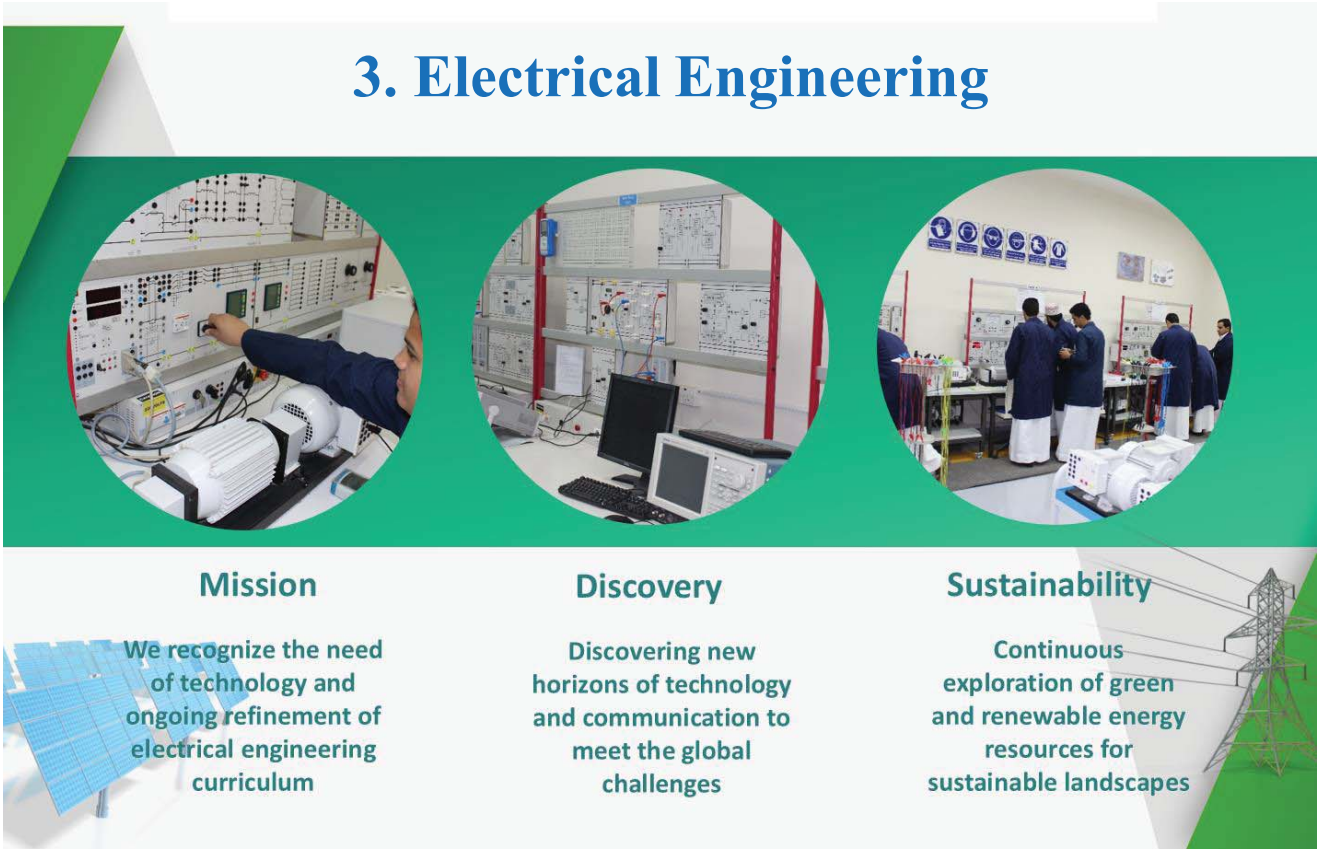
Course Description (catalog): This course covers in depth safety and risk management in construction including the followings: Construction accidents and injuries, Cost of construction worker injuries, OSHA, Problem areas in construction safety, Job-site safety assessment, Safety meetings, Safety in 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 (2, 0, 0)

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 (2, 0, 0)

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.*



3- Department of Electrical Engineering

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 programme which emphasise 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.

1. 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 controls
    - 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.

2. Note From Department 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.

As of August 2015, the Department has received accreditation from ABET through September 2021. 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.

3. 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.

4. Program Study Plan:

EE program requires the undertaking the following set of courses as shown in the flowchart.

FIRST SEMESTER			
Course Code	**Course Title**	**C.H.**	**Pre-& Co-requisite**
Math 144	Calculus I	4	None
CChem 140	General Chemistry I	3	None
ENG 133	English Composition I	2	None
Engr 100	Introduction to Engineering	1	None
Engr 106	Engineering Graphics	2	None
Phys 140	General Physics I	3	C: Math 144
Phys 144	General Physics I Lab	1	C: Phys 140
Total		**16**	
SECOND SEMESTER			
Engr 105	Engineering Computing & Skills	2	C: Math 145
Math 145	Calculus II	4	P: Math 144
Eng. 138	Fundamentals of Speech Comm.	2	C: Eng. 134
CChem 142	General Chemistry II	3	P: Chem 140
ENG 134	English Composition II	2	P: Eng. 133
CChem 143	General Chemistry Lab	1	C: Chem142
Phys 141	General Physics II	3	P: Phys 140
Phys 145	General Physics II Lab	1	C: Phys 141
Total		**18**	
THIRD SEMESTER			
EE 241	Electric Circuits I	3	C: Math 240 & EE 247

EE 247	Electric Circuits Lab	1	C: EE 241
EE 231	Digital Logic Design	3	P: Math 145, C: EE 232
EE 232	Digital Logic Design Lab	1	C: EE 231
Deci xxx	University Elective	2	None
Math 244	Multivariate Calculus	3	P: Math 145
Deci 101	Islamic Creed & Con. Doct.	2	None
Math 240	Differential Equations	3	P: Math 145
Total		**18**	
FOURTH SEMESTER			
Eng. 137	Technical Writing	2	P: Eng. 134
Math 215	Math for EE	3	P: Math 145
EE 243	Electronics I	3	P: EE 241, C: EE 248
EE 248	Electronic Circuits Lab	1	P: EE 247 & C: EE 243
Deci 301	Islamic Culture	2	None
EE 242	Electric Circuits II	3	P: EE 241
CS 204	Engineering Programming	3	P: Math 144
Total		**17**	
FIFTH SEMESTER			
EE 233	Microprocessors	3	P: EE 231 & CS 204, C: EE 234
EE 234	Microprocessors Lab	1	P: EE 232 & C: EE 233
EE 331	Engineering Electromagnetism	3	P: EE 242 & P: Math 244
Engr 340	Probability & Statistics for Engineers	3	P: Math 145, C: EE 330
EE 244	Electronics II	3	P: EE 243
EE 330	Signals and Systems	3	P: Math 215 & Math 240 & EE 242
Total		**16**	
SIXTH SEMESTER			
Engr 205	Materials Science	3	P: CChem 142
Engr 310	Numerical Methods	3	P: Math 240 & P: CS 204
EE 332	Communication Systems Fundamentals	3	P: EE 330 & Engr 340 & C: EE 333
EE 333	Communication Systems Fundamentals Lab	1	P: EE 248 & C: EE 332
EE 335	Electric Energy & Power Systems	3	P: EE 242 & C: EE 336
EE 336	Electric Energy & Power Systems Lab	1	P: EE 247 & C: EE 335
Engr 223	Engineering mechanics	3	P: Math 145 & Phys140
Total		**17**	
SEVENTH SEMESTER			
EE 434	Digital Systems & Signal Processing	3	P: EE 330
Deci xxx	University Elective	2	None
EE 495	Senior Design I	2	P: 4th year level
EE 4xx	Technical Elective	3	
EE 431	Mechatronics & Controls Lab	1	P: EE 234 & C: EE 430 & C: EE 429
EE 429	Mechatronics	3	P: EE 330 & EE 233
EE 430	Analogue Control Systems	3	P: EE 330
Total		**17**	
EIGHTH SEMESTER			
EE 4xx	Technical Elective	3	
EE 4xx	Technical Elective	3	
EE 496	Senior Design II	2	P: EE 495
Engr 307	Engineering Economics	3	P: Engr 100
Engr 303	Thermos Fluids	3	P: Phys140 & P: CChem 142
Mg 292	Management Fundamentals & Skills	3	None
Total		**17**	
DEPARTMENT ELECTIVE			
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
UNIVERSITY ELECTIVE			
Deci 102	Fiqh Biography	2	None
Deci 302	Islam and Science & Technology Issues	2	None
Deci 317	Islamic Morals and Ethics	2	None
Deci 318	Economic System in Islam	2	None
Deci 401	Islamic Social System	2	None
Deci 418	Political System and Human Rights in Islam	2	None

Department of Electrical Engineering
Study Plan Flowchart Updated Spring 2018

Year 1		Year 2		Year 3		Year 4	
Term 1	Term 2	Term 3	Term 4	Term 5	Term 6	Term 7	Term 8
ENGR100 Intro to Engineering (1 | 1 0 0)	MATH144 / MATH145 Calculus II (4 | 4 0 0)	EE241 / EE 247 MATH 240 Electric Circuits I (3 | 3 0 0)	EE241 / EE242 Electric Circuits II (3 | 2.5 0.5 0)	Math 215 / Math 240 / EE 242 / EE 330 Signals and Systems (3 | 3 0 0)	EE 242 / EE335 / EE336 Electric & Energy Systems (3 | 3 0 0)	EE495 Senior Design I (2 | 0 2 0)	EE405 / EE496 Senior Design II (2 | 0 2 0)
ENGR 106 Engineering Graphics (2 | 0 2 0)	PHYS140 / PHYS141 PHYS145 / General Physics II (3 | 3 0 0)	EE241 / EE 247 Electric Circuits Lab (1 | 0 3 0)	MATH144 / CS 204 Engineering Programming (3 | 3 0 0)	EE243 / EE244 Electronics II (3 | 3 0 0)	EE 247 / EE336 Electric & Energy Systems LAB (1 | 0 3 0)	EE 330 / EE 233 / EE429 Mechatronics (3 | 3 0 0)	Phys 140 / Chem142 / ENGR 303 Thermo Fluids (3 | 3 0 0)
MATH144 Calculus I (4 | 4 0 0)	PHYS145 / PHYS141 General Physics II Lab (1 | 0 3 0)	MATH145 / MATH 244 Multivariate Calculus (3 | 3 0 0)	EE241 / EE 243 EE 248 Electronics I (3 | 3 0 0)	EE232 / EE 234 EE 233 Microprocessors Lab (1 | 0 3 0)	EE 330 / Engr340 / EE 332 EE 333 Comm. Systems Fundamentals (3 | 3 0 0)	EE 330 / EE 430 Analogue Control Systems (3 | 3 0 0)	ENGR100 / ENGR 307 Engineering Economics (3 | 3 0 0)
PHYS140 / PHYS144 MATH144 General Physics I (3 | 3 0 0)	CHEM140 / CHEM142 General Chemistry II (3 | 3 0 0)	MATH145 / EE 231 EE 232 Digital Logic Design (3 | 3 0 0)	EE247 / EE 248 EE 243 Electronic Circuits Lab (1 | 0 3 0)	EE 231 / CS 204 / EE233 EE 234 Microprocessors (3 | 3 0 0)	EE 248 / EE 333 EE 332 Communications Systems Fund Lab (1 | 0 3 0)	EE 234 / EE 431 EE 429 / EE 430 Mechatronics & Controls Lab (1 | 0 3 0)	MGT292 Management Fundamentals & Skills (3 | 3 0 0)
PHYS140 / PHYS144 PHYS 140 General Physics Lab (1 | 0 1 0)	CHEM 143 / CHEM 142 General Chemistry Lab (1 | 0 3 0)	EE 232 / EE 231 Digital Logic Design Lab (1 | 0 3 0)	1900102 Islamic culture (2 | 2 0 0)	Math244 / EE 242 / EE 331 Engineering Electromagnetism (3 | 3 0 0)	Chem 142 / ENGR 205 Material Science (3 | 3 0 0)	EE 330 / EE 434 Digital Systems & Signal Processing (3 | 3 0 0)	EE 4## Technical Elective (3 | 3 0 0)
CHEM140 General Chemistry I (3 | 3 0)	ENGR 105 / MATH 145 Engineering Computing & Skills (2 | 2 0 0)	MATH145 / MATH 240 Differential Equations (3 | 3 0 0)	MATH145 / MATH 215 Math for EE (3 | 3 0 0)	Math 215 / ENGR 340 EE 330 Probability & Statistics for Engineers (3 | 3 0 0)	MATH 145 / PHYS 140 / ENGR 223 Engineering Mechanics (3 | 3 0 0)	EE4## Technical Elective (3 | 3 0 0)	EE 4## Technical Elective (3 | 3 0 0)
ENG133 English Composition I (2 | 2 0 0)	ENG133 / ENG 134 English Composition II (2 | 2 0 0)	1900 ### University Elective (2 | 2 0 0)	ENG134 / ENG 137 Technical Writing (2 | 2 0 0)		Math 240 / CS 204 / ENGR 310 Numerical Methods (3 | 3 0 0)	1900### University Elective (2 | 2 0 0)	

ENG124 / ENG125	Fund of Speech Communication (2 | 2 0 0)
1900101	Creed & Doctrines (2 | 2 0 0)

Pre Code	Co-R Course Title
CH	L P T

5. Course Descriptions (Catalog)

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 hour lecture per week.

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

Course Description (catalog): 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)

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: 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)

Course Description (catalog): 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)

Course Description (catalog): 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)

Course Description (catalog): 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)

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. Three one-hour lecture periods per week. Pre-requisite: Engr 100

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 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)

Course Description (catalog): 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 145 and Co-requisite: EE 330

Engr 399 Engineering Training (0 CH)

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. Pre-requisite(s): Department Approval

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

Course Description (catalog): 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)

Course Description (catalog): 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)

Course Description (catalog): 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 and CS 204. Co-requisite EE 234.

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

Course Description (catalog): 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)

Course Description (catalog): 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. Co-requisite: Math 240 & EE 247.

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

Course Description (catalog): 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)

Course Description (catalog): 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. Co-requisite: EE 248.

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

Course Description (catalog): 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)

Course Description (catalog): 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)

Course Description (catalog): Lab experiments for EE 243 using diodes, BJTs and MOSFETs. Software circuit simulations will be used. Three hours lab per week. Pre-requisite EE 241, Co-requisite: EE 243.

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

Course Description (catalog): 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)

Course Description (catalog): 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)

Course Description (catalog): 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)

Course Description (catalog): 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 248. Co-requisite: EE 332.

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

Course Description (catalog): 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)

Course Description (catalog): 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 247. Co-requisite: EE 335.

EE 429 Mechatronics 3(3,0,0)

Course Description (catalog): 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)

Course Description (catalog): 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 lecture periods per week. Pre-requisite: EE 330.

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

Course Description (catalog): 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 team work 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 Description (catalog): 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)

Course Description (catalog): 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)

Course Description (catalog): Basic Principles of power Systems; Generator - 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)

Course Description (catalog): 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 and EE 243 & EE 336.

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

Course Description (catalog): 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.

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

Course Description (catalog): 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 232.

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

Course Description (catalog): 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 486 Digital Communication Systems 3(2.5,1.5,0)

Course Description (catalog): 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)

Course Description (catalog): 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)

Course Description (catalog): 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 332 & EE 333.

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

Course Description (catalog): 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)

Course Description (catalog): 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)

Course Description (catalog): 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 331** and **EE 244**

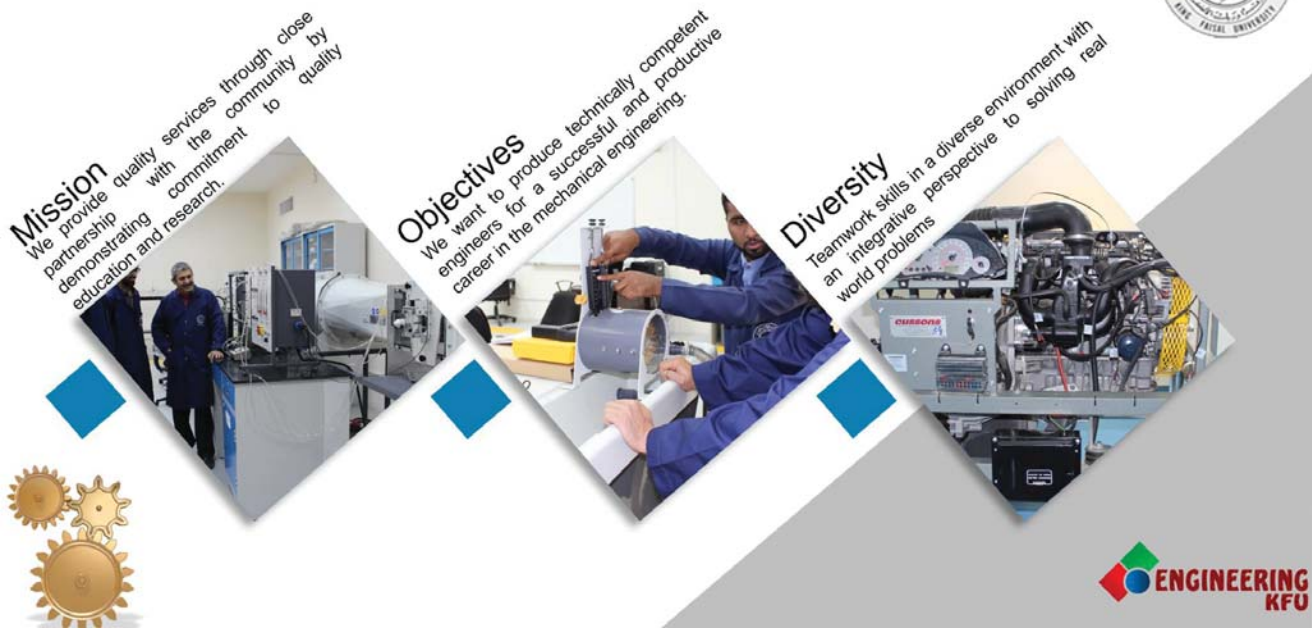
EE 495 Senior Design I 2(1,1,0)

Course Description (catalog): 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

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

Course Description (catalog): 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.

4. Mechanical Engineering



4- Department of Mechanical Engineering

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 programme which emphasise 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.

1. 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 specialised 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.

2. 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.

3. Program Description

The program has come a long way in applying for the ABET accreditation. The continuous hard work was culminated by applying to the ABET accreditation cycle 2014-2015. The ME program is ABET accredited to September 2021.

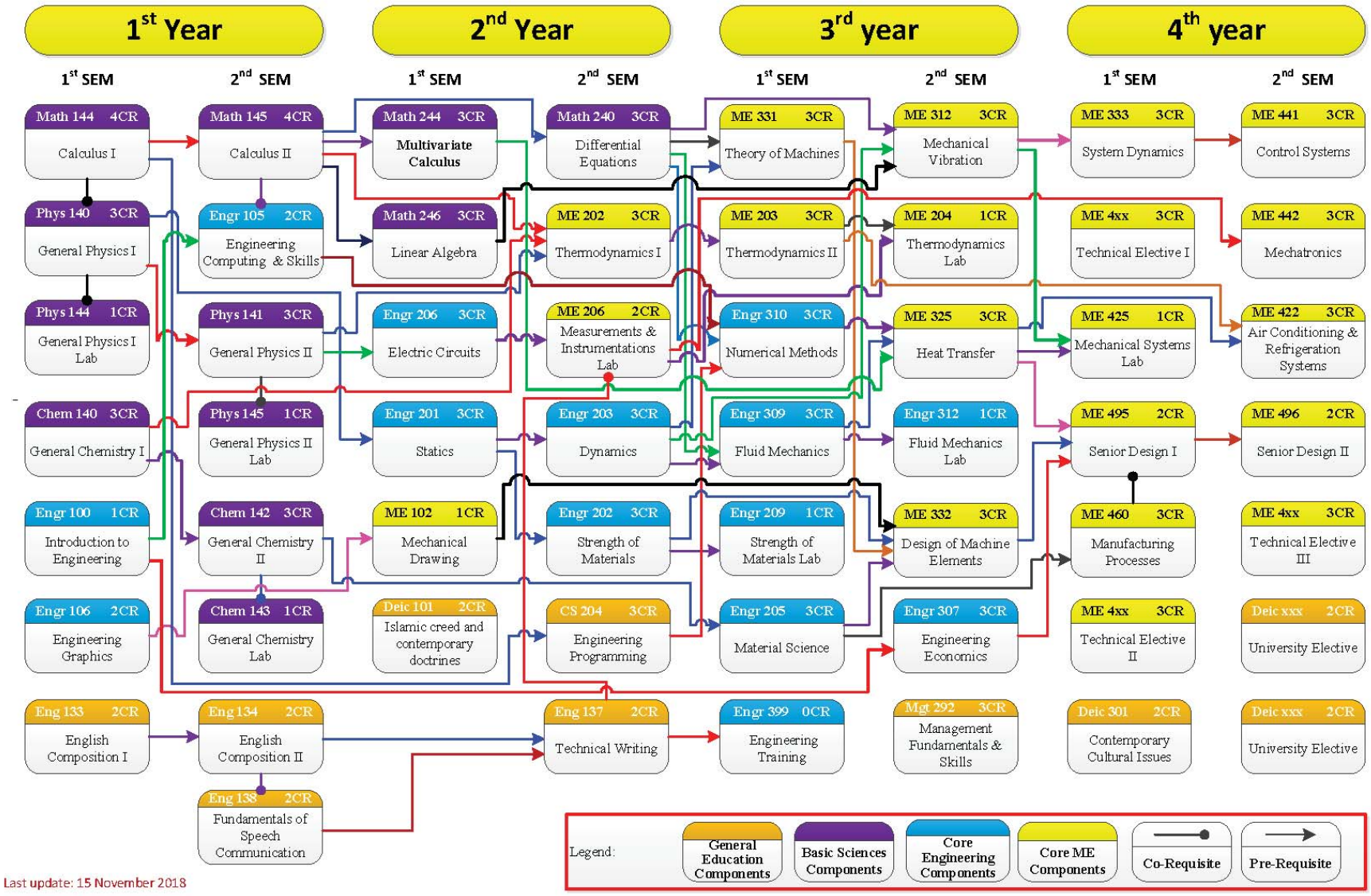
4. Program Study Plan:

FIRST SEMESTER			
Course Code	Course Title	Credits	Pre-& Co-requisite
Engr 100	Introduction to Engineering	1	None
Engr 106	Engineering Graphics	2	None
Math 144	Calculus I	4	None
Chem 140	General Chemistry I	3	None
Eng 133	English Composition I	2	None
Phys 140	General Physics I	3	C: 0817-144
Phys 144	General Physics I Lab	1	C: 0814-140
	Total	16	
SECOND SEMESTER			
Eng 134	English Composition II	2	P: 1722-133
Chem 142	General Chemistry II	3	P: 0815-140
Chem 143	General Chemistry Lab	1	C: 0815-142

Math 145	Calculus II	4	P: 0817-144
Phys 141	General Physics II	3	P: 0814-140
Phys 145	General Physics II Lab	1	C: 0814-141
Eng 138	Fundamentals of Speech Communication	2	C : 1722-134
Engr 105	Engineering Computing & Skills	2	P: 2200-100 & C: 0817-145
	Total	18	
Third SEMESTER			
Math 244	Multivariate Calculus	3	P: 0817-145
Deic 101	Islamic Creed and Contemporary Doctrines	2	None
Engr 201	Statics	3	P: 0814-140
Math 246	Linear Algebra	3	P: 0817-145
Engr 206	Electric Circuits	3	P: 0814-141
ME 102	Mechanical Drawing	1	P: 2200-106
	Total	15	
FOURTH SEMESTER			
Math 240	Differential Equations	3	P: 0817-145
CS 204	Engineering Programming	3	P: 0817-144
Eng 137	Technical Writing	2	P: 1722-134 & P: 1722-138
Engr 203	Dynamics	3	P: 2200-201
ME 202	Thermodynamics I	3	P:0815-140 & P: 0814-141 & P: 0817-145
Engr 202	Strength of Materials	3	P: 2200-201
ME 206	Measurements & Instrumentations	2	P: 2200-206 & C: 1722-137
	Total	19	
FIFTH SEMESTER			
Engr 310	Numerical Methods	3	P: 0817-240 & P: 0901-204 & P: 2200-105
ME 203	Thermodynamics II	3	P: 2201-202
Engr 205	Materials Science	3	P: 0815-142
ME 331	Theory of Machines	3	P: 2200-203 & P: 0817-240
Engr 309	Fluid Mechanics	3	P: 2200-203 & P: 0817-240
Engr 209	Strength of Materials Lab	1	P: 2200-202
Engr 399	Engineering Training	0	P:1722-137
	Total	16	
SIXTH SEMESTER			
Engr 307	Engineering Economics	3	P: 2200-100
Mgt 292	Management Fundamentals & Skills	3	None
ME 325	Heat Transfer	3	P: 2200-309 & 2200-310 & P: 0817-244
ME 332	Design of Machine Elements	3	P: 2200-205 & P: 2200-202 & P: 2201-331 & P: 2201-102
ME 204	Thermodynamics Lab	1	P: 2201-203 & P: 2201-206
ME 312	Mechanical Vibration	3	P: 2200-203 & P: 0817-240 & P: 0817-246
Engr 312	Fluid Mechanics Lab	1	P: 2200-309
	Total	17	
SEVENTH SEMESTER			

Deic 301	Contemporary Cultural Issues	2	P: 2201-312
ME 333	System Dynamics	3	P: 2200-205
ME 460	Manufacturing Processes	3	P: 2201-325 & P: 2201-312
ME 425	Mechanical Systems Lab	1	P: 2201-332 , P: 2201-325 & P: 2200-307 & C:2201-460
ME 495	Senior Design I	2	P: 220X-XXX
ME 4xx	Technical Elective	3	P: 220X-XXX
ME 4xx	Technical Elective	3	P: 2201-312
	Total	17	
EIGHTH SEMESTER			
Deic xxx	University Elective	2	None
Deic xxx	University Elective	2	None
ME 441	Control Systems	3	None
ME 422	Air Conditioning & Refrigeration Systems	3	P: 2201-333
ME 496	Senior Design II	2	P: 2201-203 & 2201-325
ME 442	Mechatronics	3	P: 2201-495
ME 4xx	Technical Elective	3	P:2201-206
	Total	18	
DEPARTMENT ELECTIVE			
ME 420	Design of Thermal Systems	3	P: 2201-203 & 2201-325
ME 421	Internal Combustion Engines	3	P: 2201-203 & 2201-325
ME 423	Renewable & Solar Energy	3	P: 2201-203 & 2201-325
ME 426	Energy Conversion	3	P: 2201-203 & 2201-325
ME 427	Turbomachinary	3	P: 2201-325
ME 430	Computer Aided Design	3	P: 2201-332
ME 445	Robotics	3	P: 2200-203 & 2200-310
ME 467	Nanotechnology	3	P: 2200-205 & P: (level seven or above)
ME 431	Finite Element Method	3	P: 2201-332 & P: 2201-325
ME 481	Undergraduate Research I	3	P: (level seven or above)
ME 482	Undergraduate Research II	3	P: (level seven or above)
ME 484	Special Topics I	3	P: (level seven or above)
ME 485	Special Topics II	3	P: (level seven or above)
EE 429	Mechatronics	3	P: 2202-330
EE 483	Modern Control Systems	3	P: 2202-430
UNIVERSITY ELECTIVE			
Deci 102	Fiqh Biography	2	None
Deci 302	Science and Technology Issues in Islam	2	None
Deci 317	Islamic Morals and Ethics	2	None
Deci 318	Economic System in Islam	2	None
Deci 401	Social System in Islam	2	None
Deci 418	Political System and Human Rights in Islam	2	None

Mechanical Engineering Program



Last update: 15 November 2018

5. Courses Description Catalogue:

ME 102-Mechanical Drawing I 1(0,3,0)

Course Description (catalog): 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.

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.

ME 203–Thermodynamics II 3(3,0,0)

Course Description (catalog): 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.

ME 204– Thermodynamics Lab 1(0,3,0)

Course Description (catalog): 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 Stirling 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.

ME 206–Measurements & Instrumentations Lab 2(1,3,0)

Course Description (catalog): 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.

ME 312–Mechanical Vibrations 3(3,0,0)

Course Description (catalog): 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.

ME 325–Heat Transfer 3(3,0,0)

Course Description (catalog): The course addresses the mechanism of heat transfer modes, introduction to conduction, the thermal conductivity of solids, diffusion equation, heat transfer in fins and extended surfaces, multi-dimensional steady-state conduction, transient conduction, lumped capacitance method, introduction to convection, forced convection, natural convection, hydrodynamic and thermal boundary layers, forced convection external flow, heat exchangers, an introduction to basic radiation.

ME 331–Theory of Machines 3(3,0,0)

Course Description (catalog): Theory of Machines and Mechanisms is a study of linear and angular displacements, velocities, accelerations of points and 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, and reciprocating engines.

ME 332–Design of Machine Elements 3(3,0,0)

Course Description (catalog): Design of mechanical elements: Initially students will be familiarized with some concepts and definitions, and then they will be introduced to general considerations & procedure of machine design: general principles of machine design, static strength and failure theories, fatigue strength and failure theories. Finally, the students will be introduced to the basic design principles of some machine elements and their selection; shafts, power screws, fasteners, and mechanical springs, bearings; spur and helical gears; flywheels, clutches and brakes. Also, the students will be introduced to the ethical and social impacts of mechanical design.

ME333–System Dynamics 3(3,0,0)

Course Description (catalog): 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.

ME 420-Design of Thermal Systems 3(3,0,0)

Course Description (catalog): 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.

ME 421–Internal Combustion Engines 3(3,0,0)

Course Description (catalog): 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.

ME 422–Air Conditioning and Refrigeration Systems 3(3,0,0)

Course Description (catalog): Review of psychrometry. 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.

ME 423–Renewable and Solar Energy 3(3,0,0)

Course Description (catalog): 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.

ME425–Mechanical System Lab 1(0,3,0)

Course Description (catalog): 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,

ME 426–Energy Conversion 3(3,0,0)

Course Description (catalog): 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.

ME 427–Turbomachinery 3(3,0,0)

Course Description (catalog): Turbomachinery classifications and terminology. Implementation of dimensional analysis for predicting performance of turbomachines 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 turbomachines (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. Turbomachinery emissions and their control technologies and strategies. Design and selection of turbomachines for various engineering applications.

ME 430–Computer Aided Design 3(3,0,0)

Course Description (catalog): 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.

ME431–Finite Element Method 3(3,0,0)

Course Description (catalog): 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.

ME441–Control Systems 3(3,0,0)

Course Description (catalog): 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

ME 442-Mechatronics 3(3,0,0)

Course Description (catalog): The mechatronics course provides the student with a general overview of an integrated electromechnical 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.

ME 445–Robotics 3(3,0,0)

Course Description (catalog): 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.

ME460–Manufacturing Processes 3(3,0,0)

Course Description (catalog): Metal casting, forming and chip removal processes, cutting tools, cutting fluids, forces and power. consumption. Investigation of conventional and non-conventional manufacturing processes.

ME 467–Nanotechnology 3(3,0,0)

Course Description (catalog): 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 lithographies, self-assembly, biocatalytic 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, and actuators

ME 481-Undergraduate Research I 3(3,0,0)

Course Description (catalog): Individual research projects for students, Requires prior approval of, and arrangement with, a faculty research advisor. Prerequisite: Dept. Approval.

ME 482-Undergraduate Research II 3(3,0,0)

Course Description (catalog): The second part of ME481. Prerequisite: ME481.

ME 484-Special Topics I 3(3,0,0)

Course Description (catalog): Topics determined by the course instructor in consultation the department chair. Prerequisite: Dept. Approval.

ME 485-Special Topics II 3(3,0,0)

Course Description (catalog): The second part of ME484. Prerequisite: ME484.

ME 495-Senior Design I 2(1,0,1)

Course Description (catalog): 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.

ME 496-Senior Design II 2(1,0,1)

Course Description (catalog): 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. Similar to 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.

5- Department of Biomedical Engineering

1. Note from the Program Chair

Biomedical Engineering (BME) is a multidisciplinary field that applies the concepts of engineering and technology to solve medical and biological problems which in turn improves the performance of healthcare communities. The biomedical industry and healthcare organizations are continuously seeking highly qualified biomedical engineers. Upon that significant demand to biomedical engineers, KFU launched the BME bachelor program for female students in 1435 H (2014 AD). This program aims to be one of the leading BME programs locally and internationally by providing the society with distinct biomedical engineers and conducting high-impact researches.

2. 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, specially 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.

3. Program Mission, PEOs and SOs

Mission:

Through close partnership with the community, industry and research foundations, the Biomedical Engineering (BME) Department is committed to provide platform for quality education and high standard cutting-edge research to improve health care and ultimately human life.

4. Program Educational Objectives (PEOs):

Towards attaining the program mission, the Biomedical Engineering Department aims to prepare competent graduates who would be:

- Technically proficient to apply knowledge of mathematics, basic sciences, life sciences, engineering, and the humanities to critically solve multidisciplinary problems at the interface of engineering, biology and medicine appropriate to their chosen profession.
- Capable of pursuing postgraduate studies and research.
- Able to demonstrate their effective communication and teamwork skills in a diverse environment with an integrative perspective to solving biomedical engineering problems.
- Motivated towards life-long learning and understanding contemporary issues at the interface of biomedical sciences, engineering, and the society.

5. Student Outcomes (SOs):

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

a. An ability to apply knowledge of mathematics, statistics & probability, science, and engineering fundamentals to biomedical engineering applications.
b. An ability to design and conduct experiments, as well as to analyze and interpret data and present results in a professional manner.
c. An ability to design, model, analyze and realize components, systems, or processes to meet specific requirements and realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
d. An ability to function on multidisciplinary teams.
e. An ability to identify, formulate, and solve engineering problems, including environmental issues.
f. An ability to understand professional and ethical responsibilities of issues in biomedical engineering practice.
g. An ability to communicate effectively.
h. An ability to understand the impact of engineering solutions in a global, environmental, cultural, economic, and societal context.
i. An ability to recognize the need for professional development & the ability to engage in life-long learning.
j. An ability to recognize contemporary issues related to Biomedical Engineering.
k. An ability to use the techniques, skills, and modern engineering and computing tools necessary for engineering practice.

6. Program Study Plan

الخطة الدراسية لبرنامج بكالويوس الهندسة الطبية

Study plan of bachelor degree in BME

- Basic sciences and university elective courses
- General engineering courses
- Biomedical engineering courses

Semester 1							
Course Number	Course Code	Course Title	Units / Credits	Type	Pre-& Co-requisite	اسم المقرر	رمز المقرر
0817-144	Math 144	Calculus I	٤	اجباري كلية	None	تفاضل و تكامل ١	ريض ١٤٤
0815-140	Chem 140	General Chemistry I	٣	اجباري كلية	None	كيمياء عامة ١	كيم ١٤٠

1722-133	ENG 133	English Composition I	٢	اجباري كلية	None	تعبير انجليزي ١	نجل ١٣٣
2200-100	Engr 100	Introduction to Engineering	١	اجباري كلية	None	مدخل الى الهندسة	هـ ١٠٠
2200-106	Engr 106	Engineering Graphics	٢	اجباري كلية	None	الرسم الهندسي	هـ ١٠٦
0814-140	Phys 140	General Physics I	٣	اجباري كلية	C: 0817-144 & C: 0814-144	فيزياء عامة ١	فيز ١٤٠
0814-144	Phys 144	General Physics I Lab	١	اجباري كلية	C: 0814-140	مختبر فيزياء عامة ١	فيز ١٤٤
			16 hrs				
Semester 2							
2200-105	Engr 105	Engineering Computing & Skills	٢	اجباري كلية	C: 0817-145	مهارات حاسوبية هندسية	هـ ١٠٥
0817-145	Math 145	Calculus II	٤	اجباري كلية	P: 0817-144	تفاضل و تكامل ٢	ريض ١٤٥
2206-204	BME 204	Anatomy and Physiology l	٢	اجباري قسم	P: 0815-140	علم التشريح ووظائف الأعضاء ١	هط ٢٠٤
0815-142	Chem 142	General Chemistry II	٣	اجباري كلية	P: 0815-140 & C: 0815-143	كيمياء عامة ٢	كيم ١٤٢
1722-134	ENG 134	English Composition II	٢	اجباري كلية	P: 1722-133	تعبير انجليزي ٢	نجل ١٣٤
0815-143	Chem 143	General Chemistry Lab	١	اجباري كلية	C: 0815-142	مختبر كيمياء عامة	كيم ١٤٣
0814-141	Phys 141	General Physics II	٣	اجباري كلية	P: 0814-140 & C: 0814-145	فيزياء عامة ٢	فيز ١٤١
0814-145	Phys 145	General Physics II Lab	١	اجباري كلية	C: 0814-141	مختبر فيزياء عامة ٢	فيز ١٤٥
			18 hrs				
Semester 3							
2206-304	BME 304	Anatomy and Physiology ll	٤	اجباري قسم	P: 2206-204	علم التشريح ووظائف الأعضاء ٢	هط ٣٠٤
2206-220	BME 220	Biomaterials	٣	اجباري قسم	P: 2206-204	المواد الحيوية	هط ٢٢٠

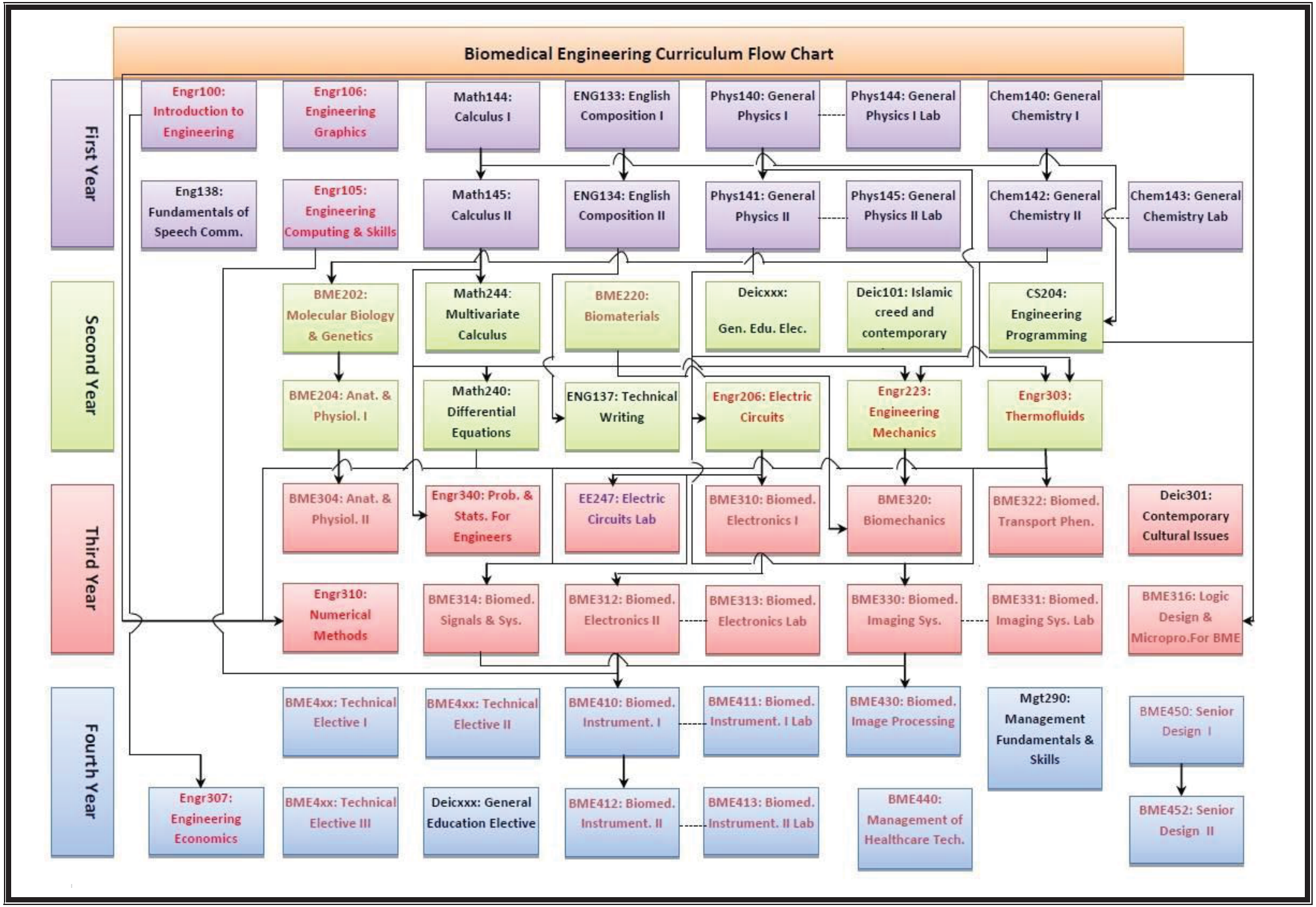
0901-204	CS 204	Engineering Programming	٣	اجباري كلية	P: 0817-144	البرمجة الحاسوبية لطلبة الهندسة	ع ح ٢٠٤
2200-303	Engr 303	Thermofluids	٣	اجباري قسم	P: 0814-140 & P: 0815-142	موائع حرارية	هـ ٣٠٣
0817-244	Math 244	Multivariate Calculus	٣	اجباري كلية	P: 0817-145	رياضيات متعددة المتغيرات	ريض ٢٤٤
1722-138	Eng 138	Fundamentals of Speech Communication	٢	اجباري كلية	C : 1722-134	أساسيات التواصل الخطابي	نجل ١٣٨
			18 hrs				
Semester 4							
1722-137	Eng 137	Technical Writing	٢	اجباري كلية	P: 1722-134	الكتابة التقنية	نجل ١٣٧
0817-240	Math 240	Differential Equations	٣	اجباري كلية	P: 0817-145	المعادلات التفاضلية	ريض ٢٤٠
2206-202	BME 202	Molecular Biology and Genetics	٣	اجباري قسم	P: 2206-304	البيولوجيا الجزيئية و علم الوراثة	هط ٢٠٢
2200-206	Engr 206	Electric Circuits	٣	اجباري قسم	P: 0814-141	دوائر كهربائية	هـ ٢٠٦
2202-247	EE 247	Electric Circuits Lab	١	اجباري قسم	C: 2200-206	مختبر دوائر كهربائية	كه ٢٤٧
2200-223	Engr 223	Engineering Mechanics	٣	اجباري قسم	P: 0817-145 & P: 0814-140	ميكانيكا هندسية	هـ ٢٢٣
7401-101	Deic 101	Islamic creed and contemporary doctrines	٢	اجباري جامعة	None	العقيدة الإسلامية والمذاهب	سلم ١٠١
			١٧ hrs				
Semester 5							
٢٢٠٦-320	BME 320	Biomechanics	٣	اجباري قسم	P: 2200-223 & P: 2206-220	الميكانيكا الحيوية	هط ٣٢٠
٢٢٠٦-310	BME 310	Biomedical Electronics l	٣	اجباري قسم	P: 2200-206	الالكترونيات الطبية الحيوية ١	هط ٣١٠
٢٢٠٦-314	BME 314	Biomedical Signals and Systems	٣	اجباري قسم	P: 0817-240 & P: 2200-206	الإشارات و الأنظمة الطبية الحيوية	هط ٣١٤

٢٢٠٠-340	Engr 340	Probability & Statistics for Engineers	٣	اجباري قسم	P: 0817-145	الاحتمالات والإحصاء لطلبة الهندسة	٣٤٠ هـ
٢٢٠٠-310	Engr 310	Numerical Methods	٣	اجباري كلية	P: 0817-240 & P: 0901-204	طرق الحل العددية	٣١٠ هـ
٧٤٠١-301	Deic 301	Contemporary Cultural Issues	٢	اجباري جامعة	None	قضايا ثقافية معاصرة	سلم ٣٠١
			١٧ hrs				
Semester 6							
7401-xxx	Deic xxx	University Elective	٢	اختياري جامعة	None	اختياري جامعة	سلم xxx
٢٢٠٠-307	Engr 307	Engineering Economics	٣	اجباري كلية	P: 2200-100	الاقتصاد الهندسي	هـ ٣٠٧
٢٢٠٦-312	BME 312	Biomedical Electronics ll	٣	اجباري قسم	P: 2206-310	الالكترونيات الطبية الحيوية ٢	هط ٣١٢
٢٢٠٦-313	BME 313	Biomedical Electronics Lab	١	اجباري قسم	C: 2206-312	مختبر الالكترونيات الطبية الحيوية	هط ٣١٣
٢٢٠٦-440	BME 440	Management of Healthcare Technology	٣	اجباري قسم	P: مستوى سابع فما فوق (level seven or above)	إدارة تكنولوجيا الرعاية الصحية	هط ٤٤٠
٢٢٠٦-322	BME 322	Biomedical Transport Phenomena	٣	اجباري قسم	P: 2200-303 & P: 0817-240	ظواهر الانتقال الطبية الحيوية	هط ٣٢٢
٢٢٠٦-316	BME 316	Logic Design and Microprocessors for BME	٣	اجباري قسم	P: 0901-204	التصميم الرقمي و المعالجات الدقيقة لطلبة الهندسة الطبية الحيوية	هط ٣١٦
			18 hrs				
Semester 7							
٢٢٠٦-410	BME 410	Biomedical Instrumentation l	٣	اجباري قسم	P: 2200-105 & P: 2206-312	الأجهزة الطبية الحيوية ١	هط ٤١٠
٢٢٠٦-411	BME 411	Biomedical Instrumentation l Lab	١	اجباري قسم	C: 2206-410	مختبر الأجهزة الطبية الحيوية ١	هط ٤١١
٢٢٠٦-330	BME 330	Biomedical Imaging Systems	٣	اجباري قسم	P: 2206-312	أنظمة التصوير الطبية الحيوية	هط ٣٣٠

					2206-314		
٢٢٠٦-450	BME 450	Senior Design I	٢	اجباري قسم	P: مستوى سابع فما فوق (level seven or above)	مشروع تخرج ١	هط ٤٥٠
2206-4xx	BME 4xx	Technical Elective	٣	اختياري قسم	P: مستوى سابع فما فوق (level seven or above)	اختياري قسم	xxهط ٤
٢٢٠٦-430	BME 430	Biomedical Image Processing	٢	اجباري قسم	P: 0817-244 0817-240 2200-105	معالجة الصور الطبية الحيوية	هط ٤٣٠
٠٦٢٢-292	Mgt 292	Management Fundamentals & Skills	٣	اجباري كلية	None	مبادئ الإدارة ومهاراتها	إد ٢٩٠
			١7 hrs				
Semester 8							
2206-4xx	BME 4xx	Technical Elective	٣	اختياري قسم		اختياري قسم	xxهط ٤
٢٢٠٦-412	BME 412	Biomedical Instrumentation ll	٣	اجباري قسم	P: 2206-410	الأجهزة الطبية الحيوية ٢	هط ٤١٢
٢٢٠٦-413	BME 413	Biomedical Instrumentation ll Lab	١	اجباري قسم	P: 2206-316 & C: 2206-412	مختبر الأجهزة الطبية الحيوية ٢	هط ٤١٣
٢٢٠٦-452	BME 452	Senior Design II	٢	اجباري قسم	P: 2206-450	مشروع تخرج ٢	هط ٤٥٢
2206-4xx	BME 4xx	Technical Elective	٣	اختياري قسم	P: مستوى سابع فما فوق (level seven or above)	اختياري قسم	xxهط ٤
٢٢٠٦-331	BME 331	Biomedical Imaging Systems Lab	١	اجباري قسم	C: 2206-330	مختبر أنظمة التصوير الطبية الحيوية	هط ٣٣١
7401-xxx	Deic xxx	University Elective	٢	اختياري جامعة	None	اختياري جامعة	سلم xxx

			١5 hrs				
			136 hrs				
مواد القسم الإختيارية Biomedical Engineering Department: Department Technical Electives:							
٢٢٠٦-414	BME 414	Biomedical Digital Signal Processing	٣	اختياري قسم	P: 2200-105 & P: 2206-314	معالجة الاشارات الرقمية الطبية الحيوية	هط ٤١٤
٢٢٠٦-416	BME 416	Introduction to BioMEMS, and Bionanotechnology	٣	اختياري قسم	P: 2206-202 2206-220	مقدمة في الأنظمة الميكروإلكتروميكانيكية الحيوية و تقنية النانو الحيوية	هط ٤١٦
٢٢٠٦-420	BME 420	Prosthetic Systems for Biomedical Engineers	٣	اختياري قسم	P: 2206-320 & P: 2206-304 & P: 2200-105	الأنظمة الاصطناعية لطلبة الهندسة الطبية الحيوية	هط ٤٢٠
٢٢٠٦-432	BME 432	Biomedical Data Processing, Archiving, and Communication	٣	اختياري قسم	P: 2206-430	معالجة و أرشفة و اتصال البيانات الطبية الحيوية	هط ٤٣٢
٢٢٠٦-442	BME 442	Information Technology for Biomedical Engineers	٣	اختياري قسم	P: 2200-105 2206-316	تكنولوجيا المعلومات لطلبة الهندسة الطبية الحيوية	هط ٤٤٢
٢٢٠٦-444	BME 444	Medical Device Innovation and Entrepreneurship	٣	اختياري قسم	P: مستوى سابع فما فوق (level seven or above)	الريادة و الابتكار في الأجهزة الطبية	هط ٤٤٤
٢٢٠٦-460	BME 460	Selected Topics in Biomedical Engineering	٣	اختياري قسم	P: مستوى سابع فما فوق (level seven or above)	موضوعات خاصة في الهندسة الطبية الحيوية	هط ٤٦٠
٢٢٠٦-462	BME 462	Undergraduate Research in Biomedical Engineering	٣	اختياري قسم	P: مستوى سابع فما فوق (level seven or above)	البحث العلمي في الهندسة الطبية الحيوية لطلبة البكالوريوس	هط ٤٦٢
مواد الجامعة الإختيارية الإسلامية University Elective Courses:							

Course Number	Course Code	Course Title	Units Credits	Type	Pre-& Co-requisite	اسم المقرر	رمز المقرر
٧٤٠١-102	Deic 102	Fiqh Biography	٢	اختياري جامعة	None	فقه السيرة	سلم ١٠٢
٧٤٠١-302	Deic 302	Islam and Science and Technology Issues	٢	اختياري جامعة	None	الاسلام وقضايا العلوم والتقنية	سلم ٣٠٢
٧٤٠١-317	Deic 317	Islamic Morals and Ethics	٢	اختياري جامعة	None	ألاخلاق ألاسلامية وأداب المهنة	سلم ٣١٧
٧٤٠١-318	Deic 318	Economic System in Islam	٢	اختياري جامعة	None	النظام الاقتصادي في الإسلام	سلم ٣١٨
٧٤٠١-401	Deic 401	Islamic Social System	٢	اختياري جامعة	None	النظام الاجتماعي في الاسلام	سلم ٤٠١
٤١٨-٧٤٠١	Deic 418	Political System and Human Rights in Islam	٢	اختياري جامعة	None	النظام السياسي وحقوق الانسان في الاسلام	سلم ٤١٨


Biomedical Engineering Curriculum Flow Chart
First Year
Second Year
Third Year
Fourth Year
Engr100: Introduction to Engineering
Engr106: Engineering Graphics
Math144: Calculus I
ENG133: English Composition I
Phys140: General Physics I
Phys144: General Physics I Lab
Chem140: General Chemistry I
Eng138: Fundamentals of Speech Comm.
Engr105: Engineering Computing & Skills
Math145: Calculus II
ENG134: English Composition II
Phys141: General Physics II
Phys145: General Physics II Lab
Chem142: General Chemistry II
Chem143: General Chemistry Lab
BME202: Molecular Biology & Genetics
Math244: Multivariate Calculus
BME220: Biomaterials
Deicxxx: Gen. Edu. Elec.
Deic101: Islamic creed and contemporary
CS204: Engineering Programming
BME204: Anat. & Physiol. I
Math240: Differential Equations
ENG137: Technical Writing
Engr206: Electric Circuits
Engr223: Engineering Mechanics
Engr303: Thermofluids
BME304: Anat. & Physiol. II
Engr340: Prob. & Stats. For Engineers
EE247: Electric Circuits Lab
BME310: Biomed. Electronics I
BME320: Biomechanics
BME322: Biomed. Transport Phen.
Deic301: Contemporary Cultural Issues
Engr310: Numerical Methods
BME314: Biomed. Signals & Sys.
BME312: Biomed. Electronics II
BME313: Biomed. Electronics Lab
BME330: Biomed. Imaging Sys.
BME331: Biomed. Imaging Sys. Lab
BME316: Logic Design & Micropro.For BME
BME4xx: Technical Elective I
BME4xx: Technical Elective II
BME410: Biomed. Instrument. I
BME411: Biomed. Instrument. I Lab
BME430: Biomed. Image Processing
Mgt290: Management Fundamentals & Skills
BME450: Senior Design I
Engr307: Engineering Economics
BME4xx: Technical Elective III
Deicxxx: General Education Elective
BME412: Biomed. Instrument. II
BME413: Biomed. Instrument. II Lab
BME440: Management of Healthcare Tech.
BME452: Senior Design II

7. Biomedical Engineering Course Descriptions

- **BME 202 Molecular Biology and Genetics (3 Credits)**

This is an introductory course in cell 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.
Prerequisite(s): Chem 142

- **BME 204 Anatomy and Physiology I (3 Credits)**

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.
Prerequisite(s): BME 202

- **BME 220 Biomaterials (3 Credits)**

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.
Prerequisite(s): None

- **BME 304 Anatomy and Physiology II (3 Credits)**

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.
Prerequisite(s): BME 204

- **BME 310 Biomedical Electronics I (3 Credits + Tutorials)**

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.
Prerequisite(s): Engr 206

- **BME 312 Biomedical Electronics II (3 Credits + Tutorials)**

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.
Prerequisite(s): BME 310

- **BME 313 Biomedical Electronics LAB (1 Credit)**

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.
Corequisite(s): BME 312

- **BME 314 Biomedical Signals and Systems (3 Credit + Tutorials)**

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.
Prerequisite(s): Math 240, Engr 206

- **BME 316 Logic Design and Microprocessors for BME (3 Credits + Tutorials)**

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.
Prerequisite(s): CS 204

- **BME 320 Biomechanics (3 Credits + Tutorials)**

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.
Prerequisite(s): Engr 223, BME 220

- **BME 322 Biomedical Transport Phenomena (3 Credits + Tutorials)**

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.
Prerequisite(s): Math 240, Engr 303

- **BME 330 Biomedical Imaging Systems (3 Credits + Tutorials)**

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).
Prerequisite(s): Phys 141, Math 240

- **BME 331 Biomedical Imaging Systems Lab (1 Credit)**

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.
Corequisite(s): BME 330

- **BME 410 Biomedical Instrumentation I (3 Credits)**

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.
Prerequisite(s): BME 312, Engr 105

- **BME 411 Biomedical Instrumentation I Lab (1 Credit)**

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.
Co-requisite(s): BME 410

- **BME 412 Biomedical instrumentation II (3 Credits)**

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. Prerequisite(s): BME 410

- **BME 413 Biomedical Instrumentation II Lab (1 Credit)**

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. Team work and written communication skills are emphasized through laboratory report organization, documentation of results, error analysis and interpretation of findings.
Prerequisite(s): BME 316; Co-requisite(s): BME 412

- **BME 414 Biomedical Digital Signal Processing Elective (3 Credits)**

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 softwares such as Matlab will be used for the course assignments to analyze biological systems and design different types of filters.
Prerequisite(s): Engr 105, BME 314

- **BME 416 Introduction to BioMEMS and Bionanotechnology Elective (3 Credits)**

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.
Prerequisite(s): BME 202; Corequisite(s): BME 410

- **BME 420 Prosthetic Systems for Biomedical Engineering Elective (3 Credits + Tutorials)**

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.
Prerequisite(s): BME 320, BME 304, Engr 105.

- **BME 430 Biomedical Image Processing (2 Credits + Tutorials)**

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.
Prerequisite(s): BME 330, BME 314

- **BME 432 Biomedical Data Processing, Archiving, and Communication Elective (3 Credits)**

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.
Prerequisite(s): BME430

- **BME 440 Management of Healthcare Technology (3 Credits)**

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.
Prerequisite(s): Senior Standing in BME

- **BME 442 Information Technology for Biomedical Engineer Elective (3 Credits)**

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. Prerequisite(s): Engr 105

- **BME 444 Medical Device Innovation and Entrepreneurship Elective (3 Credits)**

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.
Prerequisite(s): Senior Standing in BME

- **BME 450 Senior Design I (2 Credits)**

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
Prerequisite(s): Senior Standing in BME

- **BME 452 Senior Design II (2 Credits)**

Continuation of BME 450 – Senior Design I
Prerequisite(s): BME450

- **BME 460 Special Topics in Biomedical Engineering Elective (3 Credits + Tutorials)**

Topics determined by the course instructor in consultation with the department chair.
Prerequisite(s): Senior Standing in BME

- **BME 462 Undergraduate Research in Biomedical Engineering Elective (3 Credits)**

Individual research projects for students with honors classification. It requires prior approval of, and arrangement with, a faculty research advisor.
Prerequisite(s): Senior Standing in BME

- **Other Engineering Courses Required as Core for Biomedical Engineering Program:**

- **Engr 206 Electric Circuits (3 Credits + Tutorials)**

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

- **EE 247 Electric Circuit Lab (1 Credit)**

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.
Prerequisite(s): Engr 206

- **Engr 223 Engineering Mechanics (3 credits + Tutorials)**

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 lectures per week. Prerequisite: Math 145 and Physics 140.

- **Engr 303 Thermofluids (3 credits + Tutorials)**

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 lectures per week
Prerequisite: Phys 141, Chem 142

- **Engr 340 Probability and Statistics for Engineers (3 credits + Tutorials)**

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 lecture hours per week. Prerequisite: Math 145.

III- College Facilities

1- 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.

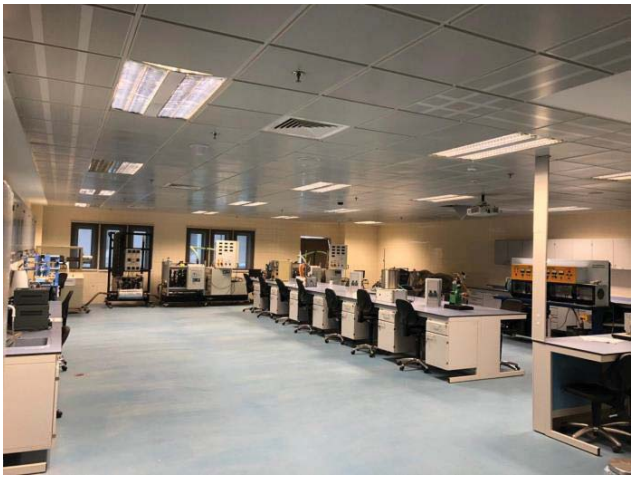
Environmental Engineering Lab

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.

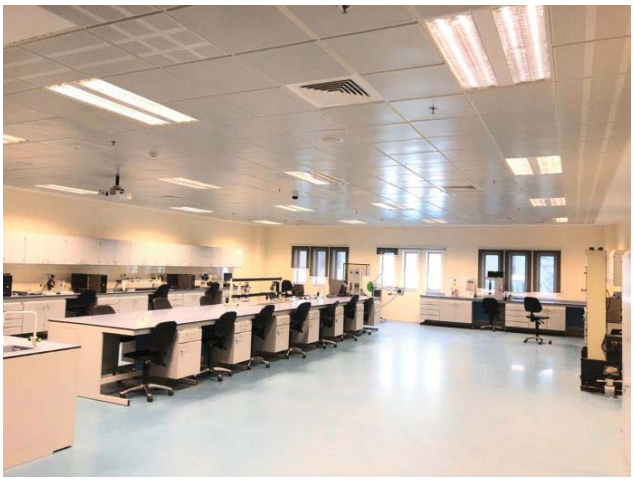
Fluid Mechanics Lab

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. Also to link the practical side with the theoretical one.

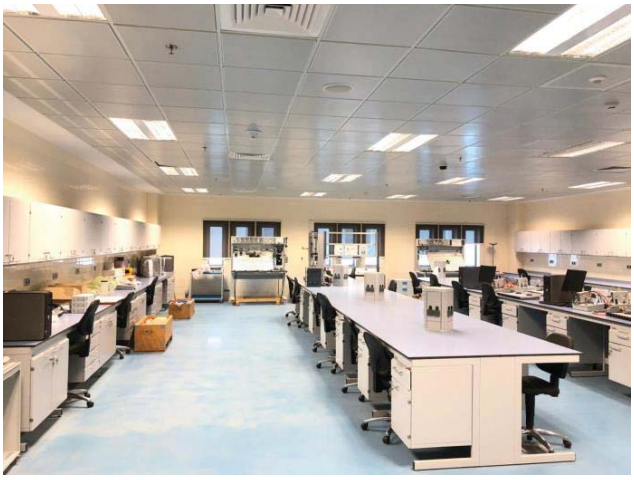
Strength of Materials Lab

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.



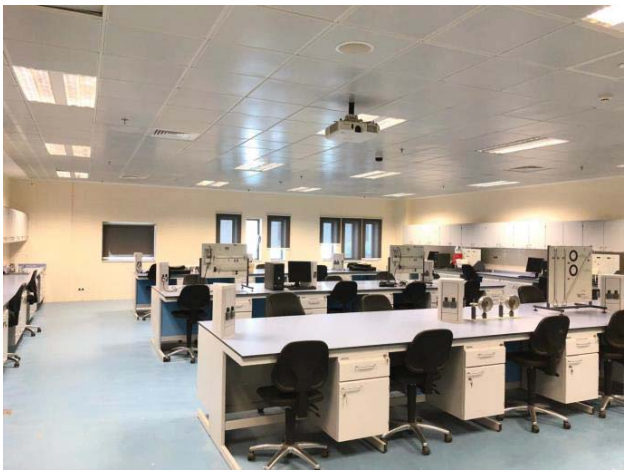
Control and Vibration Lab

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 Laboratory

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 Laboratory

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 Laboratory

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 Laboratory

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 Laboratory

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 Laboratory

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 Laboratory

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. Aeration tank
6. floatation unit

Heat Transfer Laboratory

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 Laboratory

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 Laboratory

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 Laboratory

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 Laboratory

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:

The BME department at KFU has 6 types of labs:

1. **Computer labs used for 3 courses:** engineering computing techniques, engineering programming and biomedical image processing. It is also used to study some simulation software about imaging systems.
2. **Electric circuits lab:** 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.

3. **Electronics lab:** experiments are run by students to analyze the behavior of basic electronic devices and to design and construct simple circuits containing these devices.
4. **Biomedical instrumentation lab I:** 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.

5. **Biomedical instrumentation lab II:** 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. Team work and written communication skills are emphasized through laboratory report organization, documentation of results, error analysis and interpretation of findings.
6. **Biomedical imaging systems lab:** 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.

2- 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:

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

Electrical Engineering :

Electrical engineering students find jobs as:

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

Civil Engineering:

Civil engineering students find jobs as:

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

Biomedical Engineering:

Biomedical engineering students find jobs as:

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

Chemical Engineering:

Chemical Engineering students find jobs as:

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

Appendix A - Course description for Non-engineering courses:

Non-Engineering Courses Descriptions:

- **Deci 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. Two 1-hour lectures per week.

- **Deci 301- 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. Student is required to memorize part of the holy Quran. Two 1-hour lectures per week.

- **Deci 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 1-hour lectures per week.

- **Deci 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 1-hour lectures per week.

- **Deci 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, …). Student is required to memorize part of the holy Quran. Two 1-hour lectures per week.

- **Deci 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, Shure, judiciary system, security, His bah. 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. Two 1-hour lectures per week.

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

Introductory course of mathematics for college of engineering students. It 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, Hospital Rule, Mean value theorems, Area and estimating with finite sums, Introduction to integrals & definite integrals. Four 1-hour lectures 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 1-hour lectures per week.

- **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.

- **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.

- **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. Prerequisite: MATH 145.

- **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. Prerequisite: 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.

- **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.

- **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. 3 hours Lab per week.

- **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. 3 hours' lab per week.

- **CChem 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.

- **CChem 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.

- **CChem – 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, Le Hotelier 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(s): CChem 142. 3 hours Lab per week.

- **CChem 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. Prerequisite(s): CChem 142.

- **CChem 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): CChem 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.

- **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 1-hour lectures per week. Prerequisite(s): Math 144.

- **Mg 290 – 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.

- **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, supporting details, and a conclusion. Students write multi-draft compositions for a variety ofpractical and academic purposes. Students 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(s)**:** English course offered by Preparatory-year Deanship.

- **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 1-hour lectures per week.

- **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. Prerequisite(s): 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. Two 1-hour lectures per week. Co-requisite(s): Eng. 134.

Appendix B - Useful website links

Useful website links for ME Graduates:

***Useful website links for ME Graduates*:**

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:

***Useful website links for Che Graduates*:**

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 Tool Box	*http://www.engineeringtoolbox.com/*
American Institute of Chemical Engineers	*http://www.aiche.org/*

Electrical Engineering Students:

Useful website links for EE Graduates:

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:

Useful website links for CE Graduates:

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

Useful website links for BME Graduates:

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*