QU
Saudi Arabia

Qassim University
جامعة القصيم

COLLEGE OF ENGINEERING
STUDENT HANDBOOK

1442/1443 A.H.
2020/2021 A.D.

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COLLEGE OF ENGINEERING

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DEAN MESSAGE

College of Engineering at Qassim University seeks to offer a developed and accredited engineering education to satisfy the needs of the job market, and to offer society and research services which support the sustained development in the Kingdom and participate in the knowledge econ. This is the mission of the College of Engineering in Qassim University, for which great efforts are done to be achieved through an ambitious strategic plan for the coming ten years. Through this strategic plan the college hopes by the end of 2020 to achieve its vision as "a locally and regionally recognized college in the engineering education and scientific research, and supporting the sustained development in Qassim and Kingdom."

When designing the study plans for the college's three BSc programs great attention has been paid to them to be comprehensive such that they satisfy the four fundamental aspects of modern engineering education; the mathematics and engineering fundamentals, knowledge and analysis, engineering design, training and practice. The college, also, gives great concern to the soft skills to develop the student communication and character building skills through modern teaching methods which made the college's outcomes compatible with the requirements of the job market. Despite the newness of our college, as it has not completed its first decade yet, the college was able to race against the clock and got the academic accreditation from the ABET organization for the EE, CE, and ME B.Sc programs delivered on the main campus , and has become one of four colleges of Engineering which got the accreditation in Saudi Arabia. Also, the college has sent more than forty postgraduate students to USA, Canada and Australia to achieve the master and PhD degrees. The college prepares, nowadays, for offering four graduate programs in electrical engineering, civil engineering, mechanical engineering and renewable energy engineering. The College will concentrate in the coming years as stated in its strategic plan on scientific research by establishing research chairs and specialized research centers. Moreover, it will activate its role in serving the community through conducting engineering studies, consultation and professional training programs. In the end, I pray to Allah Almighty to grant success to all employees at the Faculty of Engineering and Qassim University, and wish full success to all our students.

College Dean

ABOUT THE COLLEGE

On 17/1/1423 A.H.; the council of King Saudi University (KSU) recommended the transformation of the Department of Agriculture Engineering from the College of Agriculture and Veterinary at its Qassim campus (branch) into an engineering college. The college was to start with three main departments: electrical, mechanical and civil engineering.

The recommendation was then discussed in the meeting of the Saudi Council for Higher Education on 2/11/1423 A.H. and headed by his majesty King Fahd (God bless him) as the Pri-Minister and the Head of Council for Higher Education. The council approved the recommendation on 23/ 11/1423-A.H.

Consequently, a committee of specialists from KSU was selected and assigned the task of developing the curriculums for the three programs. The committee approved the general requirements of the B. Sc. degree in engineering. This included the fulfillment of the university, the college, and the department requirements. Therefore; the schooling process, according to the programs previously set by KSU, started and continued for two full academic years. In "1426-A.H.", Qassim University decided to adopt the Preparatory (foundation) Year Program (PYP) for all its scientific colleges. It was a good chance for the Engineering College to enhance and improve its programs with the objectives of satisfying the new-university-system (PYP) in addition to the job market demands.

Mission

College of Engineering at Qassim University seeks to offer a developed and accredited engineering education to satisfy the needs of the job market, and to offer society and research services which support the sustainable development in the Kingdom and contribute to the knowledge economy.

Vision

A nationally and regionally recognized college in the engineering education and scientific research that supports the sustainable development in Qassim and Kingdom.

Educational Objectives

The educational objectives of Qassim Engineering College (QEC) are stated as follows:

1- Preparation of the graduates to have a successful career as engineers in the governmental and private sectors.
2- Preparation of the graduates to pursue their professional development through self-learning and advanced degrees.
3- Giving the chance for the engineers to develop their skills and scientific abilities through the postgraduate engineering programs.
4- Preparation of the graduates to advance towards leadership positions in their profession.
5- Preparation of the graduates to effectively participate in the sustainable development of Saudi Arabia.

Research Objectives

1- To establish research links with the industry, energy and construction organizations to help develop and promote these organizations.
2- To establish research centers which participate in developing the scientific research and supporting the academic staff and post-graduate students from inside and outside the university.
3- To offer post-graduate programs which focus on research subjects those serve the Saudi society.

Community-Service Objectives

1- To contribute and support the different university committees such as committee of missions and training, demonstrators' committee and the scientific council, etc.
2- To participate, in cooperation with the university community service deanship, in the promotion of the engineering profession through offering training courses and workshops for engineers and technicians in different engineering fields.
3- To conduct engineering studies and field surveys, and to present technical consultations for solving the society problems.
4- To conduct standard tests on constructions, engineering systems, equipment, machines, devices and materials.

Departments

1- Electrical Engineering Department
2- Civil Engineering Department
3- Mechanical Engineering Department

Major Programs

The Engineering College offers three B.Sc. programs:

1- Electrical Engineering Program.
2- Civil Engineering Program
3- Mechanical Engineering Program

Admission Conditions

The admission to College of Engineering requires the completion of the preparatory year program of Qassim University. The number of students who can be accepted in the College of Engineering is determined yearly by the University Council taking into consideration the College capacity. Then, the students who have the desire to join the College of Engineering compete based on their GPA in the preparatory year program.

COLLEGE EDUCATION SYSTEM

The educational system in the college is based on two main semesters per educational year - each semester is fifteen weeks' length. In addition, an optional eight weeks summer semester may be offered.

Course Requirements

According to the educational plans, a student may complete any of the engineering programs in 8 semesters (4 years) after the Preparatory Year Program (PYP). A successful student may complete the full requirements of the selected program if he completes, after the PYP, a total of 139 credit hours as shown in the table below.

Requirement		CR	%
University Requirements (12 CR)		12	8.63
College Requirements (48 CR)	Compulsory	42	30.22
	Elective	6	4.32
Program/Department Requirements (73 CR)	Compulsory	63	45.32
	Elective	10	7.19
Free Courses (6 CR)		6	4.32
Total		**139**	**100**

University Requirements

Twelve credit-hours are required by the University in order for graduation. A list of these courses comes next.

College Requirements

The college of engineering requires that student must complete 48 credit hours before graduation. Six out of the 48 credit hours are elective courses and the rest are Compulsory courses.

Program and/or Departmental Requirements

Each department requires the completion of 73 credit hours distributed between specialized courses offered by the department itself or offered by other departments of the college.

Free Courses

Six credit hours have to be selected among the set of courses offered by the university.

Academic Supervision

An academic advisor is assigned to each student. In addition, there is full-time staff in the Students Affairs Office to help them in this regard. The student is advised to meet with his academic advisor at least once per semester which should be prior to course registration. The academic advisor may assist the students on:

- Course choices, selections, and degree requirements.
- Selecting the elective and free course that match student's future development and career goals.
- Regulations, policies, and procedures on transfer credits, and academic curricula.
- Getting information about scholarships, coop training opportunities, fellowships, and undergraduate research opportunities within the department.
- Identifying and assessing alternatives and consequences of their decisions related to career goals.

Withdrawal

A student has the right to withdraw from an academic semester -without being considered fail within the withdrawal period announced in the academic calendar for the current semester. The withdrawal must be submitted to the college dean. No withdrawal is allowed during the last five weeks before the final examinations. If the college council accepted the student excuse, the council may search for additional chance of final examinations.

Transfer to the college of engineering

The college of engineering accepts the transfer applications from other colleges whether from Qassim University or from outside Qassim University. A transfer may be approved if the applicant completed his PYP and has achieved a minimum GPA set by the College council. The accepted applicant may transfer his previous achieved courses to the equivalent courses at the college of engineering in Qassim University.

Attendance

Regular engineering courses require full time attendance for academic success. The college requires that students should attend at least 75% of the lectures, practical and laboratorial sessions A student failing to meet this limit in any of his registered courses will be prohibited from attending the final examination of this course. His GPA for this course will be ZERO.

Status of Discontinuity

A student is considered to be in a Status of Discontinuity in one semester if:

1- He did not, or failed to, register in one semester.
2- He withdrew from this semester.

The validity of the causes is not an issue for discussion. It is permissible for a student to be in a discontinuity status for a maximum of two successive semesters, or a total of three non-successive semesters during his enrollment at QEC. Exceeding these limits ends up by terminating the student's enrollment at QEC.

Any student, who loses his QEC- studentship due to any of the discontinuity conditions mentioned above can appeal to be readmitted to the college based on the following conditions:

1- The student discontinuity did not exceed four semesters
2- He has to satisfy all the admission conditions announced at readmission.
3- He should keep the same university personal identification number (PIN) as well as his records he had prior to the discontinuity status.
4- The student's appeal must be approved by the College Dean.
5- The Dean, based on a recommendation from the associated department council, may require the student to retake any course that he has passed before.
6- If the student discontinuity exceeded four semesters, and it was not due misconduct, he can apply for admission as a new student or freshman. In this case all his academic records will be ignored.

Examinations and Grading System

The final grade of a specific course is the summation of the final exam grade and a grade corresponding to the class work during the semester. Each course has a total of 100 points. The grade of the semester work is within 50% to 60% of the total final grade of the course. The rest, however, is assigned for the final exam. A student must have a total of at least 60% of the total marks to pass a specific course. The grading system of QEC is explained in the next table:

Grade Letter	Numerical average %		Points
	From	To less than	
A+	more than or equal to 95		5.00
A	90	95	4.75
B+	85	90	4.50
B	80	85	4.00
C+	75	80	3.50
C	70	75	3.00
D+	65	70	2.50
D	60	65	2.00
F	Less than 60		1.00

A student's semester Grade Point Average (GPA) is calculated by dividing the cumulative point value of all his semester's courses by the total number of semester credit hours he registered for. The following is an example of a hypothetical student's report having six hypothetical courses.

Subject	Credit Hours	Grade Letter	Points	Point product
1	2	B+	4.50	4.5 x 2 = 9
2	3	D	2.00	2 x 3 = 6
3	3	C	3.00	3 x 3 = 9
4	4	D+	2.50	2.5 x 4 = 10
5	1	B	4.00	4 x 1 = 4
6	5	C	3.00	3 x 5 = 15
Total	18			53

This student's semester Grade-Point-Average (GPA) is 53/18 = 2.944

The cumulative GPA of a student is calculated by considering all the achieved courses since he was first admitted to the college till the time his-GPA is required to be calculated at. The graduation grade of a student is considered based on his cumulative GPA according to the following table:

Cumulative GPA	Graduation Grade
From 4.5 and up	Excellent
From 3.75 to less than 4.5	Very good
From 2.75 to less than 3.75	Good
From 2.00 to less than 2.75	Sufficient

Academic Evaluation for Student Standing

It is expected from all QEC-students to be in good academic standing. A student with GPA less than 2 is not eligible for graduation. A student fails to maintain an accumulating GPA less than 2.0 in any semester will be warned. Three warnings will put the student in dismissing conditions from the college and the university rules -on this case- will be applied.

Education Resources

- Textbooks
- Lectures
- The World Wide Web (Internet)
- Seminars
- Conferences
- Training Courses

Career Opportunities

1- All engineering jobs in the government.
2- The projects operation and maintenance in the government.
3- The ministry of water and electricity.
4- The ministry of municipal and village affairs.
5- The Saudi commission for the engineers.
6- The general institution for the waters refinement.
7- The general institution for ports.
8- Saudi airlines.
9- The military occupations management.
10- The constructions and contracting companies.
11- The electronics and communication companies.
12- The power and electric energy companies.

13- The Ministry of transportations.
14- The Ministry of agriculture and water recourses.
15- The general institution for the electricity.
16- The water and sewage authority.
17- Saudi Arabia Aramco company.
18- Saudi company for the basic industries (SABIC).
19- The unified Saudi company for electricity (SCECO).
20- All factories.

COLLEGE FACILITIES

Students Affairs Office

The college has a students' Affairs Office which is headed by an engineer and has two full-time expert members. The office is supported and linked to the Deanship of Admission and Registration. The office is equipped with computers connected to the university local network. The main tasks of this office are:

- The office helps in the registration of students, and supplies the necessary data concerning the students' enrolment and their progress. These documents help in the evaluation process.
- The office staff has access to the registration program to help solve problems which face the students during the registration.
- The office director participates in the committee which distributes the students after the first level to the different departments of the college.
- The office monitors the attendance of the students so that the rules of exclusion of attending the final exams are firmly applied.
- The Student Affairs Office arranges and controls all matters related to the midterm, final written exams and written outcomes achievement exam. In this regard, the office prepares the exams time table, assigns exams places, assigns exams supervisors, collects the exam questions from the faculty members, and arranges for supplying the answer sheets.
- The office also participates in informing the students about any important activities, dates, news, rules through the college web-site and/or by cellular SMS's.

Students' Activities

The student affairs deanship supervises most of the students' activities. This includes cultural, recreational, and social activities. These activities enhance the students' learning ability as well as it demonstrates good chance for entertainment and stress relief. Samples of these activities are:

1- Cultural activities: in all fields
2- Social activities like traveling and visiting major industrial cities and large scale engineering projects.
3- Recreational activities such as arranging races in football, tennis and billiards.

In addition, the college has a mosque, a cafeteria, and a student club. The club is a complementary part to of the college mission and it is a center for student activities such as discussions, workshops, competitions, culture, training, sports, social and various student related activities. Students from various departments are enrolled as club members. Members usually contribute with their creative ideas, and discuss events for the future planned activities, during meetings held by the club. All teaching staff supporting student activities can participate in this club.

College Scientific Journal

The college of engineering supervises the publication of the bi-annual Qassim University Journal of Engineering and Computer Sciences. Contributions to this journal are not limited to staff members of the college but are open to contributors from inside and outside the Kingdom of Saudi Arabia. Papers are published after being refereed by national and international specialists. This journal is considered a good journal for publication and its papers are considered by the scientific councils in all KSA universities for promotion.

PHYSICAL FACILITIES

In addition to the specialized laboratories in each department -which will be explained in the hereafter- the college contains a number of laboratories, drawing halls, teaching halls and computer laboratories which will serve all the college departments. These physical facilities are:

- Workshop
- Computer laboratories
- Drawing halls
- Active learning halls
- Teaching halls

Workshop

A workshop with many equipment and tools is used in conjunction with teaching GE 105: Basics of Eng. Technology. The workshop is located in the Department of Mechanical Engineering and has Lathes, Milling machines, Shaper, Drill Press, Band Saws, Grinder, Welding and Hydraulic Cutter.

Students of the junior levels get trained in the workshop and perform experimental exercises for different industrial programs. Moreover, the students carry out manufacturing of equipment and experimental models for their graduation projects. The workshop is utilized also in research projects performed by the college staff members.

Computer Laboratories

The college has two computer laboratories supervised by teaching staff members. The laboratories are well equipped with extensive licensed software libraries and up• to-date printers and scanners. The laboratories are utilized in graduation projects and in teaching computer sciences as well as these engineering courses which require computer application. The computer facilities include the service of electronic mail, internet. The capacity of each laboratory is about 40 students.

Drawing Halls

The college has two halls for engineering drawing. These halls are utilized in teaching GE 104: Basics of Engineering Drawing. The halls are equipped with thirty drawing tables equipped with all facilities necessary for drawing.

Active Learning Halls

Four new active learning halls are constructed and well prepared for engineering design courses (GE 211 & GE 213). Two halls are assigned for each course. The active learning halls are prepared with the necessary equipment required for creating the appropriate active learning environment. In these courses teams of students (usually five students each) meet to discuss the assignments and to perform active learning procedures.

Teaching Halls

The college contains a number of teaching halls. The halls are equipped with the most recent educational equipment like whiteboards, overhead projectors, internet connections, electric supplies, air conditioners and more.

COLLEGE ADMINISTRATION

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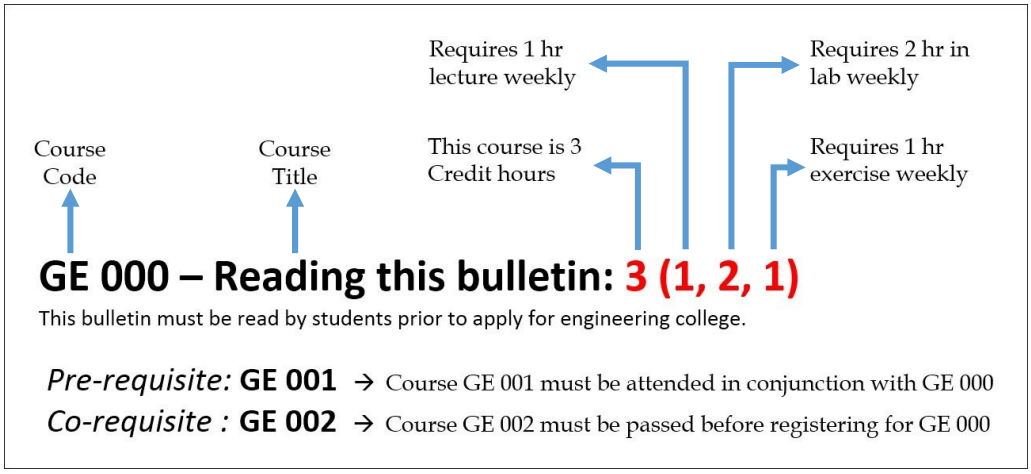
DEGREE REQUIREMENTS

The following are the requirements for the degree of Bachelor of Science in Engineering for different programs offered by QEC. A hypothetical course is given next as an example of how to read codes and terminologies.



The following set of symbols, *arranged in alphabetic order*, is used in this bulletin:

Symbol	Meaning
ARAB	Arabic Language
CE	Civil Engineering
CEN	Computer Engineering
CHEM	Chemistry
CSC	Computer Science
ECON	Economy
EE	Electrical Engineering
GE	General Engineering

Symbol	Meaning
GEO	Geology
IC	Islamic Culture
MATH	Mathematics
ME	Mechanical Engineering
MGMT	Management
PHYS	Physics
STAT	Probability & Statistics

University-Course Requirements

The following courses are required by the University for graduation.

No	Course Code	Course title	CR	LT	LB	TU	Pre-Req.	Co-Req.
1	ARB 101	Linguistic skills	2	2	-	-	-	-
2	ARB 103	Arabic Writing	2	2	-	-	-	-
3	IC 101	Introduction to Islamic culture	2	2	-	-	-	-
4	IC 102	Islam and Community Building	2	2	-	-	IC 101	-
5	IC 103	Economic System in Islam	2	2	-	-	IC 101	-
6	IC 104	Political System in Islam	2	2	-	-	IC 101	-
Total credit hours: **12**								

College-Course Requirements

Compulsory Courses

No	Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
1	CHEM 111	General Chemistry	4	3	2	-	-	-
2	CSC 209	Computer Programming	3	2	2	-	MATH 107 MATH 203	-
3	ECON 401	Engineering Economy	3	3	-	1	Pass 90 cr	-
4	GE 104	Basics of Engineering Drawing	3	1	4	-	-	-
5	GE 105	Basics of Engineering Technology	2	1	2	-	GE 104	-
6	GE 211	Introduction to Engineering Design-I	3	2	4	-	-	-
7	GE 213	Introduction to Engineering Design-2	2	2	2	-	GE 211	-
8	MATH 106	Integral Calculus	3	3	-	1	-	-
9	MATH 107	Linear Algebra & Analytic Geometry	3	3	-	1	-	-
10	MATH 203	Differential and Integral Calculus	3	3	-	1	MATH 106	-
11	MATH 208	Differential equations	3	3	-	1	MATH 203	-
12	MGMT 402	Project Management	3	3	-	1	Pass 90 cr	-
13	PHYS 131	General Physics	4	3	2	-	-	-
14	STAT 328	Probabilities and statistics	3	3	-	1	MATH 203	-
Total credit hours: **42**								

Elective Courses

Two elective courses may be selected from the following courses:

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
GE 412	Value Engineering	3	3	-	1	GE 213	-
MATH 244	Linear Algebra	3	3	-	1	MATH 107	-
MATH 254	Numerical Methods	3	3	-	1	MATH 106 MATH 107	-
MATH 328	Applied Operations Research	3	3	-	1	MATH 107	-
MGMT 411	Development of Management skills	3	3	-	1	GE 211	-

PREPARATORY YEAR PROGRAM

The Preparatory Year Program (PYP) is taken into consideration as levels 1 and 2 in the graduation program. In these levels, students study the following courses:

1st Level

Course Code	Course Title	Credit Hours
CSC 105	Computer Skills	4
ENG 0011	Preparatory English (1)	8
PHYS 110	Physics (1)	2
PSYCH 101	Thinking Skills and Learning Styles	2
STAT 100	Statistics	2
Total Hours		**18**

2nd Level

Course Code	Course Title	Credit Hours
CSC 111	Computer programming	3
ENG 0012	Preparatory English (2)	5
ESP 102	English for Engineering and Computer Science	2
MATH 105	Calculus	3
PHYS 115	Physics (2)	3
Total Hours		**16**

COURSES DESCRIPTION

The next section shows the degree of Bachelor of Science in Engineering for different programs offered by QEC.

Compulsory Courses

CHEM 111 - General Chemistry: 4 (3, 2, 0)

Stoichiometry: SI Units, chemical formulas, the mole, methods of expressing concentration, Calculations based on chemical equations. Gases: laws, kinetic theory, deviation and van der Waals equation. Thermochemistry: Types of enthalpy changes, Hess Law and its applications, first law of thermodynamics. Solutions: Type of solutions and laws related, colligative properties. Chemical kinetics: Law of reaction rate, reaction order, factors affecting the rates. Chemical Equilibrium: Relation between Kc & Kp, Le Chatelier's principle and factor affecting equilibrium. Ionic equilibrium: Acid and base concepts, pH calculations of acid, base and buffer solutions. Atomic Structure: emission spectrum, Bohr's theory de Broglre's hypothesis, quantum numbers, electronic configuration of elements, consequences of the periodic table.

CSC 209 - Computer Programming: 3 (2, 2, 0)

Introduction to computers and computing fundamentals in JAVA, Data Types, Variables, Operators, Control Structures, Simple input/output statement, Classes & Objects, Methods, Relational and logical expressions, IF-ELSE control structure, The WHILE statement, The FOR statement and looping structure, Introduction to Swing & graphical user interfaces, Arrays Matrix Methods, Vectors, String, Engineering Applications.

ECON 401- Engineering Economy: 3 (3, 0, 1)

Introduction to engineering economy. Interest formulas and equivalence. Bases for comparison of alternatives. Decision making among alternatives. Evaluating replacement alternatives. Break-even and minimum cost analysis. Cost accounting. Depreciation. Economic analysis of operations. Economic analysis of public projects.

GE 104 - Basics of Engineering Drawing: 3 (2, 2, 0)

Geometrical construction and basics of lettering, Sketching, Orthographic projection, Sectional and auxiliary views, Dimensioning, Introduction to computer graphics.

GE 105 - Basics of Engineering Technology: 2 (1, 2 , 0)

Introduction; Function and planning of workshop; Properties of materials and their applications; Non-ferrous Metals - Ferrous Alloys Production of Iron and Steel, Plain Carbon and Alloy Steels - Tool Steels and the Iron-Carbon Diagram - Heat Treatments of Steels: Heating, Quenching, Tempering, Annealing, Aging, and Surface Hardening, Destructive and Nondestructive Testing of Metals. Workshop metrology; Basic bench work operations; Machining operations; Tools, equipment and machinery used in basic workshop processes: turning, milling, grinding, forging, sheet metal-work; Welding processes: gas welding, arc welding, spot welding. Casting processes: sand casting, die casting; Industrial safety.

GE 211- Introduction to Engineering Design-I: 3 (2, 4, 0)

Engineering design or how engineers approach and solve problems; process and product design; quality principles; working in teams; presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc

GE 213 - Introduction to Engineering Design-II: 2 (2, 2, 0)

Computer or mathematical modeling of process and product, continuation of quality principles, working in teams, presentation, organization and assessment of technical work, preparation of brief reports on assigned work, self-regulation or the behaviors associated with taking personal responsibility for time management, learning new material, setting goals, etc.

Pre-requisite: GE 211

MATH 106 - Integral Calculus: 3 (3, 0, 1)

Fundamental theorem of calculus, the definite and indefinite integral, numerical integration. Area, volume of revolution, work, arc length. Differentiation and integration of inverse trigonometric functions. The logarithmic, exponential, hyperbolic and inverse hyperbolic functions. Techniques of integration:

substitution, by parts, trigonometric substitutions, partial fractions, miscellaneous substitutions. Indeterminate forms, improper integrals. Polar coordinates.

Pre-requisite: MATH 105

MATH 107 - Linear Algebra & Analytic Geometry: 3 (3, 0, 1)

Introduction to the conic sections, The parabola; translation of coordinate axes, The ellipse, The Hyperbola, Rotation of axes; second degree equation. Systems of linear equations and matrices: Introduction, Gaussian elimination, Matrices and matrix operations, Inverses; Rules of matrix arithmetic, Elementary matrices and a method for finding A-1, Further results on systems of equations and inevitability, Diagonal, Triangular and symmetric Matrices. Determinants: Determinants by cofactor expansion, Evaluating determinants by row reduction, Properties of the determinant function, A combinatorial approach to determinants Vectors in 2-space and 3-space: Introduction to vectors, Norms of a vector; vector arithmetic, Dot product, Lines and planes in 3-space.

MATH 203 - Differential and Integral Calculus: 3 (3, 0, 1)

Infinite series, convergence and divergence of infinite series, integral test, ratio test, root test and comparison test. Conditional convergence and absolute convergence, alternating series test. Power series. Taylor and Maclaurin series. Functions in two or three variables, their limits, continuity and differentiability, The chain rule, Directional derivatives; gradient, Tangent planes, Maxima and Minima for function in two or three variables, Lagrange multipliers, Double integral and its applications to area, volume, moments and center of mass. Double integrals in polar coordinates. Triple integral in rectangular, cylindrical and spherical coordinates and applications to volume, moment and center of mass. Vector fields, line integrals, surface integrals, Green's theorem, the divergence theorem. Stoke's theorem.

Pre-requisite: MATH 106

MATH 208 - Differential equations: 3 (3, 0, 1)

Different types of first order differential equations and its applications. Linear differential equations of higher order. Linear differential equations with constant coefficients. Reduction of the order. Series solution of ordinary differential equations. Frobenius's method. Fourier series of odd and even functions. Integration of Fourier series.

Pre-requisite: MATH 203

MGMT 402 - Project Management: 3 (3, 0, 1)

Basic Management Process approach, Defining Project, Project life cycle, Balancing competing demands with triple constraints, Strategies and planning, methods, Project planning and scheduling, integrated project planning, Quality management, Bar• charts and Gantt Chart, critical path methods, PERT method, resource leveling and allocation, time-cost trade off. Construction and organizational approaches, leadership elements, and decision making. Time and cost control, Project Closing. computer applications.

PHYS 131 - General Physics: 4 (3, 2, 0)

Electromagnetism: Coulomb's law in the electric fields, Gauss law, Electric potential, Energy stored, Capacitance and dielectrics, Current and resistance, Electric energy and power, Direct current circuits, Kirchhoff "s Rules, Magnetic fields, Motion of a charged particle in a magnetic field, Sources of the Magnetic fields, Ampere's law, Faraday 's law, in the inductance, Mutual inductance, Alternative current circuits, RMS values, Impedance, Resonance, Power in RLC circuits. Nuclear Physics: Photoelectric effect, Atomic spectrum, Bohr model, Nuclear structure, Radioactivity Decay, Half life, Radioactive Decay.

STAT 328 - Probability and Statistics: 3 (3, 0, 1)

Some discrete probability distributions (Uniform, binomial, multinomial, hyper-geometric, negative binomial, geometric and Poisson distributions, Mean and variance for these distributions, relationship between Poisson and hyper-geometric with binomial distributions) Some continuous probability distributions (Uniform, standard Normal, Normal, Area under the normal curve, Application of the normal distribution, mean and variance, Normal approximation to the binomial) Fundamental sampling distributions and data descriptions (Random sampling, some important statistics, Sampling distribution (central limit theorem), Sampling distribution of mean and difference between two means for large samples (and for small samples taken from normal distribution), t-distribution (its applications) One- and Two-sample estimation Problems (Statistical Inferences, Classical method of estimation, Estimating the mean, Standard error of a point estimate, Prediction Interval, Estimating the difference between two means (for known and unknown (equal) variances), Estimating a Proportion, determination of the sample size at a specified error) One-and two-sample tests of hypotheses (Null and Alternative hypotheses, type I error, type II error, one and two tailed tests, P value, tests concerning a single mean, tests on two means (for variance

known and unknown), test on a single proportion) Simple Linear Regression (Least squares and the fitted model, Properties of the least square estimators, Inferences concerning the regression coefficients, prediction).

Elective Courses

GE 412 - Value Engineering: 3 (3, 0, 1)

Introduction, Defining value; overview of value engineering, Project budget; capitalized value. Determining value through cost, market, and income approaches. Models for value engineering. Function identification analysis and FAST diagrams. Weighted evaluation and decision analysis techniques. Bidding and Procurement. Developing a detailed implementation plan. Life cycle costs including maintenance and operating costs. Value engineering workflow.

Pre-requisite: GE 213

MATH 244 - Linear Algebra: 3 (3, 0, 1)

General review of vectors in space and its engineering applications, Euclidean n–space, linear transformation from n-space to m-space and its properties. General vector in space, subspaces, linear independence, row space, column space, and null space. Inner products in space, angle and orthogonality in inner product spaces, best approximation: least squares, orthogonal matrices. Eigenvalues and eigenvectors.

Pre-requisite: MATH 107

MATH 254 - Numerical Methods: 3 (3, 0, 1)

Numerical Solution of non-linear equations and associated errors, convergence rate, solution of system of equations by direct and repeated methods and associated errors, Interpolation and polynomial approximation and associated errors, Numerical differentiation and integration and associated errors, Introduction to numerical solutions for ordinary differential equations.

Pre-requisite: MATH 106, MATH 107

MATH 328 - Applied Operations Researches: 3 (3, 0, 1)

Introduction to operation research methodology and applications, Building of mathematical models, Linear programming models, The simplex algorithm, Duality

and sensitivity analysis, Transportation and assignment models, Network models, Integer programming, Using Optimization Software.

Pre-requisite: MATH 107

MGMT 411 - Development of Management Skills: 3 (3, 0, 1)

Course definition and introduction to management and quality, Basics and definitions of management, Basics and definitions of quality, Qualities top issues. Kaizen Systems: Total Quality Management TQM, Totally Productive Maintenance, Suggestion System, Just in Time: Production System, Activities in small Groups QC. Leadership.

Pre-requisite: MATH 107

ELECTRICAL ENGINEERING PROGRAM

ABOUT THE EE DEPARTMENT

Electrical engineers are essential to almost every industry. It is in fact difficult to imagine a modern industry without the services of electrical engineers. Electrical engineering has been and continues to be a corner stone in every new technical development.

The job of Electrical engineers usually involves design, feasibility studies, cost analysis studies, installation, operation, and maintenance of plants, processes, or equipment. The focusing of the Electrical Engineering Department is on teaching, community service, and research. The department faculties recognize the need to provide the graduating engineer with the appropriate background in order to meet the challenges and large demands of a fast growing country such as the Kingdom. The department of Electrical Engineering mission is to provide education of quality, research, and community services that cover a broad spectrum of electrical engineering areas. These areas include design, operation, maintenance, and evaluation of governmental, industrial, and service systems

Mission

The Electrical Engineering Department seeks to meet the needs of the Saudi society and the region through offering outstanding electrical engineering programs in education, research, and community service.

Vision

A nationally and regionally recognized department providing high quality academic programs, research, and society services in the electrical engineering fields.

BSc Educational Objectives

The educational objectives of the Electrical Engineering Department are the attributes (knowledge, skills, and behavior) that the department graduates will be able to successfully demonstrate during a short time. In order to accomplish its mission, the department in cooperation with its constituencies has identified the following list of Program Educational Objectives:

1. Preparation of the graduates to have a successful career as electrical engineers in the governmental and private sectors.
2. Preparation of the graduates to pursue their professional development through self-learning and advanced degrees.
3. Preparation of the graduates to advance towards leadership positions in their profession.
4. Preparation of the graduates to effectively participate in the sustainable development of Saudi Arabia.

FACULTY MEMBERS

No	Faculty Name	Rank
1	Abdulrahman F. Almarshoud	Professor
2	Mohammed Abdel-Samie Abdel-halim	Professor
3	Ahmed Alaa Taha Mahfouz	Professor
4	Naim Al Hassan Mahad Asrar	Professor
5	Ahmed Thabet Muhammad	Professor
6	Rizwan Akram Muhammad	Associate Professor
7	Mohammad Rizwan Momin Khan	Assistant Professor
8	El Amjed Mohamed Hajlaoui	Assistant Professor
9	Anwar Hassan Ibrahim	Associate Professor
10	Mohammed Sulaiman Al-Manee	Assistant Professor
11	Abdulrahman Saleh Alturki	Assistant Professor
12	Ziyad Mohammed Almohaimeed	Assistant Professor
13	Mohammad Saleh N Alnassar	Assistant Professor
14	Ibrahim Saad Alsaidan	Assistant Professor
15	Muhannad Ali Saleh Alaraj	Assistant Professor
16	Abdulaziz M. Al-Hoshany	Assistant Professor
17	Abdullah Mohammed Almohaimeed	Assistant Professor

18	Abdulelah Mufreh Yousef Al-Harbi	Assistant Professor
19	Abdullah. M Alqasir	Assistant Professor
20	Khalid Ali Abdullah Aldubaikhy	Assistant Professor
21	Talal Alharbi	Assistant Professor
22	Abdulaziz Abdullah Alorf	Assistant Professor
23	Abdulhakeem Nasser Alsaleem	Assistant Professor
24	Sultan Amro Alamro	Assistant Professor
25	Khalid Ali Alkobayer	Lecturer
26	Abdul Karim Abdullah Al-Orf	TA
27	Basim Abdullah Alhumaily	TA
28	Asim Aziz Abdulaziz	Lecturer
29	Muhammad Khawaja Masood	Lecturer
30	Mohammed Hamod Aldawsari	TA
31	Mohammed Saleh Alrajhi	TA

CAREER OPPORTUNITIES

1. All engineering administrations in the governmental authorities.
2. The projects operation and maintenance administrations in the governmental authorities.
3. The ministry of water and electricity.
4. The ministry of municipal and village affairs.
5. The Saudi commission for the engineers.
6. The general institution for the waters refinement.
7. The general institution for ports.
8. The Saudi airlines.
9. The military occupations management.
10. The constructions and contracting companies.
11. The electronics and communication companies.
12. The power and electric energy companies.
13. The Ministry of transportations.
14. The Ministry of agriculture and water recourses.
15. The general institution for the electricity.
16. The water and sewage authority.
17. The Saudi Arabian American Oil (Aramco) company.
18. The Saudi company for the basic industries (SABJC)
19. The unified Saudi company for electricity (SCECO).
20. All factories

ADMISSION TO THE EE PROGRAM

The admission to the department depends on:

- The student desire
- The Student GPA
- The capacity of the department

STUDENT OUTCOMES

At the time of graduation, students will have:

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

STUDYING SYSTEM

According to the educational plans; a student may complete any of the departmental• programs in 8 semesters (4 years) after the Preparatory Year Program (PYP). A successful student may complete the full requirements of the selected program if he completed (after the PYP) a total of 139 credit-hours. In details, the 139 credit-hours include:

- University requirements (12 credit-hours)
- College requirements (48 credit-hours)
- Program and/or Departmental requirements (73 credit-hours) for each of the two tracks offered by the department. The two tracks are the Power Engineering track and the Electronics & communication Engineering track. The student has to select one of these two tracks. The 73 credit hours for each track are divided to:
    - Common basic Courses (37 credit hours)
    - Compulsory track courses (30 credit hours)
    - Elective courses 6 credit-hours.
- The Free Courses: 6 credit hours are to be selected among the set of courses available in the university.

ELECTRICAL ENGINEERING PLAN

Core Courses

No	Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co- Req.
1	EE 201	Fundamentals of Electric Circuits	3	3	-	1	PHYS 131	-
2	EE 202	Electric Circuit Analysis	3	3	-	1	EE 201	-
3	EE 203	Electromagnetism	3	3	-	1	PHYS 131	-
4	EE 205	Electric Circuits Laboratory	1	-	2	-	-	EE 202
5	EE 208	Logic Design	3	3	-	1	-	-
6	EE 210	Logic Design Laboratory	1	-	2	-	-	EE 208
7	EE 300	Instruments & Electrical Measurements	3	2	2	-	EE 205	-
8	EE 301	Signals and systems Analysis	3	3	-	1	EE 202	-
9	EE 312	Electronics - 1	3	3	-	1	EE 202	-
10	EE 313	Electronics Laboratory - 1	1	-	2	-	-	EE 312
11	EE 351	Principles of Control Systems	3	3	-	1	EE 301	-
12	EE 354	Microprocessors and Interface Circuits	3	2	2	-	EE 208	-
13	GE 406	Summer Training	2	2	-	-	Pass 100 cr	-
14	EE 491	Senior Design Project - 1	3	1	4	-	Pass 100 cr	-
15	EE 492	Senior Design Project - 2	2	1	2	-	EE 491	-
	Total		37					

Compulsory Courses

Power Engineering Track

No	Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co- Req.
1	EE 330	Electric Machines - 1	3	3	-	1	EE 202	-

No	Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co- Req.
							EE 203	
2	EE 331	Electric Machines - 2	3	3	-	1	EE 330	-
3	EE 332	Electric Machines Laboratory	1	-	2	-	-	EE 331
4	EE 340	Fundamentals of Power Systems	3	3	-	1	EE 202 EE 203	-
5	EE 343	Power Systems Analysis	3	3	-	1	EE 340	-
6	EE 344	Power Systems Laboratory	1	-	2	-	-	EE 343
7	EE 432	Power Electronics	3	3	-	1	EE 312	-
8	EE 437	Power Electronics Lab	1	-	2	-	-	EE 432
9	EE 446	High Voltage Engineering	3	3	-	1	EE 340	-
10	EE 482	Design of Electrical Protection Systems	3	3	-	1	EE 340	-
11	GE 210	Engineering Mechanics	3	3	-	1	MATH 106	MATH 107
12	ME 322	Mechanical power engineering	3	3	-	1	PHYS 131	-
	Total		30					

Electronics & communication Engineering Track

No	Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co- Req.
1	CEN 354	Principles of Networks Engineering	3	3	-	1	-	-
2	EE 317	Electronics - 2	3	3	-	1	EE 312	-
3	EE 319	Electronics Laboratory - 2	1	-	2	-	EE313	EE 317
4	EE 320	Communications Principles	3	3	-	1	EE 301	-
5	EE 322	Digital Communications	3	3	-	1	EE 320	-
6	EE 326	Communications Laboratory	1	-	2	-	EE 320	EE 322
7	EE 405	ICs Technology and Applications	3	3	-	1	EE 317	-
9	EE 406	Integrated Circuits Laboratory	1	-	2	-	-	EE 405
8	EE 420	Information Theory and Coding	3	3	-	1	EE 320	-
10	EE 423	Wave Propagation and Antennas	3	3	-	1	EE 203	-
11	EE 463	Mobile Communications	3	3	-	1	EE 320	-

No	Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co- Req.
12	GE 210	Engineering Mechanics	3	3	-	1	MATH 106	
	Total		30					

Elective Courses

Power Engineering Track

Students should complete 6 credit hours from the following courses:

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co- Req.
EE 401	Electrical Standard Specifications	3	3	-	1	EE 343 EE 331	-
EE 433	Special Electrical Machines	3	3	-	1	EE 331	-
EE 434	Selection and Installation of Motors	3	3	-	1	EE 331	-
EE 435	Electric Drive Systems	3	3	-	1	EE 432 EE 331	-
EE 436	Advanced Topics in Power Electronics	3	3	-	1	EE 432	-
EE 438	Selected Topics in Electrical Machines	3	3	-	1	EE 331	-
EE 441	Electric Energy Utilization	3	3	-	1	EE 340	-
EE 443	Control and Operation of Power Systems	3	3	-	1	EE 343	-
EE 444	Planning and Design of Power Systems	3	3	-	1	EE 343	-
EE 445	Industrial Power Systems Design	3	3	-	1	EE 340	-
EE 447	Computer Applications in Power Systems	3	3	-	1	EE 343	-
EE 448	Selected Topics in Power Systems	3	3	-	1	EE 343	-
EE 455	Applied Control	3	3	-	1	EE 351	-
EE 456	Digital Control Systems	3	3	-	1	EE 351	-
EE 483	Principles of Photovoltaic Energy Systems	3	3	-	1	EE 340	-

Electronics & communication Engineering Track

Students should complete 6 credit hours from the following courses:

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co- Req.
EE 411	Programmable Logic Controllers	3	3	-	1	EE 354	-
EE 412	Industrial Electronics	3	3	-	1	EE 317	-
EE 413	Power Electronics	3	3	-	1	EE 312	-
EE 417	Communication Electronics	3	3	-	1	EE 317 EE 320	
EE 418	Design of Analog and Digital Filters	3	3	-	1	EE 317	-
EE 419	Selected Topics in Electronics	3	3	-	1	EE 317	-
EE 421	Telephone Systems and Traffic Analysis	3	3	-	1		EE 322
EE 424	Optical Communication Networks	3	3	-	1	EE 317 EE 320	-
EE 425	Computer Network Security	3	3	-	1	CEN 354 EE 320	-
EE 427	Design of Microwave Systems	3	3	-	1		EE 322
EE 428	Satellite Communications	3	3	-	1		EE 322
EE 429	Selected Topics in Communications	3	3	-	1		EE 322
EE 450	Industrial Instrumentation	3	3	-	1		EE 317
EE 456	Digital Control Systems	3	3	-	1	EE 351	-
EE 464	Error Control Coding	3	3	-	1	EE 322	EE 420
EE 465	Network Architecture and Protocols	3	3	-	1	CEN 354 EE 320	-

BSc PROGRAM CURRICULUM

Electrical Power Engineering (EPE) Track

3rd Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
IC 101	Introduction to Islamic culture	2	2	-	-	-	-
ARAB 101	Linguistic skills	2	2	-	-	-	-

PHYS 131	General Physics	4	3	2	-	-	-
GE 104	Basics of Engineering Drawing	3	1	4	-	-	-
MATH 106	Integral Calculus	3	3	-	1	-	-
CHEM 111	General Chemistry	4	3	2	-	-	-
Total Credit hours		18					

4th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
IC 102	Islam and Community Building	2	2	-	-	IC 101	-
GE 105	Basics of Engineering Technology	2	1	2	-	GE 104	-
MATH 107	Linear Algebra & Analytic Geometry	3	3	-	1	-	-
MATH 203	Differential and Integral Calculus	3	3	-	1	MATH 106	-
GE 210	Engineering Mechanics	3	3	-	1	MATH 106	MATH 107
EE 201	Fundamentals of Electric Circuits	3	3	-	1	PHYS 131	-
EE 203	Electromagnetism	3	3	-	1	PHYS 131	-
Total Credit hours		19					

5th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
MATH 208	Differential equations	3	3	-	1	MATH 203	-
GE 211	Introduction to Engineering Design-I	3	2	4	-	-	-
CSC 209	Computer Programming	3	2	2	-	MATH 107 MATH 203	-
EE 202	Electric Circuit Analysis	3	3	-	1	EE 201	-
EE 205	Electric Circuits Laboratory	1	-	2	-	-	EE 202
EE 208	Logic Design	3	3	-	1	-	-
EE 210	Logic Design Laboratory	1	-	2	-	-	EE 208
Total Credit hours		17					

6th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
IC 103	Economic System in Islam	2	2	-	-	IC 101	-
STAT 328	Probabilities and statistics	3	3	-	1	MATH 203	-
GE 213	Introduction to Engineering Design-2	2	2	2	-	GE 211	-
EE 300	Instruments & Electrical Measurements	3	2	2	-	EE 205	-
EE 301	Signals and systems Analysis	3	3	-	1	EE 202	-
EE 312	Electronics - 1	3	3	-	1	EE 202	-
EE 313	Electronics Laboratory - 1	1	-	2	-	-	EE 312
Total Credit hours		17					

7th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
ARAB 103	Arabic Writing	2	2	-	-	-	-
ME 322	Mechanical power engineering	3	3	-	1	PHYS 131	-
EE 330	Electric Machines - 1	3	3	-	1	EE202 EE 203	-
EE 340	Fundamentals of Power Systems	3	3	-	1	EE202 EE 203	-
+++	College Elective – 1	3	3	-	-	-	-
EE 351	Principles of Control Systems	3	3	-	1	EE 301	-
Total Credit hours		17					

8th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
IC 104	Political System in Islam	2	2	-	-	IC 101	-
EE 331	Electric Machines - 2	3	3	-	1	EE 330	-
EE 332	Electric Machines Laboratory	1	-	2	-	-	EE 331
EE 343	Power Systems Analysis	3	3	-	1	EE 340	-
EE 344	Power Systems Laboratory	1	-	2	-	-	EE 343
EE 354	Microprocessors and Interface Circuits	3	2	2	-	EE 208	-
+++	Free Course	3	3	-	-	-	-
Total Credit hours		16					

9th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
ECON 401	Engineering Economy	3	3	-	1	Pass 90 cr	-
EE 432	Power Electronics	3	3	-	1	EE 312	-
EE 437	Power Electronics Laboratory	1	-	2	-	-	EE 432
EE 4xx	Elective Course - 1	3	3	-	1	-	-
+++	Free Course	3	3	-	-	-	-
EE 491	Senior Design Project - 1	3	1	4	-	Pass 100 cr	-
Total Credit hours		16					

10th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
MGMT 402	Project Management	3	3	-	1	Pass 90 cr	-
EE 446	High Voltage Engineering	3	3	-	1	EE 340	-
+++	College Elective – 2	3	3	-	-	-	-
EE 482	Design of Electrical Protection Systems	3	3	-	1	EE 340	-
EE 4xx	Elective Course - 2	3	3	-	1	-	-
EE 492	Senior Design Project - 2	2	1	2	-	EE 491	-
GE 406	Summer Training	2	2	-	-	Pass 100 cr	-
Total Credit hours		19					

Elective Courses

In the eighth semester a student must select at least 6 credit hours out of the following courses:

Course Code	Course Title	CR	LT	LB	TU	Pre-Req	Co-Req.
EE 401	Electrical Standard Specifications	3	3	-	1	EE 343 EE 331	-
EE 433	Special Electrical Machines	3	3	-	1	EE 331	-
EE 434	Selection and Installation of Motors	3	3	-	1	EE 331	-
EE 435	Electric Drive Systems	3	3	-	1	EE 432 EE 331	-
EE 436	Advanced Topics in Power Electronics	3	3	-	1	EE 432	-
EE 438	Selected Topics in Electrical Machines	3	3	-	1	EE 331	-
EE 441	Electric Energy Utilization	3	3	-	1	EE 340	-
EE 443	Control and Operation of Power Systems	3	3	-	1	EE 343	-
EE 444	Planning and Design of Power Systems	3	3	-	1	EE 343	-
EE 445	Industrial Power Systems Design	3	3	-	1	EE 340	-
EE 447	Computer Applications in Power Systems	3	3	-	1	EE 343	-
EE 448	Selected Topics in Power Systems	3	3	-	1	EE 343	-
EE 455	Applied Control	3	3	-	1	EE 351	-
EE 456	Digital Control Systems	3	3	-	1	EE 351	-
EE 483	Principles of Photovoltaic Energy Systems	3	3	-	1	EE 340	-

Electronics and Communication (ECE) Track

3rd Level

Course Code	Course Title	CR	LT	LB	TU	Pre- Req.	Co-Req.
IC 101	Introduction to Islamic culture	2	2	-	-	-	-
ARAB 101	Linguistic skills	2	2	-	-	-	-
PHYS 131	General Physics	4	3	2	-	-	-
GE 104	Basics of Engineering Drawing	3	1	4	-	-	-

MATH 106	Integral Calculus	3	3	-	1	-	-
CHEM 111	General Chemistry	4	3	2	-	-	-
Total Credit hours		18					

4th Level

Course Code	Course Title	CR	LT	LB	TU	Pre- Req.	Co-Req.
IC 102	Islam and Community Building	2	2	-	-	IC 101	-
GE 105	Basics of Engineering Technology	2	1	2	-	GE 104	-
MATH 107	Linear Algebra & Analytic Geometry	3	3	-	1	-	-
MATH 203	Differential and Integral Calculus	3	3	-	1	MATH 106	-
GE 210	Engineering Mechanics	3	3	-	1	MATH 106	MATH 107
EE 201	Fundamentals of Electric Circuits	3	3	-	1	PHYS 131	
EE 203	Electromagnetism	3	3	-	1	PHYS 131	-
Total Credit hours		19					

5th Level

Course Code	Course Title	CR	LT	LB	TU	Pre- Req.	Co-Req.
MATH 208	Differential equations	3	3	-	1	MATH 203	-
GE 211	Introduction to Engineering Design -I	3	2	4	-	-	-
CSC 209	Computer Programming	3	2	2	-	MATH 107 MATH 203	-
EE 202	Electric Circuit Analysis	3	3	-	1	EE 201	-
EE 205	Electric Circuits Laboratory	1	-	2	-	-	EE 202
EE 208	Logic Design	3	3	-	1	-	-
EE 210	Logic Design Laboratory	1	-	2	-	-	EE 208
Total Credit hours		17					

6th Level

Course Code	Course Title	CR	LT	LB	TU	Pre- Req.	Co-Req.
IC 103	Economic System in Islam	2	2	-	-	IC 101	-
STAT 328	Probabilities and statistics	3	3	-	1	MATH 203	-
GE 213	Introduction to Engineering Design-2	2	2	2	-	GE 211	-
EE 300	Instruments & Electrical Measurements	3	2	2	-	EE 205	-
EE 301	Signals and systems Analysis	3	3	-	1	EE 202	-
EE 312	Electronics - 1	3	3	-	1	EE 202	-
EE 313	Electronics Laboratory - 1	1	-	2	-	-	EE 312
Total Credit hours		17					

7th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
ARAB 103	Arabic Writing	2	2	-	-	-	-
EE 317	Electronics - 2	3	3	-	1	EE 312	-
EE 319	Electronics Laboratory - 2	1	-	2	-	-	EE 317
EE 320	Communications Principles	3	3	-	1	EE 301	-
+++	College Elective – 1	3	3	-	-	-	-
EE 351	Principles of Control Systems	3	3	-	1	EE 301	-
CEN 354	Principles of Networks Engineering	3	3	-	1	-	-
Total Credit hours		18					

8th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
IC 104	Political System in Islam	2	2	-	-	IC 101	-
EE 322	Digital Communications	3	3	-	1	EE 320	-
EE 326	Communications Laboratory	1	-	2	-	EE 320	EE 322
EE 354	Microprocessors and Interface Circuits	3	2	2	-	EE 208	-
EE 405	ICs Technology and Applications	3	3	-	1	EE 317	-
EE 406	Integrated Circuits Laboratory	1	-	2	-	-	EE 405
+++	Free Course	3	3	-	-	-	-
Total Credit hours		16					

9th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
ECON 401	Engineering Economy	3	3	-	1	Pass 90 cr	-
EE 423	Wave Propagation and Antennas	3	3	-	1	EE 203	-
EE 4xx	Elective Course - 1	3	3	-	1	-	-
+++	Free Course	3	3	-	-	-	-
EE 491	Senior Design Project - 1	3	1	4	-	Pass 100 cr	-
Total Credit hours		15					

10th Level

Course Code	Course Title		CR	LT	LB	TU	Pre-Req.	Co-Req.
MGMT 402	Project Management		3	3	-	1	Pass 90 cr	-
EE 420	Information Theory and Coding		3	3	-	1	EE 320	-
EE 463	Mobile Communications		3	3	-	1	EE 320	-
+++	College Elective – 2		3	3	-	-	-	-
EE 4xx	Elective Course - 2		3	3	-	1	-	-
EE 492	Senior Design Project - 2		2	1	2	-	EE 491	-
GE 406	Summer Training		2	2	-	-	Pass 100 cr	-
Total Credit hours			19					

Elective Courses

In the eighth semester a student must select at least 6 credit hours out of the following courses:

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
EE 411	Programmable Logic Controllers	3	3	-	1	EE 354	-
EE 412	Industrial Electronics	3	3	-	1	EE 317	-
EE 413	Power Electronics	3	3	-	1	EE 312	-
EE 417	Communication Electronics	3	3	-	1	EE 317 EE 320	
EE 418	Design of Analog and Digital Filters	3	3	-	1	EE 317	-
EE 419	Selected Topics in Electronics	3	3	-	1	EE 317	-
EE 421	Telephone Systems and Traffic Analysis	3	3	-	1		EE 322
EE 424	Optical Communication Networks	3	3	-	1	EE 317 EE 320	–
EE 425	Computer Network Security	3	3	-	1	CEN 354 EE 320	-
EE 427	Design of Microwave Systems	3	3	-	1		EE 322
EE 428	Satellite Communications	3	3	-	1		EE 322
EE 429	Selected Topics in Communications	3	3	-	1		EE 322
EE 450	Industrial Instrumentation	3	3	-	1		EE 317
EE 456	Digital Control Systems	3	3	-	1	EE 351	-
EE 464	Error Control Coding	3	3	-	1	EE 322	EE 420
EE 465	Network Architecture and Protocols	3	3	-	1	CEN 354 EE 320	-

COURSE DESCRIPTIONS

Core Courses

EE 201 - Fundamentals of Electric Circuits: 3 (3, 0, 1)

Basic circuit elements and concepts; Basic laws of circuit theory: Ohm's law, Kirchoff's law; Circuit theorems: superposition principle, Thevenin and Norton theorems; maximum power transfer theorem, Techniques of DC circuit analysis: Nodal and mesh analysis; Sinusoidal sources and the concept of phasor in circuit analysis Techniques of AC circuit analysis: Nodal and mesh analysis.

Pre-requisite: PHYS 104

EE 202 - Electric Circuit Analysis: 3 (3, 0, 1)

Introduction to concept of active, reactive, complex power and power factor. Three phase circuits; Introduction to Op-Amp: ideal characteristics with simple applications; Frequency response of RLC and resonance; Natural and step response of first and second order circuits; Laplace transform in circuit analysis; Introduction to frequency selective circuits: passive filters, Bode plots; Two-Port networks; Mutual inductance and transformers.

Pre-requisite: EE 201

EE 203 - Electromagnetism: 3 (3, 0, 1)

Review to vector calculus; Electrostatic fields; Gauss's law and divergence; Electric potential; Dielectrics and capacitance; Poisson's and Laplace's equations; Charge images; Current density and conductors; Magnetostatic fields; Biot–Savart and Ampere's laws; Curl and Stoke's theorem; Magnetic materials and circuits; Self and mutual inductances; Energy in static Fields, Introduction to electromagnetic waves.

Pre-requisite: PHYS 104

EE 205 - Electric Circuits Laboratory: 1 (0, 2, 0)

General introduction to the laboratory Voltage, current, and power in DC circuits using KVL and KCL. Superposition, Thevenin's, and Maximum power transfer theorems in DC circuits; Series and parallel AC circuits; Resonance in series and parallel circuit; Maximum power transfer theorem and power factor improvement in AC circuits; Transients in DC circuits; Magnetically-coupled circuits; Three phase circuits.

Co-requisite: EE 202

EE 208 - Logic Design: 3 (3, 0, 1)

Introduction to Numbering Systems, including: Binary system, hexadecimal system, Binary codes (Gray and ASCII codes), Logic fates and logic functions, Boolean Algebra, De-Morgan laws, Representation of negative and fractional numbers in binary systems. Combinational Logic Circuits, including: Canonical forms, Simplification using logic algebra and Karnaugh maps (K-maps), Arithmetic logic Units, Half and full Adders, Subtractors, and multipliers. Multiplexers and Demultiplexers, Encoders and decoders, Comparators and Parity generators. Programmable Logic Devices (PLD's) and VHDL, including PAL' PLA's, GAL's, CPLD's and FPGA's, Fundamentals of VHDL. Sequential Logic Devices, including: State machines, Methods of representation, state transition diagrams and tables. Flip-flops (S-R, D, J-K, T, Master-Slave), Gated and clocked flip flops, edge-triggered flip flops. Registers, their types, their operation and applications. Counters, their types, their operation and applications. Introduction to Memory Devices, SRAM and DRAM cells, their operation and organization. Flash memory and its architecture and operation.

EE 210 - Logic Design Laboratory: 1 (0, 2, 0)

Familiarization with logic circuits laboratory; Introduction to logic gates; Implementation of Boolean functions using AND and OR gates; NAND and NOR implementation; XOR and address; Design of combinational circuits; Flip-flops; Design of sequential circuits; Sequential PLA's.

Co-requisite: EE 208

EE 300 - Instruments & Electrical Measurements: 3 (2, 2, 0)

Measurements fundamentals: units and standards, errors, statistical analysis; DC/AC meters construction; loading effect; insertion loss; Difference and instrumentation amplifiers; Oscilloscope: CRT, amplifiers, triggered sweep circuits, attenuation, specifications; Spectrum analyzer, Transducers and sensors: passive and self-generating transducers; Liquid crystal displays (LCDs), CCDs, and optical fiber sensors; Digital measurements: Data conversion principles; Digital voltmeter.

Pre-requisite: EE 205

EE 301- Signals and systems Analysis: 3 (3, 0, 1)

Introduction, including: continuous-time and discrete-time signals and systems, analog-to-digital and digital-to-analog conversion. Continuous Signals, including: linear time-invariant (LTI) systems and their properties, Fourier series, Fourier

Transform (FT) and its inverse (IFT) and their properties. Convolution and Correlation theory. Discrete Signals, including: linear shift-invariant (LSI) systems and their properties, Discrete Fourier Transform (DFT) and its inverse (IDFT) and their properties. Z-Transform, its inverse and their properties. Mapping Theory, Fast Fourier transform (FFT). Parseval Theory. Sampling Theory, including: Nyquist sampling criterion, signal aliasing and reconstruction. Fundamentals to Signal processing, including: types of filters (LPF, HPF, BPF, SBF).

Pre-requisite: EE 202

EE 312 - Electronics - 1: 3 (3, 0, 1)

Introduction to Semiconductors, including: Crystal lattice, bonds and energy bands in solids. P-N Junction including: Junction formation, I-V characteristics, forward and reverse bias, breakdown voltage. Applications of P-N Junction including Rectification, Zener diode, solar cells and light emitting diode (LED). Bipolar Junction Transistor (BJT), including: BJT types and operation, and its currents and current amplification factor. BJT modes of operation and biasing configurations. BJT current equations and Ebers Moll model. Operating point and bias stability. BJT small signal models and BJT operation as an amplifier. Metal-Oxide-Semiconductor Field Effect Transistor (MOSFET), including: MOSFET types and theory of operation. Channel formation in Enhancement-mode MOSFET and its I-V characteristics in linear and saturation modes. MOSFET biasing configurations. MOSFET small signal models and MOSFET operation as an amplifier.

Pre-requisite: EE 202

EE 313 - Electronics Laboratory - 1: 1 (0, 2, 0)

Introduction to the lab tools. I-V characteristics of diode. Clipping circuits using diodes. Rectification using diodes. Zener diode and regulators. BJT dc biasing. CE BJT amplifier. MOSFET dc biasing. CS MOSFET amplifier. Simple AM receiver circuit, MOS digital circuits.

Co-requisite: EE 312

EE 351 - Principles of Control Systems: 3 (3, 0, 1)

Dynamic system representations (block diagram, transfer function, signal-flow graph, and state-space representation); modeling of electric and mechanical systems; state variable analysis; transient response specifications; steady-state error analysis; stability by Routh-Hurwitz criterion; root-locus technique; Bode plots; Nyquist diagram; pole-placement technique; PID controller design; simulation by Matlab/Simulink.

Pre-requisite: EE 301

EE 354 - Microprocessors and Interface Circuits: 3 (2, 2, 0)

Introduction to Microprocessor Systems, including: microcomputer architecture, data, address and control buses, memory access and interrupts. Architecture of 80x86 Microprocessors, including 16-bit, 32 bit microprocessors, Pentium and Core2 microprocessors. Memory Organization & Segmentation, including memory segmentation and address generation (20-bit and 32-bit addresses). Instruction Set of 80x86 Microprocessors, including addressing modes, data-transfer instructions, logic and mathematic instructions, flow control, subroutines and interrupts, program control instructions, instruction decoding. Assembly Language and Programming of Intel microprocessors, including, DEBUG and Macro-assembler, Procedures and subroutines. Memory Interface Circuits. Interface Circuits for Input/Output Devices, programmable I/O (8255 PIO), examples, handshaking and microprocessor communications.

Pre-requisite: EE 208

GE 406 - Summer Training 2 (-, -, -)

The student performs the summer training in one of the summer terms provided that he finished 100 credits at least. The student will be trained in an approved body in the private or governmental sectors. The training lasts for two months, and

at the end of the training period, the student should submit a report and a student portfolio, and will be evaluated through discussing its contents with the student by a specialized committee.

EE 491 - Senior Design Project - 1: 3 (1, 4, 0)

The student is assigned, among a team of students and one or more faculty professors, the design of an applied project which simulates the real working condition to which the student will be exposed after graduation. The project should be comprehensive and includes all the necessary preliminary field studies, visibility studies, final design drawings, bill of quantities, and the total operating cost of the project. The graduation project shall continue for one semesters. At the end of the semester, there will be a seminar held for the working team of students to present the details of the project. The working team will be orally examined and evaluated based on the presentation as well as the oral discussion.

Pre-requisite: Pass 100 Cr

EE 492 - Senior design Project - 1: 2 (1, 2, 0)

The course is the second part for the senior design project. It aims to expose the students to the practical experience of real civil engineering projects/projects components in order to gain the necessary experience which relates the design process to the full course work studied during the program. The previously selected team of students shall continue the design process for this part of the project. The students are responsible for and shall utilize all the knowledge and skills gained through the program as well as in order to complete the task. At the end, students will be examined in final project report which is done in the form of an oral presentation as a team.

Pre-requisite: EE 491

Compulsory Courses

General

GE 210 - Engineering Mechanics: 3 (2, 2, 0)

Force and moment for planner systems; Basic equilibrium conditions Centroids; friction, area and mass moments of inertia. Kinematics of a particle: rectilinear and

curvilinear motion. kinetics of particles: Newton's law, work and energy; kinematics of rigid body in plane motion. Relative velocity and acceleration; Kinetics of a rigid body in plane motion: translation, fixed axis rotation, general motion, work and energy.

Co-requisite: MATH 106

Electrical Power Engineering Track (EPE)

EE 330 - Electric Machines - 1: 3 (3, 0, 1)

Transformers (construction, operation of single-phase transformers, equivalent circuit, voltage regulation and efficiency, auto-transformers, three-phase transformers), AC machinery fundamentals, Synchronous machines (components, internal voltage, equivalent circuit, phasor diagram, performance of turbo-alternator, generator operating alone, parallel operation of alternators, synchronous motors, steady-state operation, motor starting), synchronous machine dynamics: the swing equation, steady state and transient stability.

EE 331 - Electric Machines - 2: 3 (3, 0, 1)

Three-phase induction machines (construction, operation, equivalent circuit, performance characteristics, starting of induction motors, speed control), single-phase induction motors, fundamentals of d.c machines, DC machines (components, classification, performance, motor characteristics, starting of d.c motors, speed control of d.c motors).

EE 332 - Electric Machines Laboratory: 1 (0, 2, 0)

Equivalent circuit of transformers; Three-phase connections and harmonic problems; Equivalent circuit of three-phase and single-phase induction motors; Load testing of induction motors; Starting of single-phase induction motors; Equivalent circuit of synchronous machine: Performance of synchronous motors; Terminal characteristics of dc machines

EE 340 - Fundamentals of Power Systems: 3 (3, 0, 1)

Power system components and elements: generation – transmission - distribution; Generation of electrical energy: main sources – alternative sources; Transmission line conductors; Electric insulators: types – parameters; Transmission line parameters: series impedance, shunt admittance; Analysis of transmission lines:

short line – medium line – long line; Power cables parameters: series impedance, shunt admittance; Analysis of distribution systems: radial system – ring system.

EE 343 - Power Systems Analysis: 3 (3, 0, 1)

Per unit system; Power system matrices: bus admittance matrix – bus impedance matrix; Load flow analysis: Gauss-seidel method – Newton-Raphson method; Economic operation of generators: neglecting transmission line losses – including transmission line losses; Symmetrical faults: Thevenin's method – bus impedance matrix method; Unsymmetrical faults: symmetrical components – Thevenin's method – bus impedance matrix method; Stability analysis: steady state stability – transient stability – equal area criterion.

EE 344 - Power Systems Laboratory: 1 (0, 2, 0)

Transmission line characteristics; Reactive power compensation; Symmetrical and unsymmetrical fault analysis; Load-flow simulation; Transient stability simulation; Active and reactive power generator control; Characteristics of isolated and interconnected systems; Characteristics and coordination of protective relays.

EE 432 - Power Electronics: 3 (3, 0, 1)

Power semiconductor devices: terminal characteristics; Power converters: ac-ac converters, rectifiers, inverters, dc-dc converters and resonant converters; Applications in power systems.

Pre-requisite: EE 312

EE 437 - Power Electronics Laboratory: 1 (0, 2, 0)

Diode characteristics, Single phase uncontrolled half wave rectifier circuits, Single phase uncontrolled half full rectifier circuits, SCR characteristics, Single phase controlled half wave rectifier circuits, Single phase controlled half full rectifier circuits, AC voltage controllers, Three phase uncontrolled half wave rectifier circuits, Three phase uncontrolled half full rectifier circuits, Three phase controlled half wave rectifier circuits, Three phase controlled half full rectifier circuits, DC Chopper circuits, Single phase Inverters.

Co-requisite: EE 432

EE 446 - High Voltage Engineering: 3 (3, 0, 1)

Effect of Impulse voltage on the Circuit Breaker performance during short circuit interruption. Effect of Lightning on the high voltage network. Surge Over Voltage Protection (Switching - Lightning). Methods of Earthing (Protective - Systems). Electrical Insulators (Solid - Liquid - Gases). High Voltage Test techniques. High Voltage Generation (DC - AC -Impulse).

Pre-requisite: EE 340

EE 482 - Design of Electrical Protection Systems: 3 (3, 0, 1)

Protection system components: Objectives, system components, requirements, protection zones, main and backup protection; Protection Instrument transformers (CT, VT & CVT): Types, construction, equivalent circuit, ratio error, burden, accuracy classes; Protective relays: Types (electromechanical, solid state, digital, numerical), function classifications, merits & demerits, JED; Circuit Breakers: introduction, types (air, vacuum, oil, SF6), principle of operation, applications, merits and demerits, during fault behavior, rapture capacity; Transmission Line Protection and Design: Overcurrent protection schemes, distance protection schemes, power line carrier protection (PLC), case study (design of a TL protection scheme); Generator Protection and Design: Stator protection schemes, rotor

protection schemes, case study (design of a generator protection scheme); Transformer Protection and Design: Overcurrent protection, restricted earth fault, differential, Buchholz, case study (design of a transformer protection scheme).

Pre-requisite: EE 340

ME 322 - Mechanical power engineering: 3 (3, 0, 1)

First law, second law. Properties of vapors and perfect gases, Air standard cycles. Carnot, Rankine and Gas Turbine Cycles. Refrigeration cycles. Heat Transfer: Conduction, convection and radiation. Fluid Mechanics: Properties of fluids, fluid static and Kinematics. Similitude and dimensional Analysis. Dynamics of Ideal and Viscous Flows. Renewable energy resources.

Pre-requisite: PHYS 104

Electrical Communication Engineering Track (ECE)

CEN 354 - Principles of Network Engineering: 3 (3, 0, 1)

Introduction to networking principles. Communication channels and their capacity. Multiplexing and switching principles. Packet switching networks. Network structures. High speed networks. Local area networks (LAN's). Ethernet. Wide area networks (SONET, ATM, Fiber to the home, GPON, GEPON). Switches, Routers and Hubs. Internet, Extranet and Intranet principles. Network standards and OSI model. Network services and their benefits, IPv4, Delivery and Forwarding of IP packets, routing protocols (RIP, OSPF, BGP)

Co-requisite: MATH 106

EE 317 - Electronics - 2: 3 (3, 0, 1)

Introduction to Semiconductors, including: Introduction, including basic electronic device and their theory of operation. Multi-stage a1nplifier, including: RC-Coupled Amplifiers, their frequency response and Bode plots. Feedback and Oscillators, including: Negative and positive feedback, Voltage and current feedback circuits, Stability of feedback amplifiers, Bode contours and Nyquist stability Criteria. Parkhausen criterion. Feedback oscillators (Phase-shift, Wien bridge, Hartley, Colpitts and Clapp oscillators), Negative resistance oscillators, Voltage-controlled osc11lator (VCO) and phase-locked loops (PLL). Operational Amplifiers and their Applications, including: Opamp building blocks, linear and non-linear applications,

Analog-to-digital and digital-to-analog converters (ADC and DAC), Multivibrators. Digital Circuits, including: Transistor (BJT and MOSFET) as a switch, Switching parameters, like fan-out, noise margins and propagation delay. Transistor-transistor logic (TTL) circuits and CMOS logic

Pre-requisite: EE 312

EE 319 - Electronics Laboratory - 2: 1 (0, 2, 0)

PSPICE simulation of electronic circuits. Linear applications of op-amp. Wein• bridge oscillator. Active filters: LPF, and HPF. Schmitt trigger and unstable multi• vibrator. Differential amplifier using BJT. Design and implementation of digital circuits using VHDL. CMOS inverter characteristics. TTL inverter characteristics.

Co-requisite: EE 317

EE 320 - Communications Principles: 3 (3, 0, 1)

Basic Elements of a Communication System, including: types of communication systems and their building blocks, receiver, transmitter and channel. Wireless communication systems, Super heterodyne transceivers (TRX). Basic Modulation Techniques, including: Amplitude modulation (AM), Frequency modulation (FM), and phase modulation (PM). Pulse modulation Techniques, including: PAM, PWM and PPM, Pulse Code Modulation (PCM), Differential PCM (DPCM), Delta Modulation (OM). Signal Multiplexing, including: time division multiplexing (TDM), and frequency-division multiplexing (FDM). Introduction to Digital Modufation (Shift Keying), including amplitude-shift keying (ASK), frequency-shift keying (FSK) and phase-shift keying (PSK).

Pre-requisite: EE 301

EE 322 - Digital Communications: 3 (3, 0, 1)

Introduction to Digital Communications, including: random variables and probability distributions, signal-to-noise (SIN) ratio, probability of error. Coherent Digital Modulation Techniques, including amplitude-shift keying (ASK), frequency-shift keying (FSK) and phase-shift keying (PSK), quadratic PSK (QPSK), Minimum-shift keying (MSK), Gaussian MSK (OMSK). Orthogonal Digital Modulation Techniques. Orthogonal FDM (OFDM). Comparison between Digital Modulation Techniques, including bandwidth, power spectrum and probability of error.

Introduction to Information Theory, including: Channel Capacity, source coding, channel coding, inter-symbol interference, error correcting coding techniques.

Pre-requisite: EE 320

EE 326 - Communications Laboratory: 1 (0, 2, 0)

Basic Modulation & modulation Techniques, including: Amplitude modulation (AM), Frequency modulation (FM). Si al Multiplexing, including: time division multiplexing (TOM), and frequency-division multiplexing (FDM). Super heterodyne radio receiver (RX), measurement of sensitivity, selectivity and fidelity, Pulse modulation Techniques, including: PAM, PWM and PPM, Pulse Code Modulation PCM), Differential PCM (DPCM), Delta Modulation (DM). Digital Modulation Shift Keying), including amplitude-shift keying (ASK'.), frequency-shift keying FSK) and phase-shift keying (PSK: BPSK, PSK, M-ary PSK, GM.SK). Coding, including: Source Coding, Channel Coding and Error Correcting Codes.

Pre-requisite: EE 320
Co-requisite: EE 322

EE 405 - ICs Technology and Applications: 3 (3, 0, 1)

Introduction to IC Technology, including: crystalline silicon preparation, oxidation, impurity diffusion, ion implantation, die separation, pad contacts, Heat sinking, BJT and CMOS technology. Linear IC's and their Applications, including: operational amplifiers (OpAmps), the 74 1 IC, and operational trans-conductance amplifiers (OTA). Digital IC's and their Applications, including: Combinational logic MSI circuits, sequential logic IC's, VLSI circuits and memory IC's. Mixed IC 's and their Applications, including: analog-to-digital converters (ADC) and digital-to-analog• converters (DAC), Timers and multi-vibrator IC's (555/556/557) and their applications in communications. Switched-mode power supplies (SMPS) IC's, PWM and DC-DC converter IC's.

Pre-requisite: EE 317

EE 406 – Integrated Circuit Laboratory: 1 (0, 2, 0)

Electronic Design Automation. Linear IC Measurements and Testing, Digital IC and their Testing, Mixed-Signal IC's measurement and Testing. Switched-m ode Power Supply IC's.

Co-requisite: EE 405

EE 420- Information Theory and Coding: 3 (3, 0, 1)

Basic definitions: Information, entropy for zero-memory (memory less) sources. Variable length codes: Huffinan code, Shannon_Fano code and code efficiency. Markov (memory) information sources. Rate distortion theory. Channel coding and channel capacity. Error detecting and error correction codes.

Pre-requisite: EE 320

EE 423 - Wave Propagation and Antennas: 3 (3, 0, 1)

Introduction to antennas and propagation; Basic propagation models and antenna parameters; Ground wave propagation; Sky wave propagation; Space wave propagation; Statistical models and diversity principles; Propagation models in mobile radio systems; Antenna engineering in LF, MF, VHF and UHF systems; antenna a linear and planar arrays.

Pre-requisite: EE 203

EE 463 - Mobile Communications: 3 (3, 0, 1)

Practical and theoretical aspects of mobile communication system design are studied; particular emphasis is on mobile communications. frequency reuse, hand-off, cell splitting, indoor/outdoor propagation, co-channel interference, frequency management channel assignment techniques cell-site antennas, handset antenna/human body interaction, switching and traffic, AMPS, GSM, TDMA, and CDMA are studied.

Pre-requisite: EE 320

Elective Courses

Electrical Power Engineering Track (EPE)

EE 401 - Electrical Standard Specifications: 3 (3, 0, 1)

Introduction; harmonized standards; CE marking and conformity assessment of electric products; underwriter laboratories (UL) mark: mission of UL, types of UL marks; IEC standard marking (nameplate data & terminal marking) of electric products, motor marking, contactor marking, fuse marking, circuit breaker marking; safety of low voltage equipment (LVD), safety classification, IP code, electrical hazards; IEC standard sites and electric operating conditions for motors,

HVF, imbalance factor, motor derating, standard motor testing, electromagnetic compatibility (EMC): emission; immunity, harmonic currents, third harmonic emission limits, flicker; standard classification of hazardous areas; types and standard marking of motors and electric equipment suitable for use in potentially explosive atmospheres.

Pre-requisite: EE 343, EE 331

EE 433 - Special Electrical l Machines: 3 (3, 0, 1)

Reluctance motor, stepper motor, eddy current motors, hysteresis motors, ac commutator motors, universal motor, two phase servo motor, linear induction motor, linear d.c. motor.

Pre-requisite: EE 331

EE 434 - Selection and Installation of Motors: 3 (3, 0, 1)

Motor duty types; motor mounting arrangement: IM code, cable selection, cable layout (power cable, control cable); motor methods of cooling: IC code, motor auxiliaries, impeded temperature detectors (ETD), requirements of motors thermal protection; short circuit protection: selection and sizing of load break switch, fuse and circuit breaker; selection and sizing of motor automatic starter: DOL, star/delta (open& closed transition) starter, auto transformer starter, SRIM starter, DC motor starter, Automatic starting of synchronous motor; selection of motor overload protection; selection and sizing of motor power factor correction capacitors; selection and sizing of motor controller.

Pre-requisite: EE 331

EE 435 - Electric Drive Systems: 3 (3, 0, 1)

Drive system components, D.C motor drive systems, D.C motors fed from single• phase rectifier circuits, D.C motors fed from three-phase rectifier circuits, chopper• fed D.C motors, induction motor drive systems, induction motors fed from A.C voltage controller, inverter-fed induction motors.

Pre-requisite: EE 331, EE 432

EE 436 - Advanced Topics in Power Electronics: 3 (3, 0, 1)

Advanced rectifier converters (star-double star with inter-phase reactor, 12 pulse rectifiers), rectifier converter operation (overlap, regulation, and power factor),

frequency converters, analysis of three-phase ac voltage controllers, thyristor triggering circuits, thyristor commutation techniques, applications of power electronics.

Pre-requisite: EE 432

EE 437 - Power Electronics Laboratory: 1 (0, 2, 0)

Diode characteristics, Single phase uncontrolled half wave rectifier circuits, Single phase uncontrolled half full rectifier circuits, SCR characteristics, Single phase controlled half wave rectifier circuits, Single phase controlled half full rectifier circuits, AC voltage controllers, Three phase uncontrolled half wave rectifier circuits, Three phase uncontrolled half full rectifier circuits, Three phase controlled half wave rectifier circuits, Three phase controlled half full rectifier circuits, DC Chopper circuits, Single phase Inverters.

EE 438 - Selected Topics in Electrical Machines: 3 (3, 0, 1)

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student.

Pre-requisite: EE 331

EE 441 - Electric Energy Utilization: 3 (3, 0, 1)

Illumination: types of lamps, illumination schemes, calculation of illumination, requirements of proper lighting. Electric Heating: advantages of electrical heating, heating methods, design of resistance heating element. Electric Welding: advantages of electric welding, welding methods, comparison between AC and DC arc welding, welding control circuits. Electrolytic Processes: laws of electrolysis, process of electro-deposition, factors affecting electro-deposition, manufacturing of chemicals by electrolysis process. Refrigeration and Air Conditioning: principle of air conditioning, refrigeration cycle, eco-friendly refrigerants, electrical circuits used in refrigerator and air-conditioner. Electric Traction: advantages of electric traction, systems of electric traction, types of motors used for electric traction, starting and braking of traction motors.

Pre-requisite: EE 340

EE 443 - Control and Operation of Power Systems: 3 (3, 0, 1)

Concepts of power system operation; Network topology and incidence matrices; Formation of bus impedance matrix; Unit commitment; Optimal power flow; Automatic generation control (AGC); Energy management systems (EMS) and control centers operation; State estimation (SE); Dynamic security assessment (DSA).

Pre-requisite: EE 343

EE 444 - Planning and Design of Power Systems: 3 (3, 0, 1)

Introduction to Power System Planning: Definitions, objectives, procedures, requirements; Load Characteristics: Definitions, types, load curves; Load Forecasting: Definitions, objectives, types, methodologies (time series); Introduction to Power System Reliability: Introduction, terms and definitions, reliability indices, reliability evaluation, service interruption, failure mode, outages; System Cost Assessment: Present worth value, investment and fixed costs, operating costs, case study (generation cost assessment); Transmission Line Planning and Design: Introduction, Kelvins law, Tollgem Theory, case study (design of a TL planning);Distribution System Planning and Design: Introduction, distribution system components, distribution substation site location, substation rating, substation service area with many primary feeders, percentage voltage drop, design of primary system, design of secondary system, case study (design of distribution system).

Pre-requisite: EE 343

EE 445 - Industrial Power Systems Design: 3 (3, 0, 1)

Construction of site Plans, site plan interpreting, unit substation, feeders and bus systems, Panel boards, using wire tables for determining conductor sizes, motor installation calculations, system protection and include: circuit barkers, fuses, over current protect ion devices, short circuit protection devices and their time- current characteristic charts.), lighting protection, installation in hazardous locations

Pre-requisite: EE 340

EE 447 - Computer Applications in Power Systems: 3 (3, 0, 1)

Computer applications in power system planning, Computer applications in power flow solution and control, Computer applications in power system fault analysis,

Computer applications in power system dynamics and control, Computer applications in power system economic operation.

Pre-requisite: EE 343

EE 448 - Selected Topics in Power Systems: 3 (3, 0, 1)

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student

Pre-requisite: EE 343

EE 455 - Applied Control: 3 (3, 0, 1)

Introduction to control systems and their classifications. Advantages of using feedback in control systems. Basics of system modeling and analysis. Examples of applied control systems: speed control system, temperature control system, liquid• level control system. State-space models. Derivation of state-space model from transfer function and vice versa. Time response of state-space model. Transient response characteristics. Classifications of industrial controllers. Automatic controller. Basics of PID controller. PID controller design methods; Transducers and actuators; Control applications in power systems: turbine-governor control, generator voltage control, and load frequency control.

Pre-requisite: EE 351

EE 456 - Digital Control Systems: 3 (3, 0, 1)

Transducer fundamentals. Basic sampling concepts. Sample and hold circuits and analog multiplexers. Data conversion systems. Z-transform applied to discrete-time system with transformation form the s-plane to the z-plane. Analysis of digital control system using Nyguist, Bode plots and root-locus. Stability analysis of digital systems. Data loggers and acquisition systems. Application of microcomputers to closed-loop industrial systems.

Pre-requisite: EE 351

EE 483 - Principles of Photovoltaic Energy Systems: 3 (3, 0, 1)

Introduction: Renewable Energy Technologies, History of Photovoltaics, Environmental Characteristics: Solar Angles, Sun Path Diagrams, Solar Radiation, Thermal Radiation, Extraterrestrial Solar Radiation, Atmospheric Attenuation,

Terrestrial Irradiation, Total Radiation on Tilted Surfaces, Typical Meteorological Year, Photovoltaic Systems: PV Cell Characteristics, Types of PV Technology, Related Equipment: Batteries, Inverters, Charge Controllers, Peak-Power Trackers, Applications: Direct Coupled PV System, Stand-Alone Applications, Grid-Connected Systems, Hybrid-Connected Systems, Design of PV Systems, Solar Economic Analysis: Life Cycle Cost Analysis, Time Value of Money, Payback Time, Optimization Using P1 and P2 Method, Uncertainties in Economic Analysis.

Electrical Communication Engineering (ECE) Track

EE 411 - Programmable Logic Controllers: 3 (3, 0, 1)

Introduction (What's PLC?), PLC Architecture; including PLC building blocks (I/O ports, internal relays, timers, counters, serial ports, high-speed counters), PLC operation, scan cycle, PLC response time, case study: Siemens S7 PLC's, PLC's Memory Organization ; including: input memory, output memory, S-memory, variable memory, config memory, external EEPROM, PLC Programming; including: PLC programming Languages (LAD, functional and STL), LAD and STL basic instructions, programming devices and compilers (STEP-7), program editing, designing and editing a PLC project, compiling, downloading, testing (simulation) and running, PLC Wiring; including: DC inputs, AC inputs, transistor and relay outputs, analog and digital Inputs, analog and digital outputs, PLC Communications; including: PLC communication busses, Fieldbus, Profibus, industrial Ethernet, Examples; including miscellaneous industrial applications.

Pre-requisite: EE 354

EE 412 - Industrial Electronics: 3 (3, 0, 1)

Power Devices, including: Power diodes, power BJT, thyristors, phase control, thyristor protection circuits. Stabilized Power Supplies, including: DC power supplies, stabilization using zener diodes, series regulators, shunt regulators, IC regulators, switch mode power supplies (SMPS). Energy Conversion, including: static converters, commutation circuits (natural and forced). Inverter Circuits, including: inverter circuits, push-pull and bridge inverters, commutation of inverters, sinewave inverters. Converters Circuits, including: DC-DC converters, Flyback DC converters, push-pull DC converters, bridge converters, DC• up and Dc-down converters. Transducers, including: strain gauges, temperature sensors,

pressure and force measurements, optoelectronic sensors, proximity sensors. Operational Amplifiers Industrial Applications, including: Instrumentation Amplifiers, Bridge amplifiers. Assembly, Testing & Troubleshooting of Electronic Circuits, including: electronic circuits assembly, automatic test equipment, computer-aided assembly (pick and place) and manufacturing (CAM) systems.

Pre-requisite: EE 317

EE 413 - Power Electronics: 3 (3, 0, 1)

Power semiconductor devices: terminal characteristics; Power converters: ac-ac converters, rectifiers, inverters, de-de converters and resonant converters; Applications in power systems.

Pre-requisite: EE 312

EE 417 - Communication Electronics: 3 (3, 0, 1)

Introduction to Analog and Digital Transceivers, including: Wireless and Cable systems, Heterodyne and Homodyne (Zero-IF) Radio Receivers, all-digital transceivers. Design and Synthesis of analog RF Transceiver, including: Functional block diagram, Design of LNA, Mixers, VCO, Phase-locked loops (PLL), Frequency synthesizers, IF amplifiers, AM detectors, and FM discriminators. Design and Synthesis of Digital/Mixed-signal RF Transceiver, including: QPSK modulator/demodulator (modem), Timing and Clock recovery circuits, FSK circuits, GMSK modems, ASK and QAM circuits. Line Coding and Pulse Modulation Circuits, including: PCM modulators, sss.- modulators and their variants. TV Receivers, including: Functional blocks of Monochrome TV, Video Transmission Standards (PAL, SECAM, NTSC) and Camera systems, Design of video amplifiers, SAW-IF amplifiers, sync separators, horizontal and vertical oscillators and AFC. Function al block diagram of Color TV receivers, Color signal representation and processing, Digital Video Broadcasting (DVB) and High-definition TV (HDTV).

Pre-requisite: EE 317 & EE 320
Co-requisite: EE 322

EE 418 - Design of Analog and Digital Filters: 3 (3, 0, 1)

Introduction to Theory of N-port networks, including: Transfer functions of linear and discrete systems and their representation in the frequency domain and using

Z• Transform, Poles and Zeros. Filter Design, including: Types of filters in the frequency domain low-pass, high-pass, band-pass and stop-band filters, Types of Filters according to their Approximate characteristics, like Butterworth, Tchebychev, Elliptic (Cauer) and Gaussian filters. Analog Filter Synthesis (implementation), including: Sallen-Key general structure using Op-Amps, Quad filters, Negative• impedance converters (NIC) and Gyrators, Leapfrog filters, and gm-C filters (using OTA). Applications including: RF, IF filters in cellular phones and radio transceivers, equalization of telephone cables and CATV. Digital Filters, including: Finite impulse response (FIR) and Infinite impulse response (IIR) filters. Fast Fourier Transform and Digital Signal Processors (DSP). Applications, including: voice and image processing and remote sensing.

Pre-requisite: EE 317

EE 419 - Selected Topics in Electronics: 3 (3, 0, 1)

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student.

Pre-requisite: EE 317

EE 421 - Telephone Systems and Traffic Analysis: 3 (3, 0, 1)

The public telephone network hierarchy. PABX and Centrex. Transmission system: two-wire and four-wire, pair-gain systems. Transmission impairments: cross-talk, hybrid circuit, echo suppressor an d echo canceller. Conventional and common channel signaling. Space and time division digital switching and blocking probability. Data and integrated services digital networks (ISDN) and packet switching. Traffic analysis: loss system and delay system. Network blocking probability.

Pre-requisite: EE 320
Co-requisite: EE 322

EE 424 - Optical Communication Networks 3: (3, 0, 1)

Optical Fiber waveguides: light propagation in fiber, step-index and graded index fibers, optical fiber transmission modes and optical fiber fabrication and connections standard. Photonic semiconductor materials: spontaneous emission and lasing (stimulated) emission. Optical sources: LED and laser diodes.

Photodetectors: PIN photodiode and APD avalanche photodiode. Optical amplifier and Erbium-Doped Fiber Amplifier (EDFA). Wavelength division multiplexing (WDM) and optical networking.

Pre-requisite: EE 317, EE 320

EE 425 - Computer Network Security: 3 (3, 0, 1)

Introduction to cryptography and cryptanalysis; Basic definitions: Security services, attacks and mechanisms; conventional encryption algorithms: DES, IDEA, RCS and Blowfish, key distribution; introduction to number theory, public key encryption algorithm: RSA; message authentication code; hash function; digital signature and authentication protocols.

Pre-requisite: EE 320, EE 355

EE 427 - Microwave System Design: 3 (3, 0, 1)

Different types of waveguides. Limitations of low-frequency components. Microwave materials (semiconductors, ferrites, etc.). Microwave tubes and solid• state devices: klystrons, magnetron, Gunn diodes, Impart diodes, etc. Microwave circuit design. Directional couplers. Power dividers, equalizers, phase shifters. Microwave integrated circuit design: filters and amplifiers. Applications of microwaves.

Pre-requisite: EE 320
Co-requisite: EE 322

EE 428 - Satellite Communications: 3 (3, 0, 1)

Overview of satellite systems. Orbits and launching methods. The geostationary orbit. Modulations schemes and satellite multiple access (FDMA, TDMA, and CDMA). Space link analysis: Uplink, downlink and systen1 noises. Satellite antennas: Antenna polarization and radiation pattern. Applications of satellites: Asynchronous transfer mode (ATM) over satellite networks, the internet, Direct broadcast satellite (DBS) television and satellite mobile services.

Pre-requisite: EE 320
Co-requisite: EE 322

EE 429 - Selected Topics in Communications: 3 (3, 0, 1)

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student.

Pre-requisite: EE 320

EE 450 - Industrial Instrumentation: 3 (3, 0, 1)

Instrumentation and control. Signal and data acquisition and processing. Interfacing techniques. Physio-chemical principles of instrumentation. Force, torque, and pressure measurements. Temperature, flow, moisture, and humidity sensors. Digital transducers. Calibration techniques. Errors in measurements. Introduction to actuators. Norms and standardization. Introduction to intelligent instrumentation.

Pre-requisite: EE 208, EE 317, EE 351

EE 456 - Digital Control Systems: 3 (3, 0, 1)

Transducer fundamentals. Basic sampling concepts. Sample and hold circuits and analog multiplexers. Data conversion systems. Z-transform applied to discrete-time system with transformation from the s-plane to the z-plane. Analysis of digital control system using Nyguist, Bode plots and root-locus. Stability analysis of digital systems. Data loggers and acquisition systems. Application of microcomputers to closed-loop industrial systems.

Pre-requisite: EE 351

EE 464 - Error Control Coding: 3 (3, 0, 1)

Linear block codes: Cyclic Codes: Generating Polynomial, Encoder for cyclic codes, Some important cyclic codes: BCH & Reed-Solomon codes. Convolutional codes: Code tree, Trellis and state diagram, The Viterbi algorithm. Trellis coded modulation, Ungerboeck codes for 8-ary PSK. Spread spectrum modulation. Techniques of multiple accesses: FDMA, TDMA and CDMA.

EE 465 - Network Architecture and Protocols: 3 (3, 0, 1)

Basic network architecture. The ISO-OSI layered protocols. TCP-IP Internet protocols. Frame relay, cell relay, and ATM protocols. LAN protocols. Network management: ITU functions, SNMP, and TMN.

Pre-requisite: EE 320, EE 355

LABORATORIES AND EQUIPMENT

1. Circuit and Electrical Measurement Lab

EE 202: Electric circuit analysis
EE 205: Electric Circuits Laboratory
EE 300: Instruments & Electrical Measurements

Equipment available include: Cathode Ray Oscilloscope, Function Generator, Variable DC supply, Digital Multimeter, Analog Multimeter, LCR meter, Resistor Box, Capacitor Box, 3 phase extra low voltage transformer

This lab is the first the student is faced to at the beginning of his study in the Department of Electrical Engineering. In this lab the student is requested to make some simple circuits and asked to test them and make some measurements. The student is also trained to use basic instrumentations as Galvanometer, Ammeter and Voltmeter and the measure of capacity.

2. Logic circuit Design lab

EE 208: Logic Design
EE 210: Logic Design Laboratory

Equipment available includes: Digital Board XLAS, Logic Probe, Logic Pulser, IC trainer Kit (WUEKRO-w5 I 01-30), Field service toolbox, TTL IC Tester, Computers, ICs.

In this lab students learn how to install and test simple logical circuits, after that pass to more complicated ones. He also learns how to design logical circuits by using the computer assistance and Xilinix software. Then apply them in the practice using the programmable integrated circuits FPAG

3. Electronics Lab

EE 319: Electronics Laboratory - 2
EE 406: Integrated Circuits Laboratory

Equipment available include: Oscilloscope 2ch 50 Hz, Oscilloscope 2ch 100 Hz, Oscilloscope 4ch 50 Hz, Oscilloscope 2ch 200 Hz, Function Genator Max Freq. 15Mhz, Function Genator Max Freq. 30Mhz, Dual DC Power Supply, Digital Multimeter, LCR Meter, Decade resistance box, Decade inductor box, Decade capacitance box, Bread Board

This lab is equipped with all the necessary electronic devices and tools where the student can install and test electronic circuits associated with the theoretical electronics course. The students can work on many devices that would enable them to perform experiments. Laboratory also used to assist students in completing pa1ts of laboratory projects graduation.

4. Electric power system Lab

EE 344: Power Systems Laboratory

Equipment available includes: Transmission line model 380 kV, 3-PL transformer, Double Bus-bar, Bus bar feeder, bus bar connector, bus bar extension, bus bar tap, circuit breaker, Inductive load, capacitive load, Resistive load, Multifunction meter, Multimeter, Transformer, Differential Prot Relay, Directional Power Relay, Over current relay, Over voltage relay, Power brake with controller, switchable capacitor bank, Earth Fault compensation, KWH meter., VAR meter, Effective Power Controller, Generator controller, Automatic synchronizer, Excitation voltage controller Synchroscope, Double Voltmeter, Double Freq. meter, Synchronous machine, Pendulum machine, Pendulum machine controller, Squired case Motor.

Laboratory simulation systems is also available in the college, it allows the simulation of generating stations and transmission lines and prevention systems. The generation, transfer and distribution of electrical energy can be studied in this lab, as well as to study how to operate, control and protect the power systems.

5. Electric machines Lab

EE 332: Electric Machines Laboratory

Equipment available includes: Synchronous machine, Slip ring induction, Powder brake, machine Control Unit, Three phase transformer, Single phase transformer, Powder meter/Factor, meter Tacho meter, RMS meter, Digital handheld tachometer, Console 380 V KLM 1notion starter, resistors, Star Delta switch, on/off switch, Motor protection switch, Cassy, Synchronoscope, Synchr. Indicator, 6 lamps.

This laboratory includes many different electric machines as generators and engines operate on DC and others operating on AC as well as electrical transformers and various instrumentations. These devices are used in teaching laboratory

courses for Electrical Engineering Department students and are also used in various research for graduate students, such as masters and doctorate.

6. Automatic control Lab

EE 351: Principles of Control Systems
EE 455: Applied Control
EE 456: Digital Control Systems

Equipment available includes: Universal control unit COM3 Lab, Continuous and discontinuous control Multimeter, Oscilloscope, Power supply, Principal control card CONTROL I, Advanced control card CONTROL 2.

We offer in this lab the application of undergraduate courses in Basic and Advanced Automatic Control, Nonlinear Control, Hybrid and Embedded Syste1ns, Modeling, Introduction to MATLAB and Project Course in Control

7. Microprocessor and logic controllers Lab

EE 354: Microprocessors and Interface Circuits
EE 411: Programmable Logic Controllers

Equipment available includes: Microprocessor Training System, Operating Program (Assembler), Microcontroller Training System, Switch and Lamp unit. Application board for FLT 32, 4 mm I/O module, BTEC level course.

This lab gives students the practical exposure to Assembly language programming of microprocessors, computer architecture of 8088/8086 microprocessor family, assembly program development using debugger software, use of flow charts an d other aids in software development, memory and I/O interfacing circuitry for microprocessors, interrupts, serial and parallel data communications. The lab also hosts hardware projects in more advanced areas.

8. Drives and Power Electronics Lab

EE437: Power Electronics Lab

Equipment available includes: Static converters valves, Line commutated static valves, converters and choppers, switched mode, power supply, Inverters circuits, Converter fed DC machine, AC drive.

Review of power semiconductor devices: diodes, thyristors, transistors BJTS and MOSFETS. Diode characteristics. Diode circuit rectifiers. Thyristors characteristics.

Principles of thyristor controlled rectifiers. AC voltage controllers. Thyristors commutation techniques. Power transistor characteristics. DC-choppers. Pulse-width-modulation techniques for inverters. Resonant pulse inverters. (All design and analysis concepts are supported by computer aided.design analysis).

9. Communication Lab

EE 326: Communications Laboratory

Equipment available includes: Analog Communications: Frequency Synchronizer, CF transmitter 20 kHz, CF Receiver 20 kHz, TF transmitter 16 kHz, TF Receiver 16 kHz, FM/PM Modulator, FM/PM Demodulator, Frequency Multiplier, DC Power supply ±15 V. Digital Oscilloscope, Analog Multimeter, Set of I 0 Bridging plugs. Digital Communications: PAM Modulator, PAM Demodulator, PCM Modulator, PCM Demodulator, PTM Modulator, PTM Demodulator, Delta Modulator, Delta Demodulator ASKIFSKIPSK Modulator, ASK/FSK Demodulator, FSK Demodulator. Fiber Optic Communications: Noise source, Fiber Optic Transmitter, Fiber Optic Receiver, Fiber optic microscope.

In this Laboratory the students identify the modem communication systems used in working life and proceed on practical tests. The lab contains also special devices measuring the properties of microwave antennas and the use of instruments to measure their properties. Functional blocks of analog communication systems. Desi of mixers, converters, RF and IF amplifiers, AM detectors, and FM discriminators. Functional blocks of monochrome TV receivers.

Functional blocks of digital communication systems: PAM, PWM, PPM and PCM. Design of S/H circuits, AID and DIA converters, and timing (clock generator) circuits. Circuit design using PLL, VCO and multipliers. Design of PAM, PPM, PWM and PCM transmitters and detectors. Special circuits for phase shift keying.

10. Wireless Communications Lab

EE 424: Optical Communication Networks
EE 427: Microwave Engineering
EE 463: Mobile Communications

Equipment available includes: Antenna Measuring station, Rotating antenna platform, Gunn power supply with SWR Meter, Gunn oscillator, Isolator, PIN Modulator, Large horn antenna, Support for waveguide components, Stand base MF, Set of microwave absorbers, Dipole antenna, kit Yagi-Uda antennas, kit Physics

microwave accessories, waveguide propagation accessories, Telephone switching module, Telephone set analog, RJ12, USB PCI Interface card.

Characteristic s of HF transmission lines. Lossless and lossy transmission lines. Microstrip transmission lines. Smith chart. Impedance matching techniques. Theory of waveguides (rectangular and circular). Microwave components and cavity resonators. Introduction to radio wave propagation.

11. Computer Labs

GE 104: Basics of Engineering Drawing
GE 208: Programming in C Language

Equipment available includes: Network transformer (24 output), Cables cat 6, Printer with network card, PC for students P4, PC Instructor P4, PC distributing files P4. In this lab the students apply simulations methods of many theoretical ideas faced in the courses. Also it permits them to try theoretical circuits and enhance their knowledge in programming.

CIVIL ENGINEERING PROGRAM

ABOUT THE CE DEPARTMENT

The oldest and most elegant branch of engineering profession in engineering colleges all over the world and that is due to the fact that civil engineering is related to almost all aspects of civilization. Many of the important things in our lives that we take for granted are the product of civil engineering. Civil engineer deals with a wide variety of engineering aspects such as designing, construction, and maintenance of different structure (buildings, embankments, storage tanks, dams, roads, water and wastewater networks, irrigation and drainage networks, etc), solving execution problems, managing engineering and construction projects, and it just does not end there. Civil engineer also has a significant role in planning and managing transportation systems, terrific safety, conservation and development of water resources, treatment and reuse of Wastewater, and the list extends.

The civil engineering curriculum in Qassim University is set to serve the broad range activities of the profession. It is designed to fulfill the student's need of sufficient and balanced content of different civil engineering topics. Initially such topics cover most, if not all, of the sub-disciplines of civil engineering. Students then choose to specialize in one or more sub-disciplines towards the end of the degree

Mission

The civil engineering department seeks to meet the needs of the Saudi society and the region through offering outstanding civil engineering programs in education, research, and community service.

Vision

A nationally and regionally recognized department providing high quality academic programs, research, and society services in the civil engineering fields.

Program Educational Objectives

The civil engineering department in cooperation with its constituencies has identified the following list of program educational objectives.

1. Preparation of the graduates to have a successful career as civil engineers in the governmental and private sectors.

2. Preparation of the graduates to pursue their professional development through self-learning and advanced degrees.
3. Preparation of the graduates to advance towards leadership positions in their profession.
4. Preparation of the graduates to effectively participate in the sustainable development of Saudi Arabia.

FACULTY MEMBERS

No	Faculty Name	Rank
1	Ibrahim Alsalamah	Professor
2	Abdulrahman AlKhomairy	Professor
3	Abdul Razzaq Ghumman	Professor
4	Meshal Almoshaogeh	Assistant Professor
56	Fawaz Alharbi	Assistant Professor
7	Sherif M. ElKholy	Associate Professor
8	Ahmed F. Elragi	Assistant Professor
9	Gamal Al-Saadi	Assistant Professor
10	Omar Mohammed Alawad	Assistant Professor
11	Saleh Alogla	Assistant Professor
12	Abdullah Alodah	Assistant Professor
13	Mohammad Alresheedi	Assistant Professor
14	Saleem Alsaleem	Associate Professor
15	Md. Shafiquzzaman	Associate Professor
16	Husnain Haider	Associate Professor
17	Majed Alinizzi	Assistant Professor
18	Wael Alattyih	Assistant Professor
19	Mansour Alturki	Assistant Professor

20	Omar Almutairi	Assistant Professor
21	AbdelRaouf Kassem	Assistant Professor
22	Raed Alsalhi	Assistant Professor
23	Eyad Alsuhaibani	Assistant Professor
24	Fahad Alshawmar	Assistant Professor
25	Mohammed Khalid Alkharisi	Assistant Professor
26	El-Said Abd-Allah Bayoumi	Lecturer
27	Abdullah Aloraini	Lecturer

CAREER OPPORTUNITIES

1- All engineering administrations in the governmental authorities.
2- The projects operation and maintenance administrations in the governmental authorities.
3- The ministry of water and electricity.
4- The ministry of municipal and village affairs.
5- The Saudi commission for the engineers.
6- The general institution for the waters refinement.
7- The general institution for ports.
8- The Saudi airlines.
9- The military occupations management.
10- The constructions and contracting companies.
11- The electronics and communication companies.
12- The power and electric energy companies.
13- The Ministry of transportations.
14- The Ministry of agriculture and water recourses.
15- The general institution for the electricity.
16- The water and sewage authority.
17- The Saudi Arabia Aramco company.
18- The Saudi company for the basic industries (SABIC)
19- The unified Saudi company for electricity (SCECO).
20- The construction material factories.

ADMISSION TO THE CE PROGRAM

The admission in the department depends on:

- The student desire
- The Student GPA
- The capacity of the department

STUDENT OUTCOMES

At the time of graduation, students will have:

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

STUDYING SYSTEM

According to the educational plans; a student may complete any of the departmental• programs in 8 semesters (4 years) after the Preparatory Year Program (PYP). A successful student may complete the full requirements of the selected program if he completed (after the PYP) a total of 139 credit-hours. In details, the 139 credit-hours include:

- University requirements (12 credit-hours),
- College requirements (48 credit-hours) and
- Program and/or Departmental requirements (73 credit-hours). Six credit hours have to be selected among the set of elective courses.
- The Free Courses: 6 credit hours have to be selected among the set of courses available in the university.

CIVIL ENGINEERING PLAN

Compulsory Courses

Departmental Courses:

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
CE 202	Mechanics of Materials	3	3	-	1	GE 201 MATH 203	
CE 205	Properties of Structural Materials	2	1	2	-	CE 202	-
CE 206	Structural Analysis – 1	3	3	-	1	CE 202	-
CE 212	Plane Surveying	3	1	2	1	MATH 107	-
CE 230	Fluid Mechanics	3	3	-	1	MATH 106 GE 201	-
CE 231	Fluid Mechanics Laboratory	1	-	2	-		CE 230
CE 306	Structural Analysis - 2	2	2	-	1	CE 206	-
CE 307	Properties and Testing of Concrete	2	1	2	-	CE 205	-
CE 318	Design of Reinforced Concrete Structures	4	4	-	1	CE 306 CE 307	-
CE 320	Construction Engineering	3	3	-	1	Pass 90 cr	-
CE 330	Hydraulics	2	2	-	1	CE 230	-
CE 331	Hydrology	3	3	-	1	CE 330	-
CE 343	Transportation and Traffic Engineering	3	3	-	1	MATH 203	-
CE 353	Geotechnical Engineering	3	3	-	1	GEO 285	-
CE 354	Geotechnical Engineering Laboratory	1	-	2	-	-	CE 353
CE 363	Foundation Engineering	3	3	-	1	CE 353 CE 318	-
CE 370	Water and Wastewater Engineering	4	4	-	1	CE 330	-
CE 375	Steel Structures Design	3	3	-	1	CE 306	-
CE 447	Highway Engineering	2	2	-	1	CE 205 CE 343	-
GE 406	Summer Training	2	1		2	Pass 100 cr	

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
CE 491	Senior Design Project - 1	3	1	4	-	Pass 100 cr	-
CE 492	Senior Design Project - 1	2	1	2	-	CE 491	-
Total		57					

Courses from outside the Department (10 Credits)

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
GE 201	Statics	3	3	-	1	MATH 106	
GE 202	Dynamics	3	3	-	1	GE 201	
GEO 285	Engineering Geology	2	2	-	1	-	-
ME 327	Building Thermal Loads	2	2	-	1	PHYS 131	
Total		10					

Elective Courses

Students should complete 6 credit hours from the following courses:

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
CE 317	Computer Applications	3	3	-	1	-	CE 491
CE 401	Concrete Technology	3	3	-	1	CE 307	-
CE 403	Advanced Reinforced Concrete Design	3	3	-	1	CE 318	-
CE 412	Advanced Steel Design	3	3	-	1	CE 375	-
CE 418	Structural Analysis - 3	3	3	-	1	CE 306	-
CE 443	Design of Pavement	3	3	-	1	CE 447	-
CE 448	Construction and maintenance of Highways	3	3	-	1	-	CE 447
CE 453	Advanced Geotechnical Engineering	3	3	-	1	CE 353	-
CE 457	Open Channel Hydraulics	3	3	-	1	CE 330	-
CE 458	Design of Water Structures	3	3	-	1	CE 330	-
CE 459	Groundwater Hydrology	3	3	-	1	CE 331	-
CE 462	Engineering Surveying	3	3	-	1	CE 212	-
CE 468	Rock Mechanics	3	3	-	1	CE 353	-
CE 469	Applications in Foundation Engineering	3	3	-	1	CE 363	-
CE 474	Design and Operation of Water and Wastewater Treatment Plants	3	3	-	1	CE 370	-
CE 475	Environmental Engineering	3	3	-	1	CE 370	-
CE 490	Selected Topics in Civil Engineering	3	3	-	1	-	CE 491

BSC PROGRAM CURRICULUM

3rd Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
IC 101	Introduction to Islamic culture	2	2	-	-	-	-
ARAB 101	Linguistic skills	2	2	-	-	-	-
PHYS 131	General Physics	4	3	2	-	-	-
GE 104	Basics of Engineering Drawing	3	1	4	-	-	-
MATH 106	Integral Calculus	3	3	-	1	-	-
CHEM 111	General Chemistry	4	3	2	-	-	-
		18					

4th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
IC 102	Islam and Community Building	2	2	-	-	IC 101	-
GE 105	Basics of Engineering Technology	2	1	2	-	GE 104	-
MATH 107	Linear Algebra & Analytic Geometry	3	2	-	1	-	-
MATH 203	Differential and Integral Calculus	3	2	-	1	MATH 106	-
GE 201	Statics	3	2	-	1	MATH 106	-
GEO 285	Engineering Geology	2	2	-	1	-	-
+++	Free Course – 1	3	-	-	-	-	-
		18					

5th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
IC 103	Economic System in Islam	2	2	-	-	IC 101	-
MATH 208	Differential equations	3	3	-	1	MATH 203	-
GE 211	Introduction to Engineering Design-I	3	2	4	-	-	-
CSC 209	Computer Programming	3	2	2	-	MATH 107 MATH 203	-
GE 202	Dynamics	3	3	-	1	GE 201	-
CE 202	Mechanics of Materials	3	3	-	1	GE 201 MATH 203	
		17					

6th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
STAT 328	Probabilities and statistics	3	3	-	1	MATH 203	-
GE 213	Introduction to Engineering Design-2	2	2	2	-	GE 211	-
CE 205	Properties of Structural Materials	2	1	2	-	CE 202	-
CE 230	Fluid Mechanics	3	3	-	1	MATH 106 GE 201	-
CE 231	Fluid Mechanics Laboratory	1	-	2	-	-	CE 230
CE 212	Plane Surveying	3	1	2	1	MATH 107	-
CE 206	Structural Analysis – 1	3	3	-	1	CE 202	-
		17					

7th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
ARAB 103	Arabic Writing	2	2	-	-	-	-
CE 306	Structural Analysis - 2	2	2	-	1	CE 206	-
CE 307	Properties and Testing of Concrete	2	1	2	-	CE 205	-
CE 330	Hydraulics	2	2	-	1	CE 230	-
CE 353	Geotechnical Engineering	3	3	-	1	GEO 285	-
CE 354	Geotechnical Engineering Laboratory	1	-	2	-	-	CE 353
CE 343	Transportation and Traffic Engineering	3	3	-	1	MATH 203	-
ME 327	Building Thermal Loads	2	2	-	1	PHYS 131	
		17					

8th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
IC 104	Political System in Islam	2	2	-	-	IC 101	-
CE 318	Design of Reinforced Concrete Structures	4	4	-	1	CE 306 CE 307	-
CE 370	Water and Wastewater Engineering	4	4	-	1	CE 330	-
CE 375	Steel Structures Design	3	3	-	1	CE 306	-
+++	College Elective – 1	3	3	-	-	-	-
		16					

9th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
ECON 401	Engineering Economy	3	3	-	1	Pass 90 cr	-
CE 363	Foundation Engineering	3	3	-	1	CE 353 CE 318	-
CE 331	Hydrology	3	3	-	1	CE 330	-
CE 447	Highway Engineering	2	2	-	1	CE 205 CE 343	-
CE 4++	Civil Engineering Elective -1	3	3	-	-	-	-
CE 491	Senior Design Project - 1	3	1	4	-	Pass 100 cr	-
		17					

10th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
MGMT 402	Project Management	3	3	-	1	Pass 90 cr	-
CE 320	Construction Engineering	3	3	-	1	Pass 90 cr	-
CE 4++	Civil Engineering Elective -2	3	3	-	-	-	-
+++	College Elective – 2	3	3	-	-	-	-
+++	Free Course – 2	3	3	-	-	-	-
CE 492	Senior Design Project- 2	2	1	2	-	CE 491	-
GE 406	Summer Training	2	2	-	-	Pass 100 cr	-
		19					

COURSE DESCRIPTIONS

Compulsory Courses

CE 202 - Mechanics of Materials: 3 (3, 0, 1)

Stress, strain; Hook's law. Moduli of elasticity and rigidity, and Poisson's ratio. Statical determination of axial force, shear force, bending moment and torque in bars, beams and circular shafts. Load-shear-moment relationship in beams. Section kinematics; strain and stress distribution and their resultants. Normal and shear stress distributions in beams of different shapes and the shear flow. Transformation of stress and strain, Mohr's circle. Spherical and cylindrical pressure vessels. Elastic buckling of columns.

CE 205 - Properties of Structural Materials: 2 (1, 2, 0)

Engineering materials: properties, testing, specifications, statistical evaluation; bricks, lime, gypsum, timber, wood, metals, and glasses. Testing machines. Measuring devices Tests: tension, compression, bending, shear, hardness, impact. Non destructive tests.

CE 206 - Structural Analysis - 1: 3 (3, 0, 1)

Types of structures, supports and loads. Idealization of structures and loads. Geometric stability and determinacy. Analysis of determinate trusses, beams, plane frames and arches; reaction computation; axial force, shear force and bending moment diagrams. Internal force releases. Load-shear-moment relationship. Differential equation of elastic curve. Deflections by integration, moment-area, conjugate-beam and virtual work methods. Influence lines of determinate structures.

CE 212 - Plane Surveying: 3 (1, 2, 1)

Definitions and concepts in land surveying, divisions and importance of surveying, units of measurements, introduction to theory of measurements and errors, linear measurements, angular measurements, directions, leveling and contouring, area and volume computations, computer applications.

CE 230 - Fluid Mechanics: 3 (3, 0, 1)

Fluid properties, Fluid static's and kinematics'. Dynamics of an ideal fluid. Flow of real fluids. Viscous effect and fluid resistance. Fluid measurements and introduction to pump.

CE 231 - Fluid Mechanics Laboratory: 1 (0, 2, 0)

Laboratory experiments covering Fluid measurements, flow through pipes, open channel, centrifugal pump. Measurement of temperature, atmospheric pressure, coefficient of viscosity for liquids, Hydrostatic pressure, Orifice flow, coefficient of velocity, and coefficient of discharge, Flow over weirs, Reynolds Number, Bernoulli's theorem, Pizometric tubes, Pitot tube, Fluid friction and coefficient of friction in pipes, Pump characteristics

CE 306 - Structural Analysis - 2: 2 (2, 0, 1)

Analysis of indeterminate structures; trusses, beams, plane frames and arches. Method of consistent deformation; flexibility matrix formulation; temperature change and support movement effects. Matrix analysis of beams and plane frame using the stiffness method. Moment distribution; sway consideration.

CE 307 - Properties and Testing of Concrete: 2 (1, 2, 0)

Cement: manufacture, properties, types of cement, tests. Aggregates: types, properties, grading, tests. Mixing water, Concrete: proportions, mixing, handling, placing, fresh and hardened properties, tests, curing.

CE 318 - Design of Reinforced Concrete Structures: 4 (4, 0, 1)

Fundamentals and design theories based on ultimate strength design and elastic concept. ACI Code requirements. Load factors. Analysis and design of reinforced concrete members subject to flexure, shear and diagonal tension in accordance to ACI strength method. Development length of reinforcement. Deflection and crack controls. Reinforcement detailing of different structural elements and connections

CE 320 - Construction Engineering: 3 (3, 0, 1)

Overview of the construction industry, earthmoving machinery and properties, excavation and lifting, loading and hauling, compaction and finishing, concrete construction, concrete form design, concrete economics, construction economics, contract construction.

CE 330 - Hydraulics: 2 (1, 2, 0)

Steady flow in closed and open channels. Pipes networks. Dimensional analysis and similitude. Non-uniform flow. Back water curves and hydraulic jump. Pump.

CE 331 - Hydrology: 3 (3, 0, 1)

The hydrologic cycle. Fundamentals of meteorology, temperature, humidity, wind, precipitation, evaporation. Infiltration physics, Infiltration equations. Stream-flow and run-off, Groundwater flow and aquifers, wells, and intrusion in coastal aquifers. Stream-flow hydrographs. Unit hydrographs for various durations and its applications.

CE 343 - Transportation and Traffic Engineering: 3 (3, 0, 1)

Transportation systems. Components of transportation systems. Vehicle motion, flow, and performance. Continues flow. Terminals. Introduction to transportation demand. Components of traffic system. Traffic stream characteristics. Traffic engineering studies. Traffic safety. Capacity of urban streets and intersections. Congestion management.

CE 353 - Geotechnical Engineering: 3 (3, 0, 1)

Flow of water in soil, soil compaction, Consolidation of soils. Settlement of structures. Shear strength of soils. Lateral earth pressure.

CE 354 - Geotechnical Engineering Laboratory: 1 (0, 2, 0)

Moisture density relationships. Particle size analysis, Atterberg limits. Classifications and identification of soils. Permeability properties of soil. Soil compaction. Unconfined strength. Soil consolidation. Shear strength properties of soil.

CE 363 - Foundation Engineering: 3 (3, 0, 1)

Types of foundation. Bearing capacity of shallow foundation. Bearing capacity of deep foundations. Pile foundations and caissons. Sheet piling.

CE 370 - Water and Wastewater Engineering: 4 (4, 0, 1)

Analysis of water distribution and wastewater collection systems, computer modeling of network systems; water treatment including coagulation, flocculation, softening, sedimentation, filtration, desalination and disinfection; water treatment, principles of biological treatment systems including activated sludge, extended aeration, aerated lagoons, and stabilization ponds.

CE 375 - Steel Structures Design: 3 (3, 0, 1)

Analysis and design of roof trusses. Design of tension and compression members, columns under eccentric loadings, column bases and footings. Design of beams. Welded and bolted connections. Design of building frames. Introduction to plastic analysis. Industrial building project. All according to AISC specifications.

CE 447 - Highway Engineering: 2 (2, 0, 1)

Highway planning and capacity. Geometric design. Intersections. Highway materials and drainage. Bituminous mixtures design. Flexible pavement design. Highway construction. Pavement evaluation and maintenance. Laboratory sessions on tests of aggregates and asphalts, mix design for hot asphalt concrete mixtures including Marshall and SuperPave.

GE 406 - Summer Training: 2 (-, -, -)

The student starts the Cooperation Training during the summer that precedes his final year of study and continues to the end of the next semester in either the Governmental or Private sectors. At the end of training, student must prepare a detailed report which will be orally examined by a special committee of faculty professors.

CE 491 - Senior Design Project - 1: 3 (2, 2, 0)

The student is assigned, among a team of students and one or more faculty professors, the design of an applied project which simulates the real working condition to which the student will be exposed after graduation. The project should be comprehensive and includes all the necessary preliminary field studies, visibility

studies, final design drawings, bill of quantities, and the total operating cost of the project. The graduation project shall continue for two semesters. At the end of each semester, there will be a seminar held for the working team of students to present the details of the completed part of the project. The working team will be orally examined and evaluated based on the presentation as well as the oral discussion.

Pre-requisite: Pass 100 Cr

CE 492 - Senior Design Project - 2: 2 (1, 2, 0)

The course is the second part for the senior design project. It aims to expose the students to the practical experience of real civil engineering projects/projects components in order to gain the necessary experience which relates the design process to the full course work studied during the program. The previously selected team of students shall continue the design process for this part of the project. The students are responsible for and shall utilize all the knowledge and skills gained through the program as well as in order to complete the task. At the end, students will be examined in final project report which is done in the form of an oral presentation as a team.

Courses from Outside the Department

GE 201 - Statics: 3 (3, 0, 1)

Introduction to mechanics and vectors – Force system in 2D and 3 D – Moments and couples in 2D and 3D– Equilibrium of force system – Analysis of frames and structures - Distributed forces - Centroid of simple and composite bodies – Moment of inertia – Friction

GE 202 - Dynamics: 3 (3, 0, 1)

Kinematics of a particle: curvilinear motion, and relative motion; Kinetics of particles: Newton's law, work and energy, impulse and momentum, and impact; Kinematics of a rigid body in plane motion: relative velocity and acceleration, and rotating axes; Kinetics of a rigid body in plane motion: translation, fixed axis rotation, general equation of motion, work and energy, and impulse and momentum.

GEO 285 - Engineering Geology: 2 (2, 0, 1)

Types and classification of rocks based on origin and strength. Weathering process. Classification of soil based on formation. Index and engineering classification of soil. Clay minerals and soil structure.

ME 327 - Building Thermal Loads: 2 (2, 0, 1)

Air-Conditioning Systems, Moist Air Properties and Conditioning Processes, Comfort and Health, Heat Transmission in Building Structures, conduction, convection, radiation, thermal resistance, Space Heating Load, Solar Radiation, The Cooling Load, Heat balanced method, Thermal bridge.

Elective Courses

CE 317 - Computer Applications: 3 (3, 0, 1)

Problem formulation. Preparing problem model. Constitutive modeling of different engineering materials. Using FEM-based software packages in design and solving engineering problems. Results verification and interpretation. The used software packages will vary depending on job market requirements. Examples of packages include, but not limited to, SAP 2000, PLAXIS, Geo-Slope Suit, ANSAS, STAD Pro, Mud Flow, Pipe Ne, etc.

CE 401 - Concrete Technology: 3 (3, 0, 1)

In-depth study of composition, characteristics and hydration of cements; structure and properties of hardened cement paste; local aggregates; workability, strength, volume changes and permeability of concrete; failure mechanisms of plain concrete; production, handling and quality control of concrete; mix design; special concretes such as fiber reinforced concrete, ferrocement and polymer impregnated; durability problems of concrete in the Gulf environment; preventive measures, specifications and construction techniques for local conditions.

CE 403 - Advanced Reinforced Concrete: 3 (3, 0, 1)

Design of floor systems: ribbed and flat slabs. Design of beams for torsion, combined shear and torsion by the strength method. Design of short and long columns under eccentric loadings. Study of different structural systems for covering large dimensions' halls. Analysis and design of reinforced concrete water tanks. Introduction to the design of prestressed concrete members.

CE 412 - Advanced Steel Design: 3 (3, 0, 1)

Introduction to elastic-plastic material behavior, plastic analysis and design of continuous beams and simple frames using load resistance factor design (LRFD); design of built-up beams and plate girders, optimum proportioning of I-beam, design of composite section analysis and design for torsion, design of semi-rigid and rigid connections, computer application and usage in design of rigid frames and steel buildings.

CE 418 - Structural Analysis - 3: 3 (3, 0, 1)

Theoretical development and computer implementation of special structures, space trusses, space frames, plates, shells, domes, Soil structure interaction, Introduction to structural dynamics.

CE 443 - Design of Pavement: 3 (3, 0, 1)

Pavement types and loading, behavior of pavements under dynamic loads, stresses in flexible and rigid pavements, pavement components, pavement design factors, flexible highway and airport pavement design, rigid highway and airport pavement design; overlay design and computer applications; practical pavement design project of a road and airport.

CE 448 - Construction and maintenance of Highways: 3 (3, 0, 1)

Highways construction materials; asphalt concrete mix design; asphalt plants operation; material placement and compaction methods; quality control; earthwork, roadside requirements; construction standards; pavement performance and evaluation; pavement distress identification; surface treatments; overlay design; pavement recycling techniques.

CE 453 - Advanced Geotechnical Engineering: 3 (3, 0, 1)

Fundamental relations of elasticity and plasticity in soil masses; deformation properties of cohesionless and cohesive soils; advanced strength concepts in soils and stress path; advanced slope stability analysis; introduction to soil dynamics.

CE 457 - Open Channel Hydraulics: 3 (3, 0, 1)

Steady and unsteady flow in open channels. Uniform and non uniform flow. Back water curve and its analysis. Sediment transport. Design of erodible channel. Dimensional analysis and modeling. Spillway and siphon spillway.

CE 458 - Design of Water Structures: 3 (3, 0, 1)

Design of inlet and outlet structures for irrigation canals. Cross structures; culverts, siphons and aqueducts. Energy dissipation downstream hydraulic structures. Design of Spillways, syphon spillways and dams.

CE 459 - Groundwater Hydrology: 3 (3, 0, 1)

Introduction to Surface and Groundwater Hydrology, Hydrological cycle and major processes. Monitoring of hydro-meteorology. Precipitation, meteorological, and stream flow data analysis, storage and supply of groundwater; basic differential equations for flow in confined and unconfined aquifers. Steady and unsteady groundwater flow problems; groundwater recharge; saline water intrusion and environmental aspects of groundwater; groundwater in Saudi Arabia.

CE 462 - Engineering Surveying: 3 (3, 0, 1)

Electronic distance measurement with high precision, total station, topographic mapping and earthworks computations, Laser systems and alignment, Precise leveling, construction surveying, route surveying, Underground surveying, Global Positioning System (GPS) and its Applications.

CE 468 - Rock Mechanics: 3 (3, 0, 1)

Rock and rock mass classifications. Index properties and their measurements in field and laboratory. Initial stresses and their measurements, deformability, strength and failure criteria. Foundations on Rock and Stability of soil and rock side slopes with computer applications.

CE 469 - Applications in Foundation Engineering: 3 (3, 0, 1)

Special cases of soil bearing capacity, Computer analysis and design of combined and mat foundation; Analysis and design of pile foundations, Slope stability, Analysis and design of mechanically stabilized earth retaining walls, and Computer applications.

CE 474 - Design and Operation of Water and Wastewater Treatment Plants: 3 (3, 0, 1)

Theory and practice in sanitary engineering including the concepts of processing, design, economic evaluation and computer analysis; using practical considerations in the design and operation of treatment units and the combining of unit processing

in water and wastewater treatment plants; field trips will be organized to visit various types of treatment plants in operation.

CE 475 - Environmental Engineering: 3 (3, 0, 1)

Introduction to pollution problems and impact of development on the environment. Liquid waste disposal: overland, in streams, lake and sea. Solid wastes: management, characteristics, storage, collection, disposal, and recycling. Air pollution: sources, pollutants, effects and control. Noise pollution: sources, effect and control.

CE 490 - Selected Topics in Civil Engineering: 3 (3, 0, 1)

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student.

LABORATORIES AND EQUIPMENTS

The Civil Engineering Department has established excellent laboratory facilities for undergraduate courses, graduate courses and research work. The main laboratories of the Department are listed as follows:

1. Fluid Mechanics Laboratory:

The laboratory is used for instruction in courses; Fluid Mechanics, CE-230, Fluid Mechanics Laboratory CE-231. The laboratory is equipped with Hydrostatic Pressure Apparatus to determine the hydrostatic force acting on a plane surface, Orifice & Free Jet Flow Apparatus to determine coefficients of velocity, contraction and discharge. There is also, Centrifugal Pump Characteristics to determine the characteristics of centrifugal pump and Laminar Flow Apparatus to show the stream lines.

2. Concrete Laboratory:

This laboratory is used for instruction in courses; Structural Materials, CE-203, Properties and Testing of Concrete, CE-304, Concrete Technology, CE-401 and Advanced Reinforced Concrete, CE-403. This laboratory is well equipped for carrying out basic tests on aggregates and cement, and for casting and testing concrete specimens (fresh and hardened). In addition to the undergraduate

students, this laboratory is also used by the graduate students for experin1ental and research work.

3. Environmental Engineering Laboratory:

This laboratory is used for instruction in courses; Water and Waterwaste Engineering, CE-370 and Design and Operation of Water and Waterwaster Treatment Plants CE-474. The equipment available includes: Incubator for B. 0. D. Test, Digital D. 0. Meter, TITRATOR for C. 0. D. Test, Muffle Furnace for TSS and TS measurements, Spectrophotometer, Desiccators, Magnetic Stirrer, Vacuum Pump, Ph-meter, Turbidity meter, Perialistic pumps, DATA LOGGER for measuring Water Quality Conductivity Dissolved Oxygen Colorimeter, Desalination unit.

4. Soil Mechanics Laboratory:

This laboratory is used for instruction in courses; Geotechnical Engineering, CE 353, Geotechnical Engineering Laboratory, CE-354, Foundation Engineering, CE 363 and Soil Improvement and Earth Structure Design. The laboratory is equipped with Atterberg's Limit Apparatus to determine cohesive soil indices, Sieves Sets to determine cohesionless soil gradation, Consolidation cells to determine cohesive soil compressibility characteristics. There is also, Direct Shear, unconfined compression and Triaxial Test Apparatus to determine soil shear strength parameters.

5. Transportation and Surveying Laboratory:

This laboratory is used for instruction in courses; Survey Basics, CE-112 and Project Surveying, CE-464. The laboratory is equipped with theodolites, EDM, total stations and level instruments for performing surveying field works such as distance, angle and elevation differences measurements, profiling, traversing, topographic surveying, mapping, and curve layout. In addition, it contains 3D scanner and GPS instruments.

6. Material Engineering Laboratory:

This laboratory is used for instruction in the course; Mechanics of Materials, CE-202. The laboratory is reasonably equipped for carrying out simple experiments to familiarize the undergraduate students with basic structural behavior and stress analysis and includes tests for tension, Poisson 's ratio, stress concentration, flexure and torsion.

7. Hydraulic Laboratory:

The laboratory is used for instruction in courses; Hydrology, CE-331, Hydraulic Engineering, CE-456 and Design of Water Structure, CE-458. It is also used for post graduate students and research activity.

MECHANICAL ENGINEERING PROGRAM

ABOUT THE ME DEPARTMENT

Mechanical engineers are essential to almost every industry. It is in fact difficult to imagine a modern industry without the services of Mechanical engineers. Mechanical engineering has been and continues to be a corner stone in every new technical development.

The job of Mechanical engineer usually involves design, feasibility studies, cost analysis studies, installation, operation, and maintenance of plants, processes, or equipment. The focusing of the Mechanical engineering department is on teaching, community service, and research. The department faculty recognizes the need to provide the graduating engineer with the appropriate background in order to meet the challenges and large demands of a fast growing country such as the Kingdom. The department of Mechanical engineering mission is to provide education of quality, research, and community services that cover a broad spectrum of mechanical engineering areas. These areas include evaluation, design, operation, and maintenance of integrated governmental, industrial, and service systems.

Mission

The Mechanical Engineering Department seeks to meet the needs of the Saudi society and the region through offering outstanding mechanical engineering programs in education, research, and community service.

Vision

A nationally and regionally recognized department providing high quality academic programs, research, and society services in the mechanically engineering fields.

Program Educational Objectives

The Mechanical Engineering Department in cooperation with its constituencies has identified the following list of Program Educational Objectives.

1. Preparation of the graduates to have a successful career as mechanical engineers in governmental and private sectors.
2. Preparation of the graduates to pursue their professional development through self-learning and advanced degrees.

3. Preparation of the graduates to progress to positions of leadership in their profession.
4. Preparation of the graduates to effectively participate in the sustainable development of the Saudi Society.

FACULTY MEMBERS

No	Faculty Name	Rank
1	Abdul-Aziz Alaboodi	Professor
2	Gamal Attia	Professor
3	Hanafy M. Omar	Professor
4	Radwan Almasri	Professor
5	Sulaiman Al-Yahya	Professor
6	Mohammad Sajid	Professor
7	Abdelrahiem Emad	Associate Professor
8	Fahd Almufadi	Professor
9	Osama Mohamed Irfan	Associate Professor
10	Hesham A. Othman	Assistant Professor
11	Saad M. S. Mukras	Assistant Professor
12	Hany Ammar	Associate Professor
13	Sivasankaran Subbarayan	Associate Professor
14	Mohammed Saleh AlShitawi	Associate Professor
15	Hussein Zein Korany	Associate Professor
16	Iqbal Ahmad	Assistant Professor
17	Abdulrahman Alrobaian	Associate Professor
18	Bandar Aloyaydi	Assistant Professor
19	Ahmed Alshwairekh	Assistant Professor
20	Anas Alwatban	Assistant Professor
21	Amer Allafi	Assistant Professor

CAREER OPPORTUNITIES

1- All engineering administrations in the governmental authorities.
2- The projects operation and maintenance administrations in the governmental authorities.
3- The ministry of water and electricity.
4- The ministry of municipal and village affairs.
5- The Saudi commission for the engineers.
6- The general institution for the waters refinement.
7- The general institution for ports.
8- The Saudi airlines.
9- The military occupations management.
10- The constructions and contracting companies.
11- The electronics and communication companies.
12- The power and electric energy companies.
13- The Ministry of transportations.
14- The Ministry of agriculture and water recourses.
15- The general institution for the electricity.
16- The water and sewage authority.
17- The Saudi Arabia Aramco company.
18- The Saudi company for the basic industries (SABIC)
19- The unified Saudi company for electricity (SCECO).
20- All factories.

ADMISSION TO THE ME PROGRAM

The admission in the department depends on:

- The student desire
- The Student GPA
- The capacity of the department

STUDENT OUTCOMES

At the time of graduation, students will have:

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

STUDYING SYSTEM

According to the educational plans; a student may complete any of the departmental• programs in 8 semesters (4 years) after the Preparatory Year Program (PYP). A successful student may complete the full requirements of the

selected program if he completed (after the PYP) a total of 139 credit-hours. In details, the 139 credit-hours include:

- University requirements (12 credit-hours),
- College requirements (48 credit-hours) and
- Program and/or Departmental requirements (73 credit-hours). Six or nine credit hours have to be selected among the set of elective courses.
- The Free Courses: 6 credit hours have to be selected among the set of courses available in the university.

MECHANICAL ENGINEERING PLAN

Departmental Courses

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
ME 241	Mechanical Drawing	3	2	2	-	GE 104	
ME 251	Materials Engineering	3	3	-	1	PHYS 131 GE 105	
ME 252	Materials Engineering Lab	1	-	2	-		ME 251
ME 335	Manufacturing Processes	3	3	-	1	ME 241 ME 251 ME 350	
ME 336	Manufacturing Processes Lab	1	-	2	-		ME 335
ME 340	Mechanical Design -1	3	3	-	1	ME 335	
ME 344	Measurements and Instrumentation	3	2	2	-	ME 385 STAT 328	
ME 350	Mechanics of Materials	3	3	-	1	GE 201	
ME 352	Mechanics of Materials Laboratory	1	-	2	-		ME 350
ME 360	Mechanics of Machinery	3	3	-	1	GE 202 CSC 209	
ME 363	Mechanics of Machinery Lab	1	-	2	-		ME 360
ME 371	Thermodynamics -1	3	3	-	1	CHEM 111	
ME 372	Thermodynamics - 2	3	3	-	1	ME 371	

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
ME 383	Thermo-fluid Laboratory -1	1	-	2	-		ME 385 ME 372
ME 384	Thermo-fluid Laboratory - 2	1	-	2	-		ME 395
ME 385	Fluid Mechanics	3	3	-	1	ME 371 GE 202	
ME 395	Heat Transfer	3	3	-	1	ME 385	
ME 441	Mechanical Design -2	3	3	-	1	ME 340	
ME 465	System Dynamics and Automatic Control	3	3	-	1	MATH 208 CSC 209	
ME 468	System Dynamics and Automatic Control Laboratory	1	-	2	-	-	ME 465
ME 495	Thermal Fluid Systems	3	3	-	1	ME 372	-
GE 406	Summer Training	2	1	-	2	Pass 100 cr	
ME 491	Senior Design Project - 1	3	1	4	-	Pass 100 cr	-
ME 492	Senior Design Project - 2	3	1	4	-	ME 491	-
Total		56					

Courses from Outside the Department

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
EE 318	Fundamentals of Electric circuits	3	3	-	1	PHYS 131	-
EE 339	Electrical Machines	2	2	-	1	EE 318	-
GE 201	Statics	3	3	-	1		
GE 202	Dynamics	3	3	-	1	GE 201	
Total		11					

Elective Courses

Students should complete 6 credit hours from the following courses:

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
ME 423	Renewable Energy	3	3	-	1	ME 395 ME 372	-
ME 425	Solar Energy	3	3	-	1	ME 395	-
ME 431	Tool Manufacturing	3	3	-	1	ME 335	-
ME 453	Modern Engineering materials	3	3	-	1	ME 350	-
ME 455	Corrosion Engineering	3	3	-	1	ME 350	-
ME 462	Mechatronics	3	3	-	1	ME 465	-
ME 463	Mechanical vibrations	3	3	-	1	ME 360	-
ME 466	Robotics	3	3	-	1	ME 465	-
ME 470	Thermal Power Plants	3	3	-	1	ME 395 ME 372	-
ME 474	Refrigeration Engineering	3	3	-	1	ME 395 ME 372	-
ME 475	Air Conditioning	3	3	-	1	ME 395 ME 372	-
ME 480	Turbo Machinery	3	3	-	1	ME 385 ME 372	-
ME 482	Compressible Fluids	3	3	-	1	ME 385	-
ME 483	Pumping Machinery	3	3	-	1	ME 385	-
ME 490	Selected Topics in Mechanical Engineering	3	3	-	1	ME 385	-

BSC PROGRAM CURRICULUM

The Pre-Req. for acceptance in the program is the completion of the preparatory year program with grade not less than 3.5 from 5.

3rd Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
IC 101	Introduction to Islamic culture	2	2	-	-	-	-
ARAB 101	Linguistic skills	2	2	-	-	-	-
PHYS 131	General Physics	4	3	2	-	-	-
GE 104	Basics of Engineering Drawing	3	1	4	-	-	-
MATH 106	Integral Calculus	3	3	-	1	-	-
CHEM 111	General Chemistry	4	3	2	-	-	-
		18					

4th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
IC 102	Islam and Community Building	2	2	-	-	IC 101	-
GE 105	Basics of Engineering Technology	2	1	2	-	GE 104	-
MATH 107	Linear Algebra & Analytic Geometry	3	3	-	1	-	-
MATH 203	Differential and Integral Calculus	3	3	-	1	MATH 106	-
GE 201	Statics	3	3	-	1		
ME 241	Mechanical Drawing	3	2	2	-	GE104	
EE 318	Fundamentals of Electric circuits	3	3	-	1	PHYS 131	
		19					

5th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
MATH 208	Differential equations	3	3	-	1	MATH 203	-
GE 211	Introduction to Engineering Design-I	3	2	4	-	-	-
CSC 209	Computer Programming	3	2	2	-	MATH 107 MATH 203	
GE 202	Dynamics	3	3	-	1	GE 201	
ME 251	Materials Engineering	3	3	-	1	PHYS 131 GE 105	
ME 252	Materials Engineering Lab	1	-	2	-		ME 251
EE 339	Electrical Machines	2	2	-	1	EE 318	
		18					

6th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
STAT 328	Probabilities and statistics	3	3	-	1	MATH 203	-
GE 213	Introduction to Engineering Design-2	2	2	2	-	GE 211	-
IC 103	Economic System in Islam	2	2	-	-	IC 101	-
ME 371	Thermodynamics -1	3	3	-	1	CHEM 111	
ME 360	Mechanics of Machinery	3	3	-	1	GE 202 CSC 209	
ME 363	Mechanics of Machinery Lab	1	-	2	-		ME 360
ME 350	Mechanics of Materials	3	3	-	1	GE 201	
ME 352	Mechanics of Materials Laboratory	1	-	2	-		ME 350
		18					

7th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
ARAB 103	Arabic Writing	2	2	-	-	-	-
ME 335	Manufacturing Processes	3	3	-	1	ME 241 ME 251 ME 350	
ME 336	Manufacturing Processes Lab	1	-	2	-		ME 335
ME 372	Thermodynamics – 2	3	3	-	1	ME 371	
ME 385	Fluid Mechanics	3	3	-	1	ME 371 GE 202	
ME 383	Thermo-fluid Laboratory -1	1	-	2	-		ME 385 ME 372
+++	College Elective Course-1	3	3	-	-		
		16					

8th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
IC 104	Political System in Islam	2	2	-	-	IC 101	-
+++	Free Course 1	3	3	-	-		
ME 395	Heat Transfer	3	3	-	1	ME 385	
ME 384	Thermo-fluid Laboratory -2	1	-	2	-		ME 395
ME 340	Mechanical Design -1	3	3	-	1	ME 335	
ME 344	Measurements and Instrumentation	3	2	2	-	ME 385 STAT 328	
		15					

9th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
ME 465	System Dynamics and Automatic Control	3	3	-	1	Math 208 CSC 209	
ME 468	System Dynamics and Automatic Control Lab	1	-	2	-		ME 465
ME 4xx	Elective Course - 1	3	3	-	-		
ME 441	Mechanical Design -2	3	3	-	1	ME 340	
MGMT 402	Project Management	3	3	-	1	Pass 90 cr	
ME 491	Senior Design Project - 1	3	1	4	-	Pass 100 cr	-
		16					

10th Level

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
ECON 401	Engineering Economy	3	3	-	1	Pass 90 cr	-
ME 495	Thermal Fluid Systems	3	3	-	1	ME 372	-
+++	Free Course 2	3	3	-	-		
ME 4xx	Elective Course - 2	3	3	-	1		
+++	College Elective Course-2	3	3	-	-		
ME 492	Senior Design Project - 2	2	1	2	-	ME 491	-
GE 406	Summer Training	2	2	-	-	Pass 100 cr	-
		19					

Elective Courses

In the 8th semester the student should select some elective courses not less than 6 credit hours.

Course Code	Course Title	CR	LT	LB	TU	Pre-Req.	Co-Req.
ME 423	Renewable Energy	3	3	-	1	ME 395 ME 372	-
ME 425	Solar Energy	3	3	-	1	ME 395	-
ME 431	Tool Manufacturing	3	3	-	1	ME 335	-
ME 453	Modern Engineering materials	3	3	-	1	ME 350	-
ME 455	Corrosion Engineering	3	3	-	1	ME 350	-
ME 462	Mechatronics	3	3	-	1	ME 465	-
ME 463	Mechanical vibrations	3	3	-	1	ME 360	-
ME 466	Robotics	3	3	-	1	ME 465	-
ME 470	Thermal Power Plants	3	3	-	1	ME 395 ME 372	-
ME 474	Refrigeration Engineering	3	3	-	1	ME 395 ME 372	-
ME 475	Air Conditioning	3	3	-	1	ME 395 ME 372	-
ME 480	Turbo Machinery	3	3	-	1	ME 385 ME 372	-
ME 482	Compressible Fluids	3	3	-	1	ME 385	-
ME 483	Pumping Machinery	3	3	-	1	ME 385	-
ME 490	Selected Topics in Mechanical Engineering	3	3	-	1	ME 385	-

COURSE DESCRIPTION

Departmental Courses

ME 241 - Mechanical Drawing: 3 (3, 0, 1)

Introduction to 3D modeling. Using SolidWorks to create 3D part models: Creating 2D sketches, using reference geometries, using sketched and applied features to

create 3D models. Creating mechanical assemblies: using mates to combine mechanical parts, assemble and disassemble mechanical parts. Adding standard mechanical parts to assemblies: screw threads, fasteners, bearings and springs. Detailed drawings: orthographic views, auxiliary views, sectional views, detailed views and dimensioning.

ME 251 - Materials Engineering: 3 (3, 0, 1)

Introduction to materials engineering; Structure and characteristics of metals; polymers and ceramics; Equilibrium-phase diagrams; Microstructures of alloys; Imperfections; Diffusion; Mechanical properties of metals, polymers, ceramics; Heat treatment of plain-carbon steels, cast irons and precipitation hardening.

ME 252 - Materials Engineering Laboratory: 1 (0, 2, 0)

Introducing the basic techniques of metallographic, sectioning, polishing, etching, light metallographic and microstructure analysis. Determining mechanical properties (hardness, tensile, fatigue and creep properties) of steels, cast irons and non ferrous as well as some polymeric materials and their structure properties relationship. Emphasizing and illustrating importance of these properties in manufacturing and design. Simple spread sheet based data analysis using the hardness, tensile, fatigue and creep tests results.

ME 335 - Manufacturing Processes: 3 (3, 0, 1)

Basic structure of materials processes, Classification of manufacturing processes, Basic material processes, Manufacturing properties of materials, Liquid state forming processes, casting processes of metals and non metals, Mass-conserving processes of solid state materials, forming of metals. Basics of materials processes, Mass-conserving processes of solid state materials, forming of polymers, and powders, Mass-reducing processes of solid state materials, machining processes, Joining and fabrication processes, welding, brazing, riveting, bonding, etc., Modern manufacturing processes.

ME 336 - Manufacturing Processes Lab: 1 (0, 2, 0)

Introduction to manufacturing Lab Safety, Metrology (part dimensions, surface roughness, and material hardness), Metal casting (sand casting and permanent-mold casting), Metal forming (forging, extrusion), Sheet metal forming, Welding & Joining technology, Material removal (turning, milling, or drilling), CAM systems and CNC machines (turning or milling), Industrial trips (if possible).

ME 340 - Mechanical Design -1: 3 (3, 0, 1)

Design process; Origin and identification of engineering design problems; Creativity in engineering design; Technical analysis; Human and legal factors; Problem solving and decision making; Design communication; Failures resulting from static loading; Variable loading and fatigue failure; Material selection for strength and rigidity; Design of mechanical elements: screws, power screws, fasteners and connections, welded, brazed and bonded joints; Rolling contact bearings; Term design project.

ME 344 - Measurements and Instrumentation: 3 (3, 0, 1)

Measuring concepts; Experimental procedures; Standards and dimensional units of measurement, analyzing, assessing and presenting experimental data, analog measured: time-dependent characteristics, Response of measuring systems, Signal conditioning, digital techniques in mechanical measurements, displacement measurements, measurement of motion, measurement of force and torque, measurement of strain and stress, measurement of pressure, measurement of temperature, measurement of flow, Industrial sensors.

ME 350 - Mechanics of Materials: 3 (3, 0, 1)

Study of the mechanical behavior of solid bodies (Rods, shafts, beams, etc.) under various types of loading. Mechanical and thermal stresses and strains; Stress-strain relations; Axial deformation; Shear and bending moments in beams; Stresses in beams; Torsion of shafts and thin wall tubes; Combined loadings; Analysis of plane stress and plane strain; Thick – and thin-wall cylinders; Energy methods; Stability of axially loaded beams (columns).

ME 352 - Mechanics of Materials Laboratory: 1 (0, 2, 0)

Strain gauge applications: tension test, torsion test, cantilever beam, pressurized cylindrical vessel; Deflection of beams; Buckling of columns.

ME 360 - Mechanics of Machinery: 3 (3, 0, 1)

Topological characteristics of planar mechanisms; Degree-of-freedom; Position, velocity and acceleration analysis of linkages: graphical and analytical methods; Static and dynamic force analysis of machinery: graphical and analytical methods; Flywheels; Cam mechanisms; Law of gearing; Simple and planetary gear trains; Term project.

ME 363 - Mechanics of Machinery Lab: 1 (0, 2, 0)

Introduction to the mechanics of machinery, study of various type of mechanisms like slider crank, four – bar, quick return mechanism, Hooke's coupling and different kinds of gear trains through working models. Drawing the displacement profiles for various combinations of cam and follower. Balancing of rotating and reciprocating masses. Verification of gyroscopic torque equation etc.

ME 371 - Thermodynamics -1: 3 (3, 0, 1)

Basics and definitions of thermodynamics; properties of pure substances First law of thermodynamics; Second law of thermodynamics; Entropy; Carnot and reversed Carnot cycles; simple and modified Rankine cycle; Gas power cycles; Refrigeration and heat pump cycles, ideal gas mixtures.

ME 372 - Thermodynamics – 2: 3 (3, 0, 1)

Availability, Ideal gas mixtures, Gas- vapor mixtures, Thermodynamics of gas reciprocating compressors, Internal combustion engines, combustion.

ME 383 - Thermo-Fluid Laboratory -1: 1 (0, 2, 0)

Temperature and humilities various measurements, Dead weight, Impact of a jet, hammer in pipes, Measuring the hydrostatic forces on the submerged surfaces, Performance test for a multi-stage reciprocating air compressor; Measurement of heating value of a gaseous fuel; Exhaust-gas analysis; Performance of spark ignition engine; Performance of compression ignition engine; Demonstration of fluid flow (flow visualization).

ME 384 - Thermo-Fluid Laboratory-2: 1 (0, 2, 0)

Visualization of potential flow fields; Visualization of real flow around streamlined and bluff bodies; Pipe flow, velocity distribution, pressure drop and friction factor; Flow measurements: orifice, venturi and nozzle calibrations; Calibration of thermocouples; Free convection for a lumped capacitance thermal system; determination of thermal conductivities of a new metals; thermal performance of fins (free and forced convection).

ME 385 - Fluid Mechanics: 3 (3, 0, 1)

Definitions, Fluid properties, Fluid statics, Fluid kinematics, Finite control volume analysis, Euler`s Equation, Bernoulli `s equation, Fluid dynamics, Navier Stokes

equations, Couette flow, Poiseuille flow, Similitude Dimensional analysis and modeling, Viscous flow in pipes, Pressure losses, Boundary layer theory, Introduction to one dimensional compressible flow.

ME 395 - Heat Transfer: 3 (3, 0, 1)

Introduction to heat transfer; Modes of heat transfer; One dimensional steady state heat conduction with and without heat generation; Extended surfaces (fins), transient conduction, Free and forced convection for external and internal flows; Heat Exchangers, Properties and process of radiation, Radiation exchange between surfaces.

ME 441 - Mechanical Design -2: 3 (3, 0, 1)

Design of mechanical elements: springs, lubrication and journal bearings, spur, helical, bevel, and worm gears, clutches and brakes, miscellaneous power transmission components; Term design projects.

ME 465 - System Dynamics and Automatic Control: 3 (3, 0, 1)

Laplace transformation methods; Modeling of mechanical, electrical, hydraulic and thermal systems; Analogies; Mixed systems; Representation of control system components; Transfer functions and block diagrams; Time response of feedback control systems; Routh stability criterion, Root locus technique; Frequency response methods; Compensation; Term project.

ME 468 - System Dynamics and Automatic Control Laboratory: 1 (0, 2, 0)

Experiments in support of control system theory including: servo control of electrical motors, control of linear and torsional vibrations, control of gyroscopic motion, control of pendulum motion, hydro-mechanical liquid level control, pressure control, pneumatic servomechanism, vibration control; digital simulation of linear systems using a software package (MATLAB).

ME 495 - Thermal Fluid Systems: 3 (3, 0, 1)

Pumping systems, compressor systems, steam generation systems, turbines, condensers, water desalination systems.

GE 406 - Summer Training: 2 (-, -, -)

The student starts the Cooperation Training during the summer that precedes his final year of study and continues to the end of the next semester in either the Governmental or Private sectors. At the end of training, student must prepare a detailed report which will be orally examined by a special committee of faculty professors.

ME 491 - Senior Design Project - 1: 3 (2, 2, 0)

The student is assigned, among a team of students and one or more faculty professors, the design of an applied project which simulates the real working condition to which the student will be exposed after graduation. The project should be comprehensive and includes all the necessary preliminary field studies, visibility studies, final design drawings, bill of quantities, and the total operating cost of the project. The graduation project shall continue for one semesters. At the end of the semester, there will be a seminar held for the working team of students to present the details of the project. The working team will be orally examined and evaluated based on the presentation as well as the oral discussion.

Pre-requisite: Pass 100 Cr

ME 492 - Senior Design Project-2: 2 (1, 2, 0)

The course is the second part for the senior design project. It aims to expose the students to the practical experience of real civil engineering projects/projects components in order to gain the necessary experience which relates the design process to the full course work studied during the program. The previously selected team of students shall continue the design process for this part of the project. The students are responsible for and shall utilize all the knowledge and skills gained through the program as well as in order to complete the task. At the end, students will be examined in final project report which is done in the form of an oral presentation as a team.

Courses from Outside the Department

EE 318 - Fundamentals of Electric circuits: 3 (3, 0, 1)

Circuit elements and laws, Network theorem, Nonlinear networks-AC Circuits: Phasors, Circuit analysis, Frequency response, Resonance - Ideal Amplifiers, Ideal diodes, Rectifiers, Waveshaping circuits – Junction diodes – FETs and BJTs transistors- Logic circuits – Small signal models of Diodes, FETs, and BJTs – RC-Coupled Amplifiers.

EE 339 - Electrical Machines: 2 (2, 0, 1)

Transformers (construction, types, operation, equivalent circuit); Synchronous machines (construction, generator performance, motor characteristics, starting); induction machines (construction, three phase motor: types, operation, equivalent circuit, starting speed control); Introduction to DC machines.

GE 201 - Statics: 3 (3, 0, 1)

Introduction to mechanics and vectors – Force system in 2D and 3 D – Moments and couples in 2D and 3D– Equilibrium of force system – Analysis of frames and structures - Distributed forces - Centroid of simple and composite bodies – Moment of inertia – Friction.

GE 202 - Dynamics: 3 (3, 0, 1)

Kinematics of a particle: curvilinear motion, and relative motion; Kinetics of particles: Newton's law, work and energy, impulse and momentum, and impact; Kinematics of a rigid body in plane motion: relative velocity and acceleration, and rotating axes; Kinetics of a rigid body in plane motion: translation, fixed axis rotation, general equation of motion, work and energy, and impulse and momentum.

Elective Courses

ME 423 - Renewable Energy: 3 (3, 0, 1)

Basic and principles of conventional and non-conventional energy, energy conversion, power plant cycles, The distribution, variability and availability of all

categories of renewable energy. Principles of renewable energy systems such as solar, wind, geothermal, and Nuclear energy. Environmental aspects of implementation of renewable energy. Topic also covers some practical applications to utilizing the renewable energy such as sea water desalination and power plants.

ME 425 - Solar Energy: 3 (3, 0, 1)

Basic and principles of conventional and non-conventional energy, energy conversion, power plant cycles, The distribution, variability and availability of all categories of renewable energy. Principles of renewable energy systems such as solar, wind, geothermal, and Nuclear energy. Environmental aspects of implementation of renewable energy. Topic also covers some practical applications to utilizing the renewable energy such as sea water desalination and power plants.

ME 431 - Tool Manufacturing: 3 (3, 0, 1)

Principles of cutting tools, jigs, fixtures, fit and tolerances, tool cutting geometry, tool life, cost analysis, economics, and safety in tooling design applications.

ME 453 - Modern Engineering materials: 3 (3, 0, 1)

Electrical, magnetic, optical and thermal properties of materials. Advanced ceramics, composites. Advanced engineering plastics. High temperature materials. Advanced coatings. Advanced materials processing system. Rapid solidification and powder metallurgy. Selection of modern materials.

ME 455 - Corrosion Engineering: 3 (3, 0, 1)

Technical and economic aspects of corrosion problems. Types of corrosion: pitting, crevice, intergranular, galvanic, and stress-corrosion cracking. Mechanism and prevention of corrosion failures. Cathodic protection of pipelines and submerged structures. Principles of inhibition of corrosion in process industries. Behavior of iron, copper, aluminum and their alloys in corrosive environments. Metallurgical aspects of corrosion. Design consideration in prevention of corrosion failures.

ME 462 - Mechatronics: 3 (3, 0, 1)

Mechanical system interfacing and actuation; Operational and power amplifiers; Analog to Digital and digital to analog converters; Digital data acquisition basics; Position/Orientation control; PWM control of DC motors, Sensors and actuators; Microprocessor-, microcontroller- and PC-based control; PLC basics and their programming; C programming (M-code & G-code) of CNC machine tools.

ME 463 - Mechanical vibrations: 3 (3, 0, 1)

Fundamentals of mechanical vibration, including free and forced vibration of single-, multi-and infinite-degree of freedom systems. Modal analysis and matrix formulation of vibration problems. Approximate solution techniques. Vibration and modal analysis of continuous systems: beams, rods, and strings. Approximate analytical as well as numerical solutions using suitable software such as MATLAB. Numerous examples and applications of vibration measurement and analysis, including vibration isolation and dynamic absorbers and rotating machinery. Laboratory experimentation for justifying the above topics.

ME 466 - Robotics: 3 (3, 0, 1)

Introduction to robotics and their applications, spatial descriptions and transformation, manipulator forward kinematics, manipulator inverse kinematics, trajectory generation Jacobians: velocities and static forces, manipulator dynamics, control of manipulators, robot programming, robot sensors and vision.

ME 470 - Thermal Power Plants: 3 (3, 0, 1)

Forms of energy, oil, gas and coal. Combustion processes, energy cycles. Steam generators and their component design. Turbines. Load curves. Field trips to power plants and other energy installations.

ME 474 - Refrigeration Engineering: 3 (3, 0, 1)

Mechanical vapor compression refrigeration cycles (single-stage and multi-stage); refrigerant compressors; refrigerants; absorption refrigeration systems; thermoelectric cooling; flash cooling; gas cycle refrigeration; ultra-low-temperature refrigeration (cryogenics); food refrigeration; transport refrigeration. Laboratory will be utilized to carry out experiments on refrigeration equipment and in problem solving sessions.

ME 475 - Air Conditioning: 3 (3, 0, 1)

Thermodynamics of moist air; construction of the psychrometric chart; psychrometric processes; psychrometric systems; industrial processes, air conditioning systems; duct design and air distribution methods; cooling towers. Experiments utilizing air conditioning equipment will be conducted for air conditioning systems will be practiced through a practical project in tutorial sessions.

ME 480 - Turbo Machinery: 3 (3, 0, 1)

Thermo-fluid dynamics aspects of fluid flow, efficiencies of turbomachines. Two dimensional cascades: turbine and compressor cascade correlations and performance. Axial turbines (two-dimensional analysis), axial flow compressors and fans (two-dimensional analysis), centrifugal compressors and fans, radial flow turbines.

ME 482 - Compressible Fluids: 3 (3, 0, 1)

Fundamentals of compressible fluid flow (gas dynamics) in relation to effects of area change (nozzles and diffusers), friction and heat interaction (Fanno, Rayleigh line and isothermal flow), combustion waves normal and oblique shock waves and their effects on flow properties (extended diffusers and supersonic airfoils). Applications to flow through pipelines, subsonic, sonic and supersonic flights, turbomachinery and combustion.

ME 483 - Pumping Machinery: 3 (3, 0, 1)

Terminology and description of typical pump machinery. Momentum and energy transfer between fluid and rotor. Performance characteristics of centrifugal and axial flow fans, compressors, and pumps. Various types of losses. Positive displacement pumps. Cavitation and water hammer problems in pump systems. Special problems in pump design and applications. Laboratory experiments will include performance evaluation of various types of pumps and problem-solving sessions.

ME 490 - Selected Topics in Mechanical Engineering: 3 (3, 0, 1)

The contents of this course will be determined according to the recent topics in this field which will serve the work market or according to the interest area of the instructor to enhance the experience and knowledge of the student.

LABORATORIES AND EQUIPMENT

1. Dynamics and Control lab

Equipment available includes: applications of mechanical power controls like temperature, pressure, flow and liquid-level controls. This is in addition to two important units for servo-pneumatic controls and servo-hydraulic controls.

Equipments for vibration analysis and controls include rectilinear, torsional, rotor and inverted pendulum pieces of equipments. Another i1nportant unit for machinery fault diagnosis by using vibration spectrum analysis exists. General dynamic motion controls include a magnetic levitation, an industrial emulator and a gyroscopic motion. A training unit on how to control DC, AC, and stepper motors exists. The lab also includes a unit for training on multi-motor digital controllers.

2. Measurements lab

Equipment available includes: Servo control trainer, gyroscope apparatus, Magnetic levitation apparatus, Industrial Emulator, Temperature process station, Pressure process station, Level process station, Pneumatic training system, Electrical control of pneumatic system, Servo proportion al control of pneumatic systems, Hydraulic fundamentals training system, Electrical control of hydraulic system, Servo proportional control of hydraulic systems, Flow process station.

3. Mechanical Vibrations lab.

Equipment available includes: Torsion disk, 'complete tum key' (3rd disk encoder), Rectilinear Apparatus, 'complete tum key' (3rd mass encoder) ECP Inverted Pendulum, Vibration sensor with clamping set, Sensor supply module, PC-aided data recording system, Balance of reciprocating masses, Whirling shaft apparatus, Universal driving unit, Machinery fault trainer.

4. Mechanics of Materials lab.

Equipment available includes: Universal Testing Machine 20 KN, Fatigue testing apparatus, Torsion Testing Machine, Thick Cylinder Apparatus, Thin Cylinder Apparatus, Experimental Set Unsymmetrical Bending, PC-aided Measurement Data Recording System, Universal Test Frame and Stand, Optical microscope, furnace.

5. mechanics of Machinery lab

Equipment available includes: a motorized Gyroscope, Rotating an d Reciprocating Mass balancing, Lathe Gearing Layout, Geared System apparatus along with cutaway-model of different type of gears, clutches and working models of different planar mechanisms.

This laboratory is reasonably equipped for carrying out simple experiments to familiarize the undergraduate students with basic mechanism and working of machinery and include balancing of rotating and reciprocating system and speed and depth of cut in a lathe gear system.

6. Fluid mechanics lab

Equipments available include: Impact of a Jet, Flow over Weirs, Bernoulli's Theorem Demonstration, Orifice Discharge, Energy Losses in Bends, Osborne• Reynolds' Demonstration, Energy Losses in Pipes, Hydrostatic Pressure, Orifice and Free Jet Flow, Flow Visualization in Channels around, solid bodies, Metacentric Height, Free and Forced Vortices, Water Hammer, Pelton Turbine.

This laboratory is reasonably equipped for carrying out simple experiments that related to the fluid mechanics basic& concepts, through this laboratory also many of the basic theories, phenomena and laws that related to the fluid mechanics which the students learns in the lectures are demonstrated and confirmed in the lab through available various experimental equipments.

7. Heat transfer lab

Equipment available includes: Linear Heat Conduction Module, Radial Heat Conduction Module, Radiation Heat Conduction Module, Combined Free and Forced Convection and Radiation Module, Extended Surfaces Heat Transfer Module, Radiation Error in Temperature Measurement, Unsteady State Heat Transfer Module, Plate Heat Exchanger, Shell and Tube Heat Exchanger, Coil Vessel Heat Exchanger, Jacketed Vessel Heat Exchanger, Concentric Tube Heat Exchanger,

Surface Unit Electronic Interface, Heat Exchanger Training System Computer Controlled, Computer Controlled Heat Transfer Series, Disk Top Computers

The heat transfer lab is equipped with the tabulated equipments in order to provide students with experience in engineering analysis of experimental data using relevant theory from heat transfer. Moreover, to develop in students the ability to formulate a research problem, design experiments and analysis tools and to complete a research project in a team setting.

Equipments available include: Dead Weight, Series/Parallel Pumps, Reciprocating compressors characteristics, Temperature and humidity measurements, Internal combustion engine characteristics: Diesel engines two and four strokes, Petrol engines two and four strokes, Petrol engine v.1ith variable compression ratio.

This laboratory is reasonably equipped for carrying out simple experiments that related to the thermodynamics basic& concepts, through this laboratory also many of the basic theories, phenomena and Jaws that related to the thermodynamics which the students learns in the lectures are demonstrated and confirmed in the lab through available various experimental equipments. Students will be able also to evaluate the performance of various thermodynamics open and closed systems.

8. Computer labs

GE 104: Basics of Engineering Drawing
CSC 209: Computer Programming

Equipment available includes: Network transformer (24 output), set Cables cat 6, Printer with network card, PC for students P4, PC for Instructor P4, PC distributing files P4.

In this lab the students apply simulations methods of many theoretical ideas faced in the courses. Also it permits them to try theoretical circuits and enhance their knowledge in programming.

جامعة القصيم
كلية الهندسة
المملكة العربية السعودية
القصيم – بريدة

ص.ب. ٦٦٧٧ بريدة ٥١٤٥٢
تليفون مباشر: ٠٠٩٦٦–١٦–٣٨٠٣٣٧٣
فاكس: ٠٠٩٦٦–١٦–٣٨٠١١٥٢
تحويلة: ٠٠٩٦٦–١٦–٣٨٠٠٠٥٠–٥٠٠٠
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