جامعة حائل
University of Ha'il

ELECTRICAL ENGINEERING ACADEMIC PROGRAM

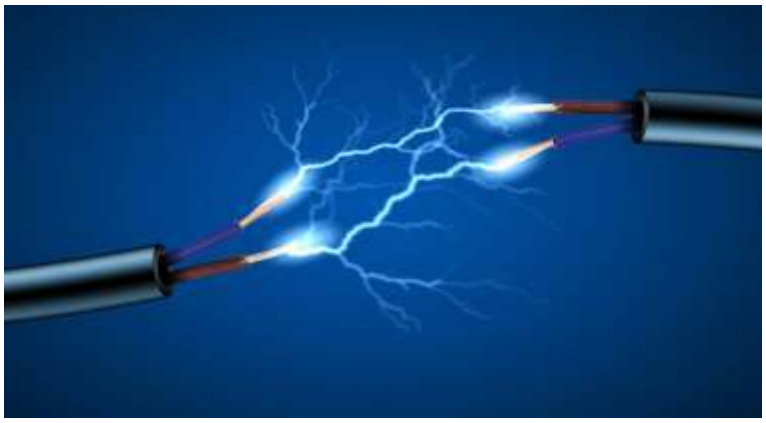
2025

Contents

Introduction

The Electrical Engineering (EE) department at College of Engineering, University of Hail Saudi Arabia currently offers an undergraduate degree in Electrical Engineering with various specializations and a strong M.Sc. Program in Electrical Engineering. The EE department offers a broad range of EE courses, both elementary and advanced, spanning the whole gamut of EE disciplines including areas such as electronics, electrical machines, power engineering, control systems, computer systems, communication systems and networks.

The EE department aims to achieve academic and research leadership in its subject area through its well-designed curriculum (that emphasizes conceptual understanding and fosters creativity) coupled with its strong focus on research, innovation, and industry-liaison. Department of Electrical Engineering also strongly emphasizes on imbibing the graduates with sound professional ethics.



Program vision

The vision of the Electrical Engineering Program is to be recognized as a world-class academic program that provides excellence and leadership in Electrical Engineering Education, Research and Community Service.

Program mission

The electrical Engineering program will prepare graduates to accept and fulfill responsibilities across a broad spectrum of activities, including the practices of electrical engineering academic careers, research in electrical engineering, services to the engineering community and the community at large.

Program Educational Objectives

The graduates of Electrical Engineering program are expected to attain the following Program Educational Objectives (PEOs)

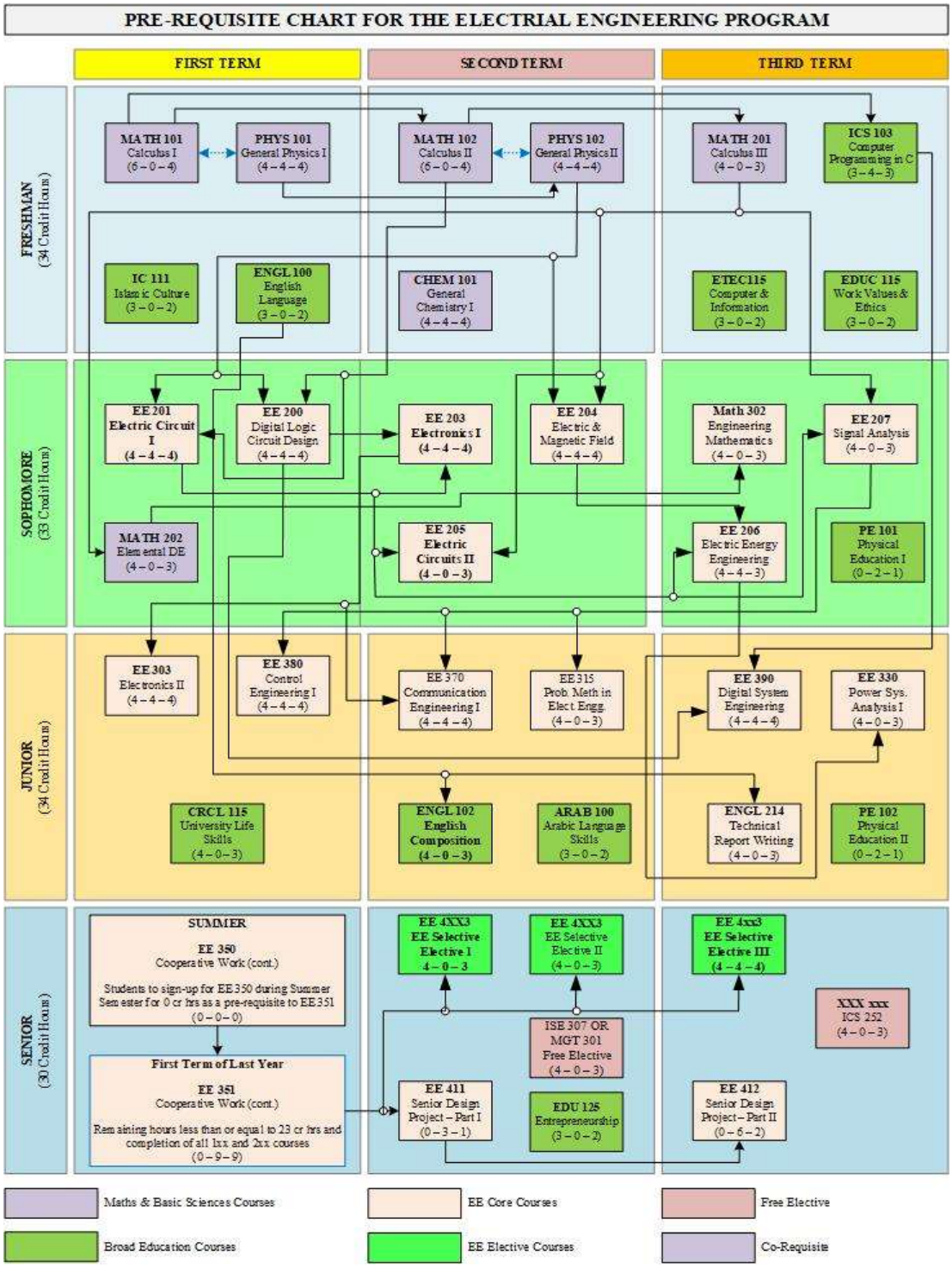
PEO#1 Graduates will successfully apply their erudition of electrical engineering practices and in research environment.

PEO#2 Graduates will comply with ethical and professional standards in electrical engineering.

PEO#3 Graduates will demonstrate a continuing commitment for lifelong learning leadership, teamwork and service to community.

PEO#4 Graduates will contribute to the establishment of enterprises and in setting up the strategic plans for the region and country.

Organization chart of program Prequisites



Admission requirements

FIRST YEAR ADMISSION

Admission into the First year of all programs in the College follows the general admission requirements of UOH as following:

1. Students must be a Saudi National or born to a Saudi Mother.

2. Students must be a holder of grade 12th certificate or the equivalent.

3. All grade 12th certificates must be valid to a max of five years only.

4. Students must be must maintain a good conduct.

5. All girl students, scientific (Sc) and art (A) tracks must pass the Aptitude test and the achievement test as well.

6. All boy students, scientific (Sc) and art (A) tracks must pass the Aptitude test and the achievement test, only for Sc students in particular.

7. Students already admitted in other university will no longer have another change unless they present official resignation documents.

8. Students do not apply online on the do day do time, will automatically drop.

9. Selecting major or specialization upon finishing the preparatory year is subject to the faculties' rules and regulation

10. All students passed the Health sciences' preparatory year should be medically fit before selecting a major.

CURRICULUM DESIGN

The curricula for the programs in the College are designed to satisfy regional and international accreditation requirements.

(a) Each program has a specified set of modules arranged into semesters and year of study.
(b) Modules may have pre- or co-requisite requirements.
(c) All combinations of modules are subject to the constraints of the time- table.

(d) The curriculum for each program shows the recommended sequence of courses. To meet graduation requirements, students are expected to follow the program structure in effect and pass each course.

Upon graduation, holders of the UOH Bachelor of Engineering degrees are expected to:

- possess an appropriate level of knowledge of engineering, mathematics and sciences fundamentals.
- have an appropriate level of knowledge of basic engineering skills and tools (laboratory, fields, and computers)
- be competent in engineering approaches to problem solving (hypotheses, design, testing).
- be skilled in technical writing and oral presentation.
- have an understanding of social, economic, political, ethical, environmental and managerial context of engineering in society.
- recognize the importance of lifelong learning and the need to undertake advanced studies and continuing professional development.

SEMESTER SYSTEM

The College follows the semester system of teaching. An academic year consists of two teaching semesters. Modules are offered in either the first semester, with final examinations normally in January, or in the second semester, with final examinations normally in May.Eachsemesternormallyhas15weeks. A limited number of modules may be offered during the summer vacation.

CREDIT SYSTEM

Every module for a qualification has a credit rating. Credit ratings are given for each module in the Module section of this Handbook. Unless specially exempted, students obtain the credit points indicated for a module by passing the assessments for that module with an average mark of not less than 60%. Such credits are also known as Degree Credits as they accumulate towards the award of the Degree.

Each program is made up of a number of modules, and each module is given a credit rating based on the number of lectures, tutorials and practical in the module. One lecture hour equivalent is equal to 1 credit point. A lecture hour equivalent can be: one 2 or 3 hours of practical work; or industrial training.

Graduation requirements

Undergraduate Degree Requirements

A minimum of credits is required for a Bachelor of Engineering (BEng) degree for those that enter into First Year of the Five Year program. Some majors may, however impose different requirements and actual degree credit requirements for graduation are specified for each program. In their first year students take modules from the basic science disciplines, but at higher years students must select modules which are required for their particular program of study.

Industrial Training (Co-operative work)

Engineering students at CoE undergo a phase of Industrial Training as part of graduation requirements. This component of industrial training requires all students to be exposed to some level of work experience by taking the practical 9-credit module; the module duration is 28 weeks.

Overall Module Grade

Overall performance in a module shall be assessed on a percentage scale, a letter grade and a grade point (see Table 1):

Cumulative Grade Point Average (CGPA)

A student's weighted GP score is calculated for a module by multiplying the credits with the grade point achieved from the percentage mark awarded. The cumulative GPA is given by the total weighted score (from the addition of the GP scores of all the modules) divided by the total number of credits. The GPA and CGPA are calculated to two decimal places.

Mark (Out of 4)	Grade Code	Grade	Percentage
4	A+	Exceptional	95-100
3.75	A	Excellent	90- less than 95
3.5	B+	Superior	85- less than 90
3	B	Very Good	80- less than 85
2.5	C+	Above Average	75- less than 80
2	C	Good	70- less than 75
1.5	D+	High Pass	65- less than 70
1	D	Pass	60- less than 65
0	F	Fail	Less than 60

General Regulations

General regulations of all programs in the College follow the general regulations of UOH.

DEFINITION OF TERMS

Academic advisor :A faculty member who is in charge to guide certain number of students in all matters related to their academic, social and health care affairs since their admission to the department.

Academic exclusion :means termination of a student's registration on academic grounds, resulting in exclusion from the university.

Academic level : It indicates the study level according to the approved study plan.

Academic load: It is the total credit hours that the student is allowed to register per semester. The minimum and maximum study load is determined by implementation rules of the University.

Academic probation: It is a notification given to the students with a cumulative GPA below the minimum acceptable limit mentioned in the University regulations.

Academic semester: It is a fifteen-week study-period excluding registration and final examination periods.

Academic year: It consists of two main regular studying semesters and a summer semester if any.

Admission: means the act by which the university admits a person to study, after acceptance by an applicant of an offer of a place at the university.

Assessment: means the evaluation and grading of work, supervised or unsupervised, carried out by a student in satisfying the requirements of a module, program or degree. A module maybe assessed through continuous assessment or a written examination or both.
Co-requisite module: means a module for which a student must register in the same semester as the proposed module.
Course: It is a subject of study within a certain academic level of the approved degree plan in each major. Each course has a number, code, title and a detailed description of its contents which distinguishes it from the other courses. A special file of each course is kept in the corresponding department for follow up, evaluation and updating purposes. Some of the courses may have pre-requisite or co-requisite requirement(s).
Course grade: It is the expressed result in percentage or letter grade of the final grade in any course
Course work: means assessable work produced by the student (also may be called classwork or continuous assessment)
Credit hour: It is a weekly theoretical lecture with a duration of not less than fifty minutes, or clinical session of not less than fifty minutes, or field, laboratory or practical lesson of not less than a hundred minutes.
Credit point or credits: means a value assigned to module to indicate its weighting within a qualification.
Curriculum: means the combination of modules which together comprise the program of study leading to a qualification. An individual student's curriculum refers to the specific selection of modules within the broad framework of the curriculum prescribed for a qualification, which enables the student to meet the requirements for the qualification.
Degree plan: It is a collection of general, core, compulsory, elective, internship, training, and preparatory courses whose total credit hours form the graduation requirements, that must be completed to obtain a scientific degree in a specified major.
Elective: a module which the student may choose
Examination: means a formal assessment, conducted within an officially designated examination session, usually invigilated, and bound by time constraints.
External examination: means examination by a person, external to the university.
Internal examination: means examination by a person or persons involved with the teaching of the relevant module in that semester or, in the case of postgraduate qualifications, is a member of the University academic staff including persons who hold honorary appointments in the University other than the supervisor(s).
Major: amajorinadisciplineconsistsofatleast12creditsattheexit-level
Module: means any separate course of study for which credits may be obtained.
Qualification: means a degree.

Prerequisite module: means a module which must have been passed, with at least the minimum mark required by the relevant College ,before registration for the proposed module is permitted.

Project: means a substantial assignment, whether comprising a single module or part of a module, and which requires research or equivalent independent work by a student.

Registered student: means a student who is registered to study in one or more modules offered by the University. Such registration will lapse on the date of the following registration session or earlier should the student cease to be an admitted student.

Registration: means completion by a student, and acceptance by the University, of a registration form, and compliance with such other conditions as are required for entitlement to a current student card.

Student: means a person who has been admitted to the University for the purpose of studying or who has registered for a qualification. A student remains a student until such time as that person graduates or otherwise completes studies, or withdraws from the University, or fails to attend or register in any semester, or is excluded and all appeal processes for readmission have been exhausted."

Summer semester: it is an intensive eight weeks study period excluding registration and final examination periods, in which course studying duration is doubled.

The University: means the university of Hail (UOH).

Academic reference standards of program

The EE program at KFUPM, which was selected as an equivalent program to the EE program at the University of Hail, is only ABET accredited. The academic standards of the EE program are, therefore, set to comply with the international ABET standards.

The characteristics of the EE program graduates are:

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

Study plan of program

The typical study program for B.Sc. students in the Department of Electrical Engineering is distributed over 8 semesters as follows:

FIRST YEAR (Freshman)

FIRST SEMESTER						
CODE	COURSE TITLE	CRED	LECT	LAB	PRE-REQUISITE	CO-REQUISITE
MATH 101	Calculus 1	4	4	0		PHYS 101
PHYS 101	General Physics 1	4	3	3		MATH 101
ENGL 100	English Language	2	2	0		
CHEM 101	General Chemistry 1	4	4	3		
IC 111	Islamic Culture	2	2	0		
PE 101	Physical Education 1	1	2	0		
TOTAL (CREDIT)		17				

SECOND SEMESTER						
CODE	COURSE TITLE	CRED	LECT	LAB	PRE-REQUISITE	CO-REQUISITE
MATH 102	Calculus 2	4	4	0	MATH 101	PHYS 102
PHYS 102	General Physics 2	4	3	3	PHYS 101	MATH 102
ICS 103	Computer Programming in C	3	2	3	MATH 101	
ENGL 102	English Composition 2	3	3	0	ENGL 100 or ENGL 101	

ARB 100	Arabic Language Skils	2	2	0		
PE 102	Physical Education 2	1	0	2	PE 101	
	TOTAL (CREDIT)	17				

SECOND YEAR

	FIRST SEMESTER					
CODE	COURSE TITLE	CRED	LECT	LAB	PRE-REQUISITE	CO-REQUISITE
MATH 201	Calculus III	3	3	0	MATH 102	
EE 200	Digital Logic Circuits Design	4	3	3	MATH 102 PHYS 102	
EE 201	Electric Circuits I	4	3	3	MATH 102 PHYS 102	
EE 204	Electric & Magnetic Fields	4	3	3	MATH 102 PHYS 102	
ENGL 214	Technical Report Writing	3	3	0	ENGL 102	
	TOTAL (CREDIT)	18				

	SECOND SEMESTER					
CODE	COURSE TITLE	CRED	LECT	LAB	PRE-REQUISITE	CO-REQUISITE
MATH 202	Elements of Diff. Equations	3	3	0	MATH 201	
EE 203	Electronics I	4	3	3	EE 201 EE 200	
EE 205	Circuits and Systems	3	3	0	EE 201 Math 201	
EE 206	Electric Energy Eng.	4	3	3	EE 201 EE 204	

EE 207	Signal Analysis	3	3	0	EE 201 Math 201	
EDUC 115	Work Values and Ethics	2	2	0		
	TOTAL (CREDIT)	19				

THIRD YEAR

FIRST SEMESTER						
CODE	COURSE TITLE	CRED	LECT	LAB	PRE-REQUISITE	CO-REQUISITE
EE 303	Electronics II	4	3	3	EE 203	
EE 390	Digital Systems Eng.	4	3	3	EE 200 ICS 103	
ISE 307	Eng. Economics (Elective)	3	3	0		
CRCL 115	University Life Skills	3	3	0		
MATH 302	Engineering Mathematics	3	3	0	MATH 202	
ETEC 115	Computer and Information	2	2	0		
	TOTAL (CREDIT)	19				

SECOND SEMESTER						
CODE	COURSE TITLE	CRED	LECT	LAB	PRE-REQUISITE	CO-REQUISITE
EE 315	Probabilistic Methods in EE.	3	3	0	EE 207	
EE 330	Power Systems Analysis I	3	3	0	EE 206	
EE 370	Communication Eng.	4	3	3	EE 207 EE203	
EE 380	Control Systems	4	3	3	EE 207	

EDUC 125	Entrepreneurship	2	2	0		
TOTAL (CREDIT)		16				

SUMMER TRAINNING

CODE	COURSE TITLE	CRED
EE 350	Cooperative Work	0
TOTAL (CREDIT)		

FOURTH YEAR

FIRST SEMESTER

CODE	COURSE TITLE	CRED	LECT	LAB	PRE-REQUISITE	CO-REQUISITE
EE 351	Cooperative Work	9	0	0	ENGL 214	
TOTAL (CREDIT)		9				

SECOND SEMESTER

CODE	COURSE TITLE	CRED	LECT	LAB	PRE-REQUISITE	CO-REQUISITE
EE 411	Senior Design Project	3	1	6	EE351	

ICS 252	**Technical Elective**	**3**	**3**	**0**		
EE 4xx	**Elective 1**	**4**	**3**	**3**		
EE 4xx	**Elective 2**	**3**	**3**	**0**		
EE 4xx	**Elective 3**	**3**	**3**	**0**		
TOTAL (CREDIT)		**16**				

Courses description

COURSES DESCRIPTIONS

The following section gives a brief description of the contents of core electrical engineering courses.

EE 200 - Digital Logic Circuit Design (3-3-4)

Number systems & codes. Logic gates. Boolean Algebra. Karnaugh maps. Analysis and synthesis of combinational systems. Decoders, multiplexers, adders and subtractors, Programmable Logic Arrays (PLAs). Types of flip-flops. Memory concept. Counters. Registers. Introduction to sequential circuit design.

Prerequisite: MATH 102 and PHYS 102

EE 201 - Electric Circuits 1 (3-3-4)

Basic laws: Ohm's law, KVL, KCL. Resistive networks. Circuit analysis techniques: nodal and mesh analysis. Network theorems: Thevenin's theorem, Norton's theorem, source transformations, superposition principles, maximum power transfer theorem. Energy storage elements. Phasor technique for steady-state sinusoidal response. Important power concepts of AC circuits. Transient analysis of first-order circuits.

Prerequisite: MATH 102 and PHYS 102

EE 203 - Electronics 1 (3-3-4)

Diodes: models and circuit analysis. Diode applications (rectifiers and clipping circuits). Transistors: Bipolar Junction Transistor (BJT), Junction Field Effect Transistor (JFET) and Metal Oxide Semiconductor Field Effect Transistor (MOSFET). DC and small signal AC analysis. Amplifier configurations. Differential Amplifiers. Digital logic families (TTL, ECL, I^2L, and CMOS circuits).

Prerequisite: EE 200, EE 201

EE 204 – Electric & Magnetic Fields (3-3-4)

Review of vector analysis. Coulomb's law and electric field intensity. Electric flux density, Gauss' law and divergence. Electric energy and potential. Conductors, dielectrics, and capacitance. The steady magnetic field. Magnetic energy and forces. Materials and inductance. Time varying fields and

Maxwell's equations. Plane waves propagation, reflection and refraction. Transmission lines. **Prerequisite: PHYS 102, MATH 102**

EE 205 – Electric Circuits 2 (3-0-3)
Analysis of three-phase networks. Time domain solutions of second order circuits. State equations for linear circuits. Computer-aided circuit analysis. Frequency domain analysis and Bode plots. Network analysis in the s-domain. Mutual inductance and transformers. Two port networks. **Prerequisite: EE 201, Math 201**

EE 206: Electric Energy Engineering (3-3-4)
Energy sources and electric power generation. Three-phase circuits. Transformers: single-phase and three-phase. Generators - DC and AC. Motors - DC and AC. Synchronous, induction, fractional horse power motors. Electric energy transmission.
Prerequisite: EE 201, EE 204

EE 207 - Signal Analysis (3-0-3)
Fourier series. Fourier transform. Laplace transform. Linear circuits and systems concepts. Impulse response. Convolution. Transfer function. Frequency response. State space representation. Introduction to sampling of analog signals. Introduction to difference equations and z-transform. **Prerequisite: EE 201, Math 201**

EE 303 - Electronics 2 (3-3-4)
Amplifier frequency response. Linear and nonlinear operational amplifier (OP-AMP) applications. Non-ideal characteristics of OP-AMPs. Multistage amplifiers. Active filters. Feedback: Circuit topologies and analysis. Oscillators. **Prerequisite: EE 203**

EE 315 – Probabilistic Methods in Electrical Engineering (3-0-3)
Fundamentals of probability theory. Single and multiple discrete and continuous random variables. Probability density function. Gaussian and other distributions. Functions of random variables. Joint and conditional probabilities. Moments and statistical averages. Central limit theorem. Random processes. Stationarity and ergodicity. Correlation function. Power spectral density. Gaussian and Poisson random processes. Response of linear systems to random signals.
Prerequisite: EE 207

EE 330 - Power Systems Analysis 1 (3-0-3)
Synchronous generator models for power systems analysis. Transmission line models. Power systems representation: one line diagram, impedance (reactance) diagrams. Per unit system. Network calculations. Network matrices. Symmetrical fault studies. Symmetrical components.

Unsymmetrical faults.

EE 350 Cooperative Work Progress (0-0-0) (Summer)
A continuous period of 10 weeks spent in the industry working in any of the fields of electrical engineering. During this training period, the student is exposed to the profession of electrical engineering through working in many of its fields. The student is required to submit, and present, a formal written report of his work.
Prerequisite: ENGL 110 and the completion of 90 credit hours including all 300 level EE courses.

EE 351 Cooperative Work (0-0-9)
A continuous period of 18 weeks spent in the industry working in any of the fields of electrical engineering. During this training period, the student is exposed to the profession of electrical engineering through working in many of its fields. The student is required to submit, and present, a formal written report of his work.
Prerequisite: EE 350

EE 370 - Communications Engineering 1 (3-3-4)
Review of signals and linear systems. Amplitude modulation (AM, DSB, SSB, VSB). Angle modulation (FM, PM). Frequency Division Multiplexing (FDM), Sampling, Quantization, PCM, DPCM, DM. Time Division multiplexing (TDM). Line coding and baseband transmission. Bandlimited channels and ISI. Digital carrier modulation (PSK, ASK, FSK, and M-ary). Examples of modern communication systems.
Prerequisite: EE 203, EE207

EE 380 - Control Engineering 1 (3-3-4)
Introduction to feedback control systems. Block diagram and signal flow graph representations. Mathematical modeling of physical systems. Stability of linear control systems. Time-domain and frequency-domain tools and performance assessment. Lead and lag compensator design. Proportional, integral and derivative control.
Prerequisite: EE 207

EE-390 - Digital Systems Engineering (3-3-4)
8088/8086 Microprocessor hardware and software Models. Instruction sets. Assembly language programming and debugging. Memory and input/output mapping. Input and output instructions.
Input/output Interfacing. Introduction to interrupts and basic microcontrollers.

EE 411 - Senior Project (1-6-3)

A comprehensive course that integrates various components of the curriculum in a comprehensive engineering design experience. Design of a complete project including establishment of objectives and criteria, formulation of design problem statements, preparation of engineering designs. The design may involve experimentation, realization and/or computer project are essential requirements for completion of the course. Team design projects, where appropriate, are highly encouraged.
Prerequisite: Senior standing (senior level), EE351

EE Electives

EE 400 Telecommunication Networks (3-3-4)
This course gives a survey of the design and implementation of communication networks. The concepts and fundamental design principles will be explained. Topics include transmission media, network topology, routing, switching, network protocols and architectures, internetworking, network performance and broadband access. **Prerequisite: EE 315, EE 370, EE351**

EE 417 Communications Engineering 2 (3-0-3)
Noise in telecommunication systems. Representation of white and narrow-band noise. Transmission of noise through linear filters. Performance of continuous wave modulation (full-AM, DSBSC, SSB, and FM) in the presence of additive white Gaussian noise. Digital waveform coding (DM, PCM, DPCM and ADPCM). Digital communication systems. Noise effects and probability of error in digital communication systems. Matched filter. **Prerequisite: EE 315, EE 370, EE351**

EE 418 Introduction to Satellite Communications (3-0-3)
Overview of satellite systems. Orbits and launching methods. Communication satellite subsystems. Modulation schemes and satellite multiple access (FDMA, TDMA, CDMA, and SDMA). Space link analysis. Satellite antennas. Applications of satellites. **Prerequisite: EE 370, EE204, EE351**

EE 430 Information Theory & Coding (3-0-3)
Concept of information and its measurement. Entropy source coding theorem. Huffman codes, LZW, arithmetic codes. Introduction to rate distortion theory. Channel coding theorem, channel capacity. Block codes: detection and correction. Linear codes, cyclic codes, hamming codes, BCH codes, encoding, and decoding algorithms. Introduction to convolutional codes. **Prerequisite: EE 315, EE 370, EE351**

EE 434 Industrial Instrumentation (2-3-3)
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.

EE 445 - Industrial Electronics (3-3-4)
555 timers. Optoelectronic sensors. Micro switches. Ultrasonic transducers. Thermal sensors. Strain gauges and instrumentation amplifiers. UJT, PUT, multilayer diodes. SCRS and TRIACS. Triggering and power control techniques. Solid state relays. Practical applications. **Prerequisite: EE 303, EE351**

EE 446 – Programmable Logic Controllers (2-3-3)

Basic concepts of microcontrollers. The structure of programmable logic controllers: I/O, relays, counters and timers. Ladder diagram concept. PLC's intermediate and advanced functions, PLC's instruction set and data manipulation. PLC's industrial applications in process control. **Prerequisite: EE 380, EE 390, EE 351**

EE 455 Analog Communication Electronics (3-3-4)

Functional blocks of analog communication systems. Design of mixers, converters, RF and IF amplifiers, AM detectors, and FM discriminators. Functional blocks of monochrome TV receivers. Design of video IF amplifiers, video amplifiers, sync. separators, horizontal and vertical oscillators and AFC. Functional blocks of color TV receivers. Color signal representation and processing.
Prerequisite: EE 303, EE 370, EE 351

EE456- Digital Communication Electronics (3-3-4)

Functional blocks of digital communication systems: PAM, PWM, PPM and PCM. Design of S/H circuits, A/D and D/A 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.
Prerequisite: EE 303, EE 370, EE 351

EE 460: Power Electronics (3-3-4)

Various aspects of power electronics and drive technology. Study of diodes, Thyristor, protection circuits, harmonic generation, fundamentals of Static Converters, Firing angle control, Multi cycle Control, AC/DC Drives, Frequency, Speed/Regulation, Control of asynchronous machines and D.C. Motors, Regenerative Braking. 3-phase drives, Torque and Current in star and delta operation. Introduction to Power Electronics & Semiconductor Diodes, Diode Circuit & Rectifiers Diode Circuit & Rectifiers, Thyristors, Controlled Rectifiers, Controlled Rectifiers, Voltage Controllers, Power
Transistors , DC-DC Converters , PWM Inverters, Resonant Pulse Inverters
Prerequisite: EE206, EE 380, EE351

EE 462 Electrical Machines (3-3-4)

Electromechanical energy conversion principles, Synchronous machines: Steady state, Synchronous machines: Transient performance, DC machines: Steady state & Dynamic analysis, Poly-phase induction machines: Steady state, Poly-phase induction machines: Dynamics & control, Fractional horsepower and special type machines.
Prerequisite: EE 330, EE 380, EE 351

EE 463 Power Systems Analysis 2 (3-0-3)

Power flow analysis, Transient stability analysis, Economic power dispatch, Automatic generation control (AGC), Reactive power control.

Prerequisite: EE 330, EE351

EE 465 Power Transmission & Distribution (3-0-3)

Transient over voltages and insulation coordination, Circuit Breakers*:* Types, Ratings, and selection**.,** Limiting factors for Extra-High and Ultra-High voltage TLs*:* Corona, radio noise, audible noise, and conductor size selection. Design of sub-transmission lines and distribution substations*:* Layout, protection needs. Voltage drop and power loss calculations

Prerequisite: EE 330, EE351

EE 466 Power System Protection (3-0-3)

Protection principles and devices, Protection of single phase and three phase transformers, Protection of rotating machines (motors and generators), Transmission line protection (pilot, non-pilot and distance), Relay coordination, and Circuit interruption. **Prerequisite: EE 330, EE351**

EE 467 Electrical Energy Efficiency (3-0-3)

Overview of the different technologies involved in electro efficiency, outlining monitoring and control concepts and practical design techniques used in residential and industrial applications. Description of the current standards of power transformers and electrical motors, with illustrative case studies showing how to achieve better design. Up-to-date information on standardization, technologies, economic realities and energy efficiency indicators (the main types and international results). Coverage on the quality and efficiency of distribution systems (the impact on distribution systems and loads, and the calculation of power losses in distribution lines, motors and in power transformers). **Prerequisite: EE 330, EE351**

Program key performance indicator (KPI's)

Code	Key Performance Indicators	Description
KPI-P-01	Percentage of achieved indicators of the program operational plan objectives **(i8)**	Percentage of performance indicators of the operational plan objectives of the program that achieved the targeted annual level to the total number of indicators targeted for these objectives in the same year
KPI-P-02	The awareness and support of the teaching staff and administrators of the mission of the program/institution **(i2)**	Percentage of faculty and program staff who are aware of the program / institution's mission using a questionnaire / interview to the total number of faculty and staff.
KPI-P-03	Students' Evaluation of quality of learning experience in the program **(i10)**	Average of overall rating of final year students for the quality of learning experience in the program on a five-point scale in an annual survey
KPI-P-04	Students' evaluation of the quality of the courses **(i6)**	Average students overall rating for the quality of courses on a five-point scale in an annual survey
KPI-P-05	Completion rate **(i12)**	Proportion of undergraduate students who completed the program in minimum time in each cohort
KPI-P-06	First-year students retention rate **(i1)**	Percentage of first-year undergraduate students who continue at the program the next year to the total number of first-year students in the same year
KPI-P-07	Students' performance in the professional and/or national examinations	Percentage of students or graduates who were successful in the professional and / or national examinations, or their score average and median (if any)
KPI-P-08	Graduates' employability and enrolment in postgraduate programs **(i14,19)**	Percentage of graduates from the program who within a year of graduation were: a. employed b. enrolled in postgraduate programs during the first year of their graduation to the total number of graduates in the same year
KPI-P-09	Average number of students in the class	Average number of students per class (in each teaching session/activity: lecture, small group, tutorial, laboratory or clinical session)

Code	Key Performance Indicators	Description
KPI-P-10	Employers' evaluation of the program graduates proficiency **(i26)**	Average of overall rating of employers for the proficiency of the program graduates on a five-point scale in an annual survey
KPI-P-11	Student evaluation of the Value and Quality of Field Activities **(i15)**	Percentage of students' satisfaction with the presence and quality of field activities during the semester and the academic year at the program / college / university.
KPI-P-12	Students' satisfaction with the offered services **(i18,28)**	Average of students' satisfaction rate with the various services offered by the program (restaurants, transportation, sports facilities, academic advising, ...) on a five-point scale in an annual survey
KPI-P-13	Ratio of students to teaching staff **(i9)**	Ratio of the total number of students to the total number of full-time and full-time equivalent teaching staff in the program
KPI-P-14	Percentage of teaching staff distribution	Percentage of teaching staff distribution based on: a. Gender b. Branches c. Academic Ranking
KPI-P-15	Proportion of teaching staff leaving the program **(i37)**	Proportion of teaching staff leaving the program annually for reasons other than age retirement to the total number of teaching staff.
KPI-P-16	Percentage of publications of faculty members **(i36)**	Percentage of full-time faculty members who published at least one research during the year to total faculty members in the program
KPI-P-17	Rate of published research per faculty member **(i42)**	The average number of refereed and/or published research per each faculty member during the year (total number of refereed and/or published research to the total number of full-time or equivalent faculty members during the year)
KPI-P-18	Citations rate in refereed journals per faculty member **(i44)**	The average number of citations in refereed journals from published research per faculty member in the program (total number of citations in refereed journals from published research for full-time or equivalent faculty members to the total research published)

Code	Key Performance Indicators	Description
KPI-P-19	Relevance of the qualifications and experience of faculty members to the courses they teach **(i17)**	Percentage of faculty members with qualifications and experience of the courses they are studying compared to the total number of courses offered during the academic year.
KPI-P-20	The percentage of full-time teaching staff members and the others of administrative staff that participate in community services activities **(i49)**	Number of full-time faculty, other staff and administrators engaged in a community service activity during the academic year compared to the total number of faculty, other staff and administrators
KPI-P-21	Satisfaction of beneficiaries with the learning resources **(i13,27,33)**	Average of beneficiaries' satisfaction rate with the adequacy and diversity of learning resources (references, journals, databases… etc.) on a five-point scale in an annual survey.

Facilities (Classrooms – Laboratories - Specialized equipment - ….etc)

A. Offices, Classrooms and Laboratories

College of Engineering is located in a purpose-built modern building (Building # B14) in the main campus o University of Ha'il. The college was shifted to the current location in the Fall of 2018. The building is equippe with modern Building Management System (BMS) for environment control. The Department of Electrica Engineering is located towards the northern side of the building in the ground, first and second floor. The nev building provides much more space for offices, classrooms, laboratories, and facilities than those, which were available in the old building.

A.1 Offices

n majority of cases, faculty members have their own offices, and in general one faculty member has his ow office. The office has adequate furniture and is equipped with wired/wireless internet connection and in a fe occasions has a desktop computer, printer machine to print out documents. The average office size is adequat o receive student visitors to discuss education and advising related matters. Whenever there arises a need, ther s a seminar room with a round table to hold departmental meetings, thesis defenses and other activities. Th ollowing Table 7- 1, lists the EE department count of the ground, first and second floor with all of its rooms.

Table 7- 1, Count of room facilities on three floors.

Floor	Room	Number of rooms
Ground Floor	Departmental Labs	5
Ground Floor	Computer Labs	1
Ground Floor	Toilets	2
First Floor	Departmental Labs	4
First Floor	Classrooms	6
First Floor	Offices	3
First Floor	Toilets	2
Second Floor	Offices	36
Second Floor	Department's Chairman Office	1

Second Floor	Break Faculty Members	1
Second Floor	Sessions	2
Second Floor	Terrace	2
Second Floor	Toilets	2

A.2 Classrooms

All classrooms are equipped with white boards, data show with a separate white screen. No stationary PCs are available in classrooms, students and faculty bring in their own laptops if they desire to use the data show to present their materials. Classrooms of the BSc Electrical Engineering program are located on the ground and the first floors.

These rooms vary in size and some of them are shared among different programs subject to availability. Details of the ground, first and second floors is shown in the table below with classrooms highlighted in Table 7- 2.

Table 7- 2, Classroom Locations & Capacity

Floor	Room Number	Classroom capacity
First Floor	F-184	45
	F-186	30
	F-188	30
	F-190	45
	F-195	35
	F-196	35

A.3 Laboratory Facilities

From the Program Educational Objectives: Graduates will model, analyze, design, and experimentally evaluate components or systems that achieve desired technical specifications subject to the reality of economic constraints.

Instructional laboratories feature modern equipment and computer-aided design tools that are more than adequate for most undergraduate courses. Nevertheless, many students take advantage of state-of-the-art research facilities to support their project work.

Labs are used by both faculty and students for course work as well as to conduct research. It is worth noting that some physical rooms are shared among different labs. Table 7- 3 shows different Labs and their locations as well as sizes. Senior students can use these labs for their projects.

Electrical Circuits Lab: This lab helps students to apply basic measurements of electrica ircuit, voltage, current and components such as resistance, capacitance and inductance. Experimenta erification of basic electrical laws and theories such as series and parallel connections.

lectrical Circuits and Digital Logic Lab: This lab facilitates students to utilize fundamentals electrical circui nd digital logic circuits using lab equipment. It includes modern work benches, digital and analog millimeters unction generators and digital oscilloscopes etc. Experimental verification of basic electrical laws and theorie uch as Ohm, KV, KCL, NVM, MCM, superposition, Norton, Thevenin's and maximum power transfer.

lectronics and Digital logic circuit design Lab: This lab serves the core courses such as EE 200 (Digita ogic circuit design). It familiarizes the student with logic gates and medium scale integration (MSI) circuits Within this lab, the student tests the validity of the logic concepts. Furthermore, they can analyze ‹design ‹build nd test basic combinational and sequential logic circuits. Also, this lab serves the core courses EE 203 "Electronics I" and EE 303 "Electronics II". In this lab the students learns the basic operations of electroni omponents such as diodes, BJT and MOSFET. In addition, the operation and applications of single nultistage ‹feedback and operational amplifier circuits are demonstrated. Furthermore ‹the students are give xperience of operation and application of active filters and oscillators.

lectric Energy Machine Lab: This lab helps student to apply fundamental Electric Energy machines design uch as balanced three phase circuits, magnetic circuit, single phase transformers, DC generators, DC motors Three-Phase synchronous generators, Three-Phase synchronous motors, Three-Phase induction motor with Slip Ring rotor, Three-Phase squirrel cage induction motor and related work benches.

lectrical Engineering Design and Simulation Lab: In this lab students perform software and hardwar xperiments in EE390-Digital Systems Engineering. The laboratory has ten PCs with TASM installed, ter Flight-86 embedded training kits and ten training kits for microcontroller 8051. Experiments include ntroduction to Debug and Turbo Debugger, Addressing modes and data transfer instructions, Arithmeti nstructions, Shift and rotate instructions, Using BIOS Services and DOS functions Part 1: Text-base Graphics, Using BIOS Services and DOS functions Part 2: Pixel-based Graphics, Introduction to Flight8 Microprocessor Trainer and Application Board, Flight86 Application I – Traffic Lights, Flight86 Applicatio I – Motor Control and Introduction to the 8051 Microcontroller.

Digital Systems and Communications Lab: Students perform hardware and software experiments in relatio o EE370-Communications Engineering-I. The laboratory has ten workstations equipped with PCs oscilloscopes ‹and function generators. Hardware experiments are performed using analog and digita ommunications trainers. Experiments include Amplitude and Angle modulation/demodulation, sampling an quantization, pulse code modulation/demodulation ‹and channel effects. Software simulations are carried out Two spectrum analyzers with bandwidths up to 1.2 GHz are also available for observing the spectra o baseband/band pass signals.

Control Engineering Lab: The lab constitutes the practice part of control engineering course. It is a review o nodeling, simulation, and implementation of a physical dynamical system by a linear time invariant ordinar differential equation. Compensators are designed to guarantee transient and steady state specifications.

Computer Lab: This computer lab is a modern, spacious facility equipped with the lates echnology. It features a variety of computers, as well as a wide range of software applications. The lab also ha high-speed internet connection and access to printers and scanners. The room is well-lit and comfortable, witl rgonomic chairs for students to use while working. There are also whiteboards for group collaboration an rainstorming sessions. The lab is open to all students and faculty members, providing an ideal environment fo earning, research, and creativity. It serves course such as ICS 103 and courses that require programmin oftware tools. 17 in number computers are available equipped with the relevant software packages.

ower Electronics Lab: This lab is a dedicated to the study and development of power electronics. It i quipped with the latest technology and equipment to enable students to gain hands-on experience in the field o ower electronics. The lab provides students with an opportunity to explore the fundamentals of powe lectronics, including topics such as electrical machines, power converters, motor drives, and control systems tudents can also gain practical experience in designing and building their own circuits and systems. The lal lso provides access to various software packages for simulation and analysis of power electronic systems.

enewable Energy Lab: This is a state-of-the-art facility dedicated to researching and developing new sola nergy technologies. The lab features a variety of cutting-edge equipment, including photovoltaic cells, sola hermal systems, and advanced solar tracking systems. Researchers in the lab are able to conduct experiment n a variety of topics related to solar energy, such as energy storage, efficiency improvements, and cos eduction. The lab also provides educational opportunities for students interested in learning more abou enewable energy sources.

aboratory facilities for Department of Industrial Engineering are located on the first floor of the buildin elow the faculty offices (Room numbers F – 078, F – 081, F – 084, F – 088 and F – 091) and a computer lal oused in Room F – 213. All labs are available to the students and faculty during the regular college hours However, laboratory facilities can also be used outside hours with the permission of the Department Chairman.

Table 7- 3 Laboratories size, capacity and utility.

No	Name of Lab	Location	Purpose of the Lab	Course for Lab	Students /session
1.	Electrical Circuits	F-200	Analysis and design of basic electric circuits	EE201, EE202	15
2.	Electronics, Digital Logic Design	F-189	Testing of logic circuits, Testing basic operation of electronic components	EE200, EE203, EE303	15
3	Electrical Engineering Design Simulation Lab	F-192	Performing software and hardware experiments in EE390.	EE 204, EE390	15
4	Computer Lab	G-278	It serves the IT course such as ICS 103 and courses that require programming software tools.	ICS 103, ICS 252	17
5	Electric Circuits and Digital Logic Lab	G-273	Analysis and design of fundamental electric circuits and logic circuits	EE201, EE202	15
6	Electric Energy Machines	G-263	Testing and characterizing different magnetic circuits and electric machines	EE 206, EE306, EE460	15
7	Power Electronics Lab	G-266	Testing and analyzing a variety of power electronics components and related circuits.	EE 206, EE306, EE460	15
8	Digital Systems and Communications Lab	F-185	Testing communication systems and measurements of room acoustics.	EE370	15
9	Control Engineering Lab	G-269	Modelling and simulation and implementation of physical dynamical systems	EE 380	15
10	Renewable Energy Lab	G-261	Modelling and implementation of solar and renewable energy resources	REE 201, REE3041, REE3051 REE3011	15

afety purposes, all labs have the following equipment installed:

1- **Health and safety guidelines**

All the labs are installed with a large sized flex bearing health and safety guidelines. At the beginning of each semester students are advised to read and understand the health and safety guidelines. Moreover, these guidelines are made permanent part of laboratory manuals for each course of the program. All the working benches are fitted with emergency cutoff switches.

2- Fire Extinguishers

All the laboratories fitted with water sprinklers. Most of the ground floor laboratories are equipped with dry riser facility. Moreover, all the laboratories are equipped with appropriate fire extinguishers.

3- First aid kit and medical facility

EE department has been fitted with first aid kits including general corridors and the labs. Selective faculty members have been trained for first aid in case of an emergency.

University has its own Medical Centre that is accessible to all faculty members and students. The Medical Centre provides all basic facilities such as, lab examination, X-Ray, medicines etc. Apart from General Practitioner, the Medical Centre also has specialists to cater for necessary advice. In a situation where the treatment is not within the scope of the Medical Centre, the faculty members and students may be referred to the Government Hospitals.

3. Computing Resources

A computer lab with 17 workstations is housed in Room G-278. The computer lab is equipped with all necessary software applications required by the students such as Microsoft Office suite. The lab also has licensed versions of MATLAB software for simulation and LABVIEW software. The lab is also equipped with smart multimedia projector and white board.

Access to computer labs are timetabled according to classes schedule at the beginning of each term, free time slots are left for students to come in and work on their own projects.

Computer labs are strictly used for educational purposes, no administrative and/or managerial tasks are allowed to be performed in these labs. Internet access is free of charge for students via a WiFi network that covers the whole campus and the dormitories.

The faculty members and students also have access to Blackboard System for uploading of lectures and other course material. Blackboard system has been an important tool for imparting online lectures especially during COVID – 19 situation.

C. Guidance

Each lab is displayed with health and safety description flex. During each lab session, the instructor remains present in the lab to help students for carry out experiments. The faculty members answer any questions which students may ask regarding current running experiment. The faculty members collect and grade reports and do documentation to prepare students' results and comments on each experiment. A lab engineer is always present to provide students with equipment and/or tools they may need.

Instructor and engineer make sure of proper use of equipment and that safety rules are being complied with during lab sessions. IT professionals are also ready to help the students who use the labs, in case of any technical issues that may be faced by them.

D. Maintenance and Upgrading of Facilities

Efforts are constantly being made to ensure proper maintenance of all lab equipment as well as upgradation to provide a conducive learning environment for the students. And also to ensure that each equipment is serviceable and safe to use.

D.1 Maintenance of Facilities

All lab equipment is routinely checked by the instructor before the start of the session to ensure that it is serviceable and safe to use. In case of any malfunction of an equipment the OEM or the local vendor may be called to carry out necessary repairs.

The maintenance of the building is carried out by the University Maintenance Department.
A team of cleaners is available the week days. The team is responsible for dusting and cleaning the offices corridors, laboratories, toilets and the window glasses.

D.2 Upgradation of Facilities

A full-time laboratory manager, maintains laboratory equipment and supplies. Each lab is supplied by a log book. Any faulty equipment is reported by faculty members in the log book with date, name and serial number of the equipment. Once the equipment is fixed the engineer completes the log book by dating and signing the form.

E. Library Services

The central library of UoH is maintained by the Deanship of Library Affairs and its services are available to all the faculty members and students. The central library has wide range of books and journals related to Electrical Engineering. In addition to main University library, College of Engineering has a small library of its own inside the college of engineering building.

Library material in main University Library is shelved in open stacks using the Dewey Decimal Classification Scheme. The Library collection is accessible to all faculty members and students during the weekday work hours. Professional librarians are available during working hours in order to provide any assistance as needed by library users.
All faculty members and students also have access to Saudi Digital Library (SDL) where it provides access to all the major databases such as, IEEE Xplore, ACM Digital Library, Science Direct, Springer, Taylor & Francis Wiley, Oxford etc. and numerous more.

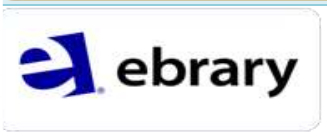
All library digital services are accessible through personal account of the faculty members as well as the students. All essential books required by the program are available in the library.

The faculty members and the students have access to the world's major providers of scientific, technical, and medical information data bases and online versions of many journals including those depicted in the following Table 7- 4.

Table 7- 4. Database Menu

Saudi Digital Library	
	ProQuest Central
	Web of Science® - ISI Thomson Reuters
	IEEE/IEE
	Math Science
	Wiley
	Science Direct
	Springer
	Emerald

University of Hail

	British Medical Journals BMJ
	IGI Global
	Economist Historical Archive
	eBrary
	Jaypee
	AAAS/Science
	CAB Reviews - CABI
	Emerald
	Computing - ProQuest
	OECD
	American Society of Civil Engineers - جمعية الأمريكية للمهندسين المدنيين

	Safari
	Nature Publisher Group
	Oxford Journals - Oxford University
	Nutrition and Food Science - CABI
	AIP - Scitation
	MyiLibrary
	قاعدة رسائل دار المنظومة
	الجامع الكبير Al Jamea
	AskZad
	مكتبة نون(Nooon Books)
	Edu Search
	Eco Link

University of Hail islamic info	قاعدة العلوم الإسلامية والقانونية Islamic Info
AraBase	اللغة العربية والأدب والعلوم الإنسانية_ Arab Base
Wolters Kluwer Health | OvidSP	Ovid
ACCESS Medicine	Access Medicine
RSC Publishing	Royal Society of Chemistry -RSC- جمعية الملكية للكيمياء
GALE CENGAGE Learning	Gale Databases
Taylor & Francis Taylor & Francis Group	Taylor & Francis
UpToDate ONLINE	UpToDate
SAGE journals	SAGE
OXFORD	OXFORD
CAMBRIDGE JOURNALS	Cambridge
nature	Nature

F. Overall Comments on Facilities

All laboratory and library facilities are well suited to serve their purpose. These facilities are provided to safely accomplish the program educational objectives and provide a conducive learning environment. Excellen classrooms with high speed internet connections, laboratories and associated equipment are available to foste faculty-student interaction and to create a climate that encourages professional development and professiona activities. Computing and information infrastructures are in place to support the instructional and scholarly activities of the faculty as well as the students.

The University Office performs annual safety audits of each building. The audits include offices, classrooms laboratories, storage and shipping areas, and building utilities (electricity, water, sewer, heat/ac, elevators, fire etc.). Each program must maintain records of maintenance and calibration of equipment owned by and used by the program. This includes office equipment (copiers, fax machines, scanners, and printers) and laboratory equipment.

Graduates employment opportunities

Electrical engineering has wide applications in manufacturing, service, commercial, and governmental sectors. Rapid Electronic development in the Kingdom of Saudi Arabia definitely requires an increasing number of competent and well-trained electrical engineers.

Typical industries and organizations, which employ mechanical engineers include:

- Electrical/Electronic industries
- Electrical power generation and distribution
- Automation and Control
- Telecommunications
- Defense
- Oil & Gas
- Food processing industries
- Health systems management
- Trading, logistics and transportation industries
- Banking and service organizations
- Training, research and development institution

EQUIPMENT

LIST OF EQUIPMENT AVAILABLE IN DIFFERENT LABORATORIES

1. Electrical Energy Machines Lab

ELECTRIC ENERGY MACHINES LAB-Inventory			
S. No	**Description**	**Model #**	**Number of Units**
1	Multimeter Peak Tech	3315	19
2	Watt meters	CA405	9
3	Motor Protection Switch	732-83	6
4	Three pole ON/OFF Switch	731-42	10
5	Multi Fuction Measurement Instrument	727-230	18
6	Sychronizing Indicator	731-62	8
7	Double Frequency Meter	727-27	4
8	Synchronoscope	727-28	5
9	Field Regulator Generator	732-66	5
10	Field Regulator Motor	732-65	8
11	Three Phase Transformer	733-90	6
12	Single Phase Transformer	733-97	5
13	Inductor Load	732-42	8
14	Resistive Load	733-10	7
15	Capacitive Load	733-11	8
17	Rotor Starter	732-99	7
18	Star Delta Switch	731-47	5
19	Star Delta Reversing Switch	731-48	2
23	Frequency Meter		4
24	Volt Meter		2
27	Starter	732-64	1
33	Transformer	726-80	1
34	Reversing Switch	731-49	2
36	Transformer	45-90	1
37	Multi Function Meter		2
38	Field Regulator Motor		2
39	Contact unit		4

40	Tacho Generator		3
41	Blocking Gear		6
42	Three Phase transformer		3
43	Single Phase transformer		2
44	Resistive load		2
45	Starter		1
46	Switch three phase pole		1
47	AC power Supply		2
48	LD Didactic GNBH		2
49	capacitive load		2
50	LD Didactic GNBH		2
51	Inductive Load		1
52	DC Multifinction machine		18
53	Sychronous machines		5
54	Bifilar wound machine		3
55	Reluctance motor		6
56	Square cage motor		7
57	Dc shunt wound machine		3
58	Repulsion motor		6
59	Multi Function Machine		7

2. Power Electronics Lab

POWER ELECTRONICS LAB-Inventory			
S. No	**Description**	**Model #**	**Number of Units**
1	Diode/thyristor branch pair	73508	11
2	Thyristor 12A/1000V	73503	10
3	Triac	73504	12
4	Diode 11A/1000V	73502	2
5	Schuko socket	729061	11
6	Phase control noise filter 3x4.5A	735190	6
7	Gate trigger switch	73516	1
8	Switching logic	73515	1
9	Selenium rectifier 25V/10A	73501	3

10	Switch TPEE POL	73142	1
11	Industrial frequency converter 300v	735312	3
12	Transformer SMP	735105	5
13	Final control element 115-230V	73422	3
14	Voltage divider 20:1	73420	3
15	IGBT 1000V/10A	735346	12
16	MOSFET 500V/10A	735342	5
17	Gain and offset adjust	73419	3
18	Bulb socket E14	72909	4
19	PID Controller	734061	6
20	Sensor cassy	524010	2
21	Machine test system 0.3	731989USB01	3
22	Pulse group control unit	73514	5
23	Reference variable generator	73402	4
24	DC power supply +_15V/3A	72686	3
25	Control unit PWM PFM	735341	6
26	Control unit 1.0	73255	1
27	Multifunction measuring instrument	727230USB	3
28	Load power electronic	73509	4
29	Temperature controlled system 45V	73511	6
30	Isolation amplifier four channels	735261	4
31	Control unit six pulse digital	735135	4
32	Trigger point limiter	73520	5
33	Absolute value circuit	73423	3
34	Transformer 54/90 3N	72680	4
35	Fuse three fold superfast acting	73518	5
36	Gate trigger switch	73516	2
7	Switching logic	73515	
38	Function generator 200 kHz	726961	6
39	Socket	729061	7
40	Run up control unit	73517	3
41	Control transformer AC	73524	3
42	Adaptive PI controller	734065	2
43	Oscilloscope HAMEG		3
44	3 Phase transformer 6/10 +23/0	521291	4

45	Servomotor	731989-02	3
46	Rheostat		3
47	Shunt wound machine	66286	4
48	Squirrel cage motor	66643	3
49	Tacho generator	73101	3
50	Multimeter Peaktech	3315	13

3. Control Engineering Lab

Control Engineering Lab Inventory			
S. No	**Description**	**Serial #**	**Number of Units**
1	Apple Computers	A550601046-57	11
2	Lab work benches with power installed		11
3	Simulated control system module	W632712103	10
4	Transfer element module	W726107117	9
5	Test Function Generator module		10
6	Measurement Indicator module		10
7	AC/DC Stabilizer module	W633310205	8
8	DC Generator with Tacho Generator mod	w634307004	10
9	Power Amplifier module	W630515447	11
10	PID Controller module	W719907097	9
11	DC Power Supply +-15V module	W706106001	4
12	Sensor Cassy 2 module	W1009426	11
13	Function Module module	W633310215	9
14	Torque Synchro Module	W633808173	17
15	Servo Set Point Potentiometer Module	W633310283	9
16	Differential Pressure Transducer Module	WR00003074	1
17	Liquid Controller System Module	WA00016379	1
18	Temperature Control system Module		1
19	Motor Generator Set Module		1
20	On Load Switch Module		1
21	Laser Printer	CNCK831065	1
22	Laser Printer		1

23	Multimedia Projector Fitted to Ceiling		1
24	Digital Multimeters		2
25	Projector Screen Fitted		1
26	White Board Fitted		1
27	Office Table		1
28	Textile Revolving Chairs		17
29	Textile Revolving Chairs		4
30	Cupboard Standard		1
31	Cupboard Glass Doors		1
32	Chest of Drawers		1
33	Chest of Drawers		2

4. Electric Circuits and Digital Logic Lab

Electric Circuits and Digital Logic Lab Inventory			
S. No	**Description**	**Model #**	**Number of Units**
1	Computer HP LE1901	Desk Top	13
2	Digital Oscilloscope Peak Tech	1215	10
3	Function Generators Peak Tech	4030	9
4	DC Dual Power Supply	6010D	10
5	Digital Multimeters Peak Tech	3315	20
6	3 Phase Xtra low voltage Transformer	52129	2
7	Experiment Trnasformer	725332G	12
8	Watt Meter	531831	10
9	Resistance Substitution Box	236A	3
10	Capacitance Substitution Box	237	3
11	Lab Inductance Box	3270	23
12	Proto Board Digital Lab	IDL800	3
13	Proto Board	PB503	3
14	Proto Board MCP	M21-500	1
15	Analogue Multimeters	531-120	10
16	Stop Watches Casio	HS-3	8
17	Work Benches Power Fitted		10
18	Work Tables		6
19	White Board Fitted		1

5. Computer Laboratory

Computer Lab			
S.No.	**Description**	**Model**	**Number of Units**
1.	HP Desk Top PCs	All in one Business PC	25

6. Electric Circuits Laboratory

Electric Circuits Lab Inventory			
S. No.	**Description**	**Model #**	**Number of Units**
1	Oscilloscopes PINTEK	PS355	12
2	Function Generators	1016	10
3	Dual Power Supplies Peak Tech	6010D	9
4	Apple computers+keyboards+mice	IMAC	6
5	Work Stations with breadboards and electrical fittings.		12
6	Multimeters Peak Tech	3315USB	11
7	Smart Board	SB68V	1
8	White Board		1
9	Sitting Stools Textile Look	Textile	7
10	Fire Extinguisher Powder 6Kgs	Red	1

7. Computer Lab (Digital System Engineering)

S No	Description	No of Units
1	Computers HP Pro one	9
2.	Peak tech Oscilloscope	5
3.	Peak tech Function Generators	5

4.	Peak tech DMM Desk Top	5
5.	Peak tech DMM 3315	5
6.	Communication Transmission line Labvolt	4
7.	Flight Development Board	13
8.	Flight 86 Trainer	29

8. Electronics and Digital Logic Laboratory

Electronics Lab Inventory			
S. No.	**Description**	**Model #**	**Number of Units**
1	Computers	Desk Top	10
2	Oscilloscope Peak Tech Digital	1170	7
3	Oscilloscope Instek	GOS6103	1
4	Oscilloscope HAMEG	HM507	4
5	Function Generator Peak Tech	1016	13
6	Dual Power Supply Instek	GPC3030DQ	8
7	Work Benches	Fitted	24

9. Digital System and Communication Laboratory

S No.	Description	No of Units
1	Computers HP Pro One 400	11
2.	Work Bench	24
3.	Emona Telecom Trainer	8
4.	Peak Tech Oscilloscope 1170	8
5	Spectrum Analyser	2

6.	Peak Tech Function Generator	10
7.	NI Embedded Controller 8135	1
8.	NI Elvis II+	1
9.	NI USRP 2920	2