Department of Electrical Engineering

2007 Study Plan

➢ *VISION*

The vision of the Department is to be well recognized regionally and internationally for excellence in its educational programs, pioneering research activities and in full compliance to the international standards of quality assurance.

➢ *MISSION*

The mission of the Department is to provide high quality and effective education in the field of electrical engineering; Materialize the partnership with industry by meeting the ever changing needs of the market for future engineers; Immunize the students with knowledge and experience in their field of specialization to contribute in the making of professional leaders.

➢ *DEPARTMENT EDUCATIONAL OBJECTIVES*

The educational objectives of the Electrical Engineering Program at JUST are to produce Electrical Engineers who

- Have strong basic knowledge of electrical engineering principles along with the required supporting knowledge of mathematics, science, computing, and engineering fundamentals.
- Have the needed communication skills to organize and present information effectively whether orally, written or graphically.
- Have an appreciation for the broad spectrum of issues arising in professional practice, including teamwork, leadership, ethics, service, safety, economics, and professional organizations.
- Have the basic skills needed to perform and design experimental projects, and the ability to identify contemporary challenges and propose a plan of action to solve them.
- Have sufficient breadth and depth for successful subsequent graduate studies, and lifelong learning.

➢ *BSC PROGRAM LEARNING OUTCOMES*

a) An ability to apply knowledge of mathematics, science and engineering.

b) An ability to design and conduct experiments, as well as to analyze and interpret data.

c) An ability to design a system, component, or process to meet desired needs.

d) An ability to function in teams.

e) An ability to identify, formulate and solve engineering problems.

f) An understanding of professional and ethical responsibility.

g) An ability to communicate effectively.

h) A broad education necessary to understand the impact of electrical engineering solutions in a global and societal context.

i) A recognition of the need for an ability to engage in life-long learning.

j) A knowledge of contemporary issues.

k) An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

- **These constitute the well-known ABET a-k criteria.**

UNDERGRADUATE CURRICULUM

➢ *COURSE CODING AND NUMBERING*

A five- or six-character code and number is used to designate courses as in the following table:

Department	Level/Year	Field	Sequence
Two- or Three-Letter Code	X (Number)	Y (Number)	Z (Number)

The Department codes at the Faculty of Engineering are as in the following table:

Code	Department
EE	***Electrical Engineering***
AE	Aeronautical Engineering
CE	Civil Engineering
ME	Mechanical Engineering

Code	Department
NE	Nuclear Engineering
IE	Industrial Engineering
ChE	Chemical Engineering
BME	Biomedical Engineering

Therefore, courses in Electrical Engineering will have numbers of the form **EE** XYZ, where the coding of X, Y and Z will be described in more detail later.

➢ *SPECIALIZATIONS*

The Department of Electrical Engineering offers the bachelor of science (B.Sc.) degree after successfully passing 159 credit hours. The B.Sc. degree in electrical engineering can be obtained in two optional specializations:

* Communications and Electronics
* Power and Control

➢ *DEGREE REQUIREMENTS*

A Bachelor of Science degree in Electrical Engineering at JUST is awarded in accordance with the Statute stated in the JUST regulations for B.Sc. awarding issued by the Deans' council based on the 1987 law for awarding scientific degrees and certifications at JUST, and after the successful completion of 159 credit hours, distributed as indicated in Tables 1 and 2.

Table 1. Distribution of Credit hours

Classification		Credit Hours		
		Compulsory	Elective	Total
University Requirements		16	9	25
Faculty Requirements		32	-	32
Department Requirements	**Department Core**	75		75
	Specialization Core	21		21
	Specialization Elective		6	6
	Total =	**123**	**36**	**159**

Table 2. Courses Classification

Source of Courses		Credit Hours	Percentage
Humanities	Theory	24	15.09
	Practical	1	0.63
Basic Sciences	Theory	30	18.87
	Practical	2	1.26
General Eng. Sciences	Theory	8	5.03
	Practical	1	0.63
Electrical Eng. Science	Theory	84	52.83
	Practical	9	5.66
Total	Theory	146	91.82
	Practical	13	8.18

➢ *UNIVERSITY REQUIREMENTS (25 CREDIT HOURS)*

University requirements consist of 25 credit hours split into 16 compulsory credit hours and 9 elective credit hours.

○ *COMPULSORY UNIVERSITY REQUIREMENTS (16 CREDIT HOURS)*

Course Code & No.	Course Title	Cr. Hr.	Theory	Practical	Pre-/ Co-Requisite
Arb 101	Arabic Language	3	3		
Arb 103	○○○Applied Arabic Language Studies	1		3	
Eng 111 (1)	English Language	3	3		Pass Eng 99
Eng 112	Communication Skills II	3	3		Eng 111
CIS 100 (2)	Computer Skills	3	3		
MS100 (3)	Military Sciences	3	3		
	Total	**16**			

1) A student who passes the English Language Placement Test with a grade > 80% is exempted from both Eng 099 and Eng. 111, while a student who passes the English Placement Test with a grade between 50% and 80% is exempted from Eng 099 only.
2) A student who passes the Computer Skills Placement Test with a grade > 50% is exempted from CIS 100.
3) This course is required from Jordanian students only; graded on Pass/Fail basis. Students graduating from Royal Military faculty and military candidates school and equivalent institutes are exempted from taking this course: Non-Jordanian Arabic Speaking students are required to take a substitute for this course from the elective courses and in this case the grade of this course is included in their grade point average (GPA).

Notice: All non Arabic Speaking foreign students in the University are required to study two courses in Arabic language as shown below:

Course Code & No.	Course Name	Cr. Hr.
Arb101A	Fundamentals of Arabic Language (for non Arabic speaking students as a substitute for the course Arb101 Arabic Language)	3
Arb103A	Fundamentals of Arabic Language Lab for non Arabic speaking students as a substitute for the course Arb103 ○○○Applied Arabic Language Studies)	1

ELECTIVE UNIVERSITY REQUIREMENTS (9 CREDIT HOURS)

The university elective courses are three courses with a total of 9 Cr. Table 3 lists these courses.

Table 3. University Elective Courses for Engineering Students

Course No.	Course title	Cr. Hr.	Lecture	Lab.	Prerequisite or Corequisit
ES 103	Environment Protection (for non Environment Sciences students)	3	3	0	
PH 200	First Aid and Emergency Procedure (for non Medicine, non Nursing, and non Midwifery students)	3	3	0	
PH 104	Community Health and Nutrition (for non Medicine, non Nursing, and non Midwifery students)	3	3	0	
PHAR 104	Drugs and Medical Plants (for non Medicine, and non Pharmacy students))	3	3	0	
NUR 100	Health Promotion (for non Medicine, non Nursing, and non Midwifery students)	3	3	0	
ADS 100	Oral and Dental Health (for non Dentistry and non Dentistry Sciences students)	3	3	0	
PP 200	Home Gardens (for non Agriculture students)	3	3	0	
PP 201	Bee Keeping (for non Agriculture students)	3	3	0	
VM 211	Animal Health (for non Veterinary Medicine and non Agriculture students)	3	3	0	
VM 212	Pet Animal Care (for non VM and Agriculture students)	3	3	0	
HSS 112	Hadith Shareef	3	3	0	
HSS 113	Aqideh	3	3	0	
HS 114	Fekeh	3	3	0	
HSS 115	Islam and Recent Problems	3	3	0	
HSS 116	Islamic Economy System	3	3	0	
HSS 121	Principles of Sociology	3	3	0	
HSS 126	Principles of Psychology	3	3	0	
HSS 127	Educational Technology	3	3	0	
HSS 128	National Education	3	3	0	
HSS 131	Islamic Civilization	3	3	0	
HSS 132	The History of the City of Jerusalem	3	3	0	
HSS 133	Civilization and Recent Cultures	3	3	0	
HSS 141	Introduction to Economics (for non CIS students)	3	3	0	
HSS 142	Library and Information Research	3	3	0	
HSS 151	Introduction to Management Sciences (for non CIS students)	3	3	0	
HSS 161	Contemporary Problems	3	3	0	
HSS 166	Man and Science	3	3	0	
HSS 182	Studies on Women	3	3	0	

HSS 250	Music History (in English)	3	3	0	
HSS 211	Introduction to Sociology in English	3	3	0	
HSS 212	Arab Society	3	3	0	
HSS 213	Individual and Society	3	3	0	
HSS 216	International Global Issues	3	3	0	
HSS 221	Introduction to Psychology in English	3	3	0	
HSS 222	Creativity and Problems Solving	3	3	0	
HSS 224	Leader ship and Communication Skills	3	3	0	
HSS 231	History of Science in Islam	3	3	0	
HSS 241	Economy in the Third World	3	3	0	
HSS 242	Information and Research	3	3	0	
HSS 429	Behavioral Science and Dealing with Children	3	3	0	
PT 100	Health and Life Styles (for non physical therapy students)	3	3	0	
ME 211	Fundamentals of Automobile Engineering (for non ME students)	3	3	0	
NR 200	Natural Resources and Human Being	3	3	0	
NF 177	Food Preservation (in English)	3	3	0	

➢ *FACULTY REQUIREMENTS (32 CREDIT HOURS)*

The Faculty of Engineering requirements consist of 32 Credit Hours distributed as follows:

Course Code & No.	Course Title	Cr. Hr.	Theory	Practical	Pre-/Co-Requisite
Math101	Calculus I	3	3		----
Math 102	Calculus II	3	3		Math 101
Math 201	Intermediate Analysis	3	3		Math 102
Math 203	Ordinary Differential Equations	3	3		Math 102
Phys 101	General Physics I	3	3		----
Phys 102	General Physics II	3	3		Phys 101
Phys 107	General Physics Lab	1		3	Co Phys 102
Chem 101	General Chemistry I	3	3		----
Chem 102	General Chemistry II	3	3		Chem 101
Chem 107	General Chemistry Lab	1		3	Co Chem 102
CS 115	Programming in C++ Language	3	3		CIS 100
EE 202	Communication Skills for Engineers	2	2		2nd Year Standing
ChE 400	Professional Ethics for Engineers	1	1		90 credits
	Total	**32**			

➢ *DEPARTMENT REQUIREMENTS (102 CREDIT HOURS)*

○ *COURSE CODING AND NUMBERING*

Electrical Engineering courses are coded and numbered in such a manner to indicate the subject area and the level. Each course code and number is composed of a two-letter code and a 3-digit number.

- The "EE" label denotes ***Electrical Engineering***.
- The leftmost digit denotes the level of the course according to student's study plan as in the following table:

Leftmost Digit	Level of Course
1	First year
2	Second year
3	Third year
4	Fourth year

5	Fifth year.

- The middle digit denotes the course subject as in the following table:

Middle Digit	Specialization
0	General Electrical Engineering, Eelectromagnetics
1	Electric Circuits
2	Electronics
3	Electromechanical Systems
4	Control, Measurements
5	Communications
6	Signal Processing
7	Networks
8	Power Systems
9	Engineering Training, Graduation Projects, Special Topics

- The rightmost digit distinguishes different courses under the same subject.

Example

Communication Systems Lab	EE 452		
EE	4	5	2
Department of Electrical Engineering	Fourth year	Communications	

○ *DEPARTMENT CORE COURSES (75 CREDIT HOURS)*

Course Code & No.	Course Title	Cr. Hr.	Theory	Practical	Pre-/Co-Requisite
EE 100	Introduction to Electrical Engineering	3	2	2	CIS 100, Co-Phys 102
ME 200	Engineering Drawing A	1		3	CIS 100
EE 207	Electromagnetics I	3	3		Phys 102, Math 201, Math 203
EE 210	Electric Circuits I	3	3		EE 100, Co-Math 203
EE 213	Electric Circuits Lab	1		3	EE 210
ME 215	Engineering Mechanics	3	3		Phy 101
EE 220	Introduction to Electronics	3	3		Co-EE 210
EE 240	Introduction to Linear Systems	3	3		EE 100, Math

					201
EE 260	Signal and System Analysis	3	3		EE 210, Co-EE 240
EE 305	Numerical Methods for Engineers	3	3		CS 115, Math 203
EE 307	Electromagnetics II	3	3		EE 207
EE 310	Electric Circuits II	3	3		EE 210, EE 260
EE 320	Electronic Circuits	3	3		EE 220
EE 322	Electronic Circuits Lab	1		3	EE 213, EE 320
EE 332	Electric Machines	3	3		EE 207, EE 310
EE 341	Instrumentation and Measurements	3	3		EE 320, EE 260
IE 341	Engineering Economy	2	2		Math 201
EE 345	Introduction to Microcontrollers	3	3		EE 100
EE 346	Microcontrollers Lab	1		3	EE 345
EE 360	Random Signal Analysis	3	3		EE 260
EE 420	Digital Electronic Circuits	3	3		EE 320
EE 440	Control Systems	3	3		EE 260
EE 445	Microcontrollers and Embedded Systems	3	2	2	EE 322, EE 346
EE 450	Communication Systems	3	3		EE 360
EE 452	Communication Systems Lab	1		3	EE 322, EE 450
EE 480	Power Systems	3	3		EE 305, EE 332
EE 482	Electromechanical Systems Lab	1		3	EE 213, EE 480
EE 490	Engineering Training	3			Passing 117 credit hours
EE 591	Graduation Project I	1	1		Passing 114 credit hours
EE 592	Graduation Project II	3	2	2	EE 591
	Total	**75**			

○ *CORE COURSES FOR COMMUNICATIONS AND ELECTRONICS (21 CREDIT HOURS)*

Course Code & No.	Course Title	Cr. Hr.	Theory	Practical	Pre-/Co-Requisite
EE 407	Radiowave propagation and Antennas	3	3		EE 307
EE 422	Digital Electronic Circuits Lab	1		3	EE 420
EE 460	Digital Signal Processing	3	3		EE 305, EE 360
EE 462	Digital Signal Processing Lab	1		3	EE 460
EE 524	Electronic Communication Circuits	3	3		EE 320, EE 450
EE 528	Microwave Electronics	3	3		EE 307, EE 320
EE 551	Digital Communications	3	3		EE 450
EE 552	Digital Communications Lab	1		3	EE 452, Co-EE 551
EE 559	Introduction to Wireless Communications	3	3		EE 551
	Total	**21**			

ORE COURSES FOR POWER AND CONTROL (21 CREDIT HOURS)

Course Code & No.	Course Title	Cr. Hr.	Theory	Practical	Pre-/Co-Requisite
EE 435	Power Electronics	3	3		EE 320, EE 332
EE 436	Power Electronics Lab	1		3	EE 322, EE 435
EE 442	Control Systems Lab	1		3	EE 440
EE 447	Digital Control	3	3		EE 440
EE 483	Power Transmission and Distribution	3	3		EE 480
EE 531	Electric Drive Systems	3	3		EE 435, EE 440
EE 547	Computer Control	3	3		EE 445, EE 447
EE 580	Power System Analysis	3	3		EE 480
EE 582	Power Systems Lab	1		3	EE 482, Co-EE 580
	Total	**21**			

○ *ELECTIVE COURSES FOR COMMUNICATIONS AND ELECTRONICS (6 CREDIT HOURS FROM THE FOLLOWING TABLE*)*

Course Code & No.	Course Title	Cr. Hr.	Theory	Practical	Pre-/Co-Requisite
EE 507	Antennas	3	3		EE 407
EE 508	Introduction to Electromagnetic	3	3		EE 307, EE 320

	Compatibility				
EE 509	Microwave Engineering	3	3		EE 307
EE 521	Solid State Electronics	3	3		EE 320
EE 522	Optoelectronics	3	3		EE 320
EE 525	Electronic Circuit Design	3	3		EE 320
EE 526	Semiconductor Devices	3	3		EE 320
EE 529	CMOS Circuit Design	3	3		EE 420
EE 555	Optical Fiber Communication Systems	3	3		EE 307, EE 551
EE 558	Satellite Communication Systems	3	3		EE 551
EE 565	Digital Speech Processing	3	3		EE 460
EE 566	Digital Image Processing	3	3		EE 460
EE 570	Communication Networks	3	3		EE 450
EE 595	Special Topics in Communications & Electronics	3	3		EE 450

ELECTIVE COURSES FOR POWER AND CONTROL (6 CREDIT HOURS FROM THE FOLLOWING TABLE)*

Course Code & No.	Course Title	Cr. Hr.	Theory	Practical	Pre-/Co-Requisite
EE 537	Switched-Mode Power Supplies	3	3		EE 435, EE 440
EE 538	High Voltage Engineering	3	3		EE 480
EE 539	Advanced Electric Machines	3	3		EE 332
EE 540	Introduction to Robotics	3	3		EE 447
EE 541	Sensors and Actuators	3	3		EE 320, EE 332, EE 440
EE 546	Power System Control	3	3		EE 440, EE 480
EE 586	Power System Protection	3	3		EE 580
EE 596	Special Topics in Power and Control	3	3		EE 480

* A student in each of the two specializations above can study a maximum of 3 credit hours from 400- or 500-level courses in other specializations in the Department of Electrical Engineering.

➢ *ELECTRICAL ENGINEERING COURSES*

Course Code & No.	Course Title	Cr. Hr.	Th./Pr.	Pre-/Co-Requisite	Category
EE 100	Introduction to Electrical Engineering	3	2H,2L	CIS 100, Co-Phy 102	Dept. Compulsory
EE 202	Communication Skills for Engineers	2	2H	2nd Year Standing	Fac. Compulsory
EE 207	Electromagnetics I	3	3H	Phy 102, Math 201, Math 203	Dept. Compulsory
EE 210	Electric Circuits I	3	3H	EE 100, Co-Math 203	Dept. Compulsory
EE 212	Electric Circuit Analysis	3	3H	Phy 102, Co-Math 203	Non-EE Students
EE 213	Electric Circuits Lab	1	3L	EE 210	Dept. Compulsory
EE 220	Introduction to Electronics	3	3H	Co-EE 210	Dept. Compulsory
EE 240	Introduction to Linear Systems	3	3H	EE 100, Math 201	Dept. Compulsory
EE 260	Signal and System Analysis	3	3H	EE 210, Co-EE 240	Dept. Compulsory
EE 303	Fundamentals of Electrical Engineering	3	3H	Math 102, Phy 102	Non-EE Students
EE 304	Electric Drives	3	3H	EE 212 or EE 303	Non-EE Students
EE 305	Numerical Methods for Engineers	3	3H	CS 115, Math 203	Dept. Compulsory
EE 306	Electrical Engineering Lab	1	3L	EE 304	Non-EE Students
EE 307	Electromagnetics II	3	3H	EE 207	Dept. Compulsory
EE 310	Electric Circuits II	3	3H	EE 210, EE 260	Dept. Compulsory
EE 320	Electronic Circuits	3	3H	EE 220	Dept. Compulsory
EE 321	Fundamentals of Electronics	3	3H	EE 212 or EE 303	Non-EE Students
EE 322	Electronic Circuits Lab	1	3L	EE 213, EE 320	Dept. Compulsory

EE 332	Electric Machines	3	3H	EE 207, EE 310	Dept. Compulsory
EE 341	Instrumentation and Measurements	3	3	EE 320, EE 260	Dept. Compulsory
EE 345	Introduction to Microcontrollers	3	3H	EE 100	Dept. Compulsory
EE 346	Micrcocontrollers Lab	1	3L	EE 345	Dept. Compulsory
EE 360	Random Signal Analysis	3	3H	EE 260	Dept. Compulsory
EE 407	Radiowave Propagation & Antennas	3	3H	EE 307	Comm. & Electro. Compulsory
EE 420	Digital Electronic Circuits	3	3H	EE 320	Dept. Compulsory
EE 422	Digital Electronic Circuits Lab	1	3L	EE 420	Comm. & Electro. Compulsory
EE 435	Power Electronics	3	3H	EE 320 EE 332	P&C Compulsory
EE 436	Power Electronics Lab	1	3L	EE 322, EE 435	P&C Compulsory
EE 440	Control Systems	3	3H	EE 260	Dept. Compulsory
EE 442	Control Systems Lab	1	3L	EE 440	P&C Compulsory
EE 445	Microcontrollers and Embedded Systems	3	2H,2L	EE 322, EE 346	Dept. Compulsory
EE 447	Digital Control	3	3H	EE 440	P&C Compulsory
EE 450	Communication Systems	3	3H	EE 360	Dept. Compulsory
EE 452	Communication Systems Lab	1	3L	EE 322, EE 450	Dept. Compulsory
EE 460	Digital Signal Processing	3	3H	EE 305, EE 360	Comm. & Electro. Compulsory
EE 462	Digital Signal Processing Lab	1	3L	EE 460	Comm. & Electro. Compulsory
EE 480	Power Systems	3	3H	EE 305, EE 332	Dept. Compulsory
EE 482	Electromechanical Systems Lab	1	3L	EE 213, EE 480	Dept. Compulsory
EE 483	Power Transmission and Distribution	3	3H	EE 480	P&C Compulsory
EE 490	Engineering Training	3		Passing 117 credit hours	Dept. Compulsory
EE 507	Antennas	3	3H	EE 407	Comm. & Electro. Elective
EE 508	Introduction to Electromagnetic Compatibility	3	3H	EE 307, EE 320	Comm. & Electro. Elective

EE 509	Microwave Engineering	3	3H	EE 307	Comm. & Electro. Elective
EE 521	Solid State Electronics	3	3H	EE 320	Comm. & Electro. Elective
EE 522	Optoelectronics	3	3H	EE 320	Comm. & Electro. Elective
EE 524	Electronic Communication Circuits	3	3H	EE 320, EE 450	Comm. & Electro. Complusory
EE 525	Electronic Circuit Design	3	3H	EE 320	Comm. & Electro. Elective
EE 526	Semiconductor Devices	3	3H	EE 320	Comm. & Electro. Elective
EE 528	Microwave Electronics	3	3H	EE 307, EE 320	Comm. & Electro. Complusory
EE 529	CMOS Circuit Design	3	3H	EE 420	Comm. & Electro. Elective
EE 531	Electric Drive Systems	3	3H	EE 435, EE 440	P&C Compulsory
EE 537	Switched-Mode Power Supplies	3	3H	EE 435, EE 440	P&C Elective
EE 538	High Voltage Engineering	3	3H	EE 480	P&C Elective
EE 539	Advanced Electric Machines	3	3H	EE 332	P&C Elective
EE 540	Introduction to Robotics	3	3H	EE 447	P&C Elective
EE 541	Sensors and Actuators	3	3H	EE 320, EE 332, EE 440	P&C Elective
EE 546	Power System Control	3	3H	EE 440, EE 480	P&C Elective
EE 547	Computer Control	3	3H	EE 445, EE 447	P&C Compulsory
EE 551	Digital Communications	3	3H	EE 450	Comm. & Electro. Complusory
EE 552	Digital Communications Lab	1	3L	EE 452, Co-EE 551	Comm. & Electro. Complusory
EE 555	Optical Fiber Communication Systems	3	3H	EE 307, EE 551	Comm. & Electro. Elective
EE 558	Satellite Communication Systems	3	3H	EE 551	Comm. & Electro. Elective
EE 559	Introduction to Wireless Communications	3	3H	EE 551	Comm. & Electro. Compulsory
EE 565	Digital Speech Processing	3	3H	EE 460	Comm. & Electro. Elective

EE 566	Digital Image Processing	3	3H	EE 460	Comm. & Electro. Elective
EE 570	Communication Networks	3	3H	EE 450	Comm. & Electro. Elective
EE 580	Power System Analysis	3	3H	EE 480	P&C Compulsory
EE 582	Power Systems Lab	1	3L	EE 482, Co-EE 580	P&C Compulsory
EE 586	Power System Protection	3	3H	EE 580	P&C Elective
EE 591	Graduation Project I	1	1H	Passing 114 credit hours	Dept. Compulsory
EE 592	Graduation Project II	3	2H,2L	EE 591	Dept. Compulsory
EE 595	Special Topics in Communications & Electronics	3	3H	EE 450	Comm. & Electro. Elective
EE 596	Special Topics in Power and Control	3	3H	EE 480	P&C Elective

➢ *COURSE DESCRIPTIONS*

EE 100	**Introduction to Electrical Engineering**	**3C,2H,2L**
	Engineering profession. Nature and scope of Electrical Engineering. Engineering design and problem solving. Study skills. Library search. Department facilities and resources available. Accreditation criteria. Careers and job prospects. Introduction to electric and logic circuits and the use of SPICE to simulate and solve such circuits. Matlab programming and applications in linear algebra: solving linear and nonlinear equations and ordinary differential equations, plotting of functions and curve fitting, Introduction to statistical data analysis. Experiments to familiarize the students with the introductory lab equipments.	
Pre-/Co-Requisites:	CIS 100, Co-Phys 102	Department Compulsory
EE 202	**Communication Skills for Engineers**	**2C,2H**
	Managing technical data and writing for the workplace. namely, memorandums, letters, applications, and research projects. Building presentation skills through several individual and team presentations, focusing on style of delivery, and interaction with audience. Job interview skills.	
Pre-/Co-Requisites:	2nd Year Standing	Faculty Compulsory
EE 207	**Electromagnetics I**	**3C,3H**
	Vector analysis. Electrostatic fields. Magnetostatic fields. Solution of Laplace's and Poisson's equations. Faraday's law and applications. Maxwell's equations.	
Pre-/Co-Requisites:	Phys 102, Math 201, Math 203	Department Compulsory
EE 210	**Electric Circuits I**	**3C,3H**
	Units and definitions. Experimental laws and simple circuits. Useful techniques of circuit analysis. Inductance and capacitance. Source-free RL and RC circuits. Application of the unit step forcing function. RLC circuits. Sinusoidal forcing function. Phasor concept. Sinusoidal steady-state response.	
Pre-/Co-Requisites:	EE 100, Co-Math 203	Department Compulsory
EE 212	**Electric Circuit Analysis**	**3C,3H**

	Units and definitions. Experimental laws and simple circuits. Useful techniques of circuit analysis. Inductance and capacitance. Source-free RL and RC circuits. Application of the unit step forcing function. RLC circuits. Sinusoidal forcing function. Phasor concept. Sinusoidal steady-state response.	
Pre-/Co-Requisites:	Phy 102, Co-Math 203	Non-EE Students
EE 213	**Electric Circuits Lab**	**1C,3L**
	Resistors and resistive circuits. Potentiometers. Superposition principle. Thevenin's theorem and maximum power transfer. RLC current and voltage characteristics. Frequency response of RL, RC and RLC circuits. Series and parallel resonant circuits. Lab project.	
Pre-/Co-Requisites:	EE 210	Department Compulsory
EE 220	**Introduction to Electronics**	**3C,3H**
	Semiconductor materials. Intrinsic, N-type and P-type semiconductors. Carriers. Density of state and Fermi function. Distribution of carriers. Drift and diffusion currents. Einstein's relationship. p-n junctions: depletion region, forward and reverse biasing, I-V relationship. Diode circuits and applications. Bipolar junction and field-effect transistors: theory, dc biasing, dc and ac loadlines, symmetrical swing. Small-signal transistor models.	
Pre-/Co-Requisites:	Co-EE 210	Department Compulsory
EE 240	**Introduction to Linear Systems**	**3C,3H**
	Gaussian elimination. The theory of simultaneous linear equations. Orthogonal projections and least squares. Determinants. Complex-valued vectors and matrices. Eigenvalues and eigenvectors. Singular value decomposition. computer applications.	
Pre-/Co-Requisites:	EE 100, Math 201	Department Compulsory
EE 260	**Signal and System Analysis**	**3C,3H**
	Discrete and continuous time systems: classifications, convolution and impulse response. Orthogonal expansions and Fourier series. Fourier transform. Laplace transform. Z-transform. System function. Frequency response. Sampling theorem. Discrete-time Fourier transform. Discrete Fourier transform. Computer applications.	
Pre-/Co-Requisites:	EE 210, Co-EE 240	Department Compulsory
EE 303	**Fundamentals of Electrical Engineering**	**3C,3H**

	Electrical quantities. Circuit principles. Basics of DC and AC analysis. Polyphase circuits. Transformers. Semiconductor diodes. Bipolar transistors. Field effect transistors. Thyristors. Operational amplifiers.	
Pre-/Co-Requisites:	Math 102, Phys 102	Non-EE Students
EE 304	**Electric Drives**	**3C,3H**
	Introduction to electric drives. DC drives. AC drives: induction motors, synchronous motors, reluctance and stepping motors. Servomotor drives.	
Pre-/Co-Requisites:	EE 212 or EE 303	Non-EE Students
EE 305	**Numerical Methods for Engineers**	**3C,3H**
	Machine epsilon. Round-off error. Linear systems of equations. Gauss elimination and iterative methods. Eigenvalue methods. Spline interpolation. Numerical integration. Ordinary and partial differential equations. Nonlinear equations. Zeros of polynomials. One dimensional optimization. Least squares data fitting. Singular value decomposition. Random number generators.	
Pre-/Co-Requisites:	CS 115, Math 203	Department Compulsory
EE 306	**Electrical Engineering Lab**	**1C,3L**
	DC circuits. Diodes, transistors, thyristors and operational amplifiers. Transformers. DC motors. Synchronous motors. Single- and three-phase and induction motors.	
Pre-/Co-Requisites:	EE 304	Non-EE Students
EE 307	**Electromagnetics II**	**3C,3H**
	Maxwell's equations. Plane waves: propagation, reflection and refraction. Transmission lines. Waveguides and resonant cavities. Introduction to antennas.	
Pre-/Co-Requisites:	EE 207	Department Compulsory
EE 310	**Electric Circuits II**	**3C,3H**
	Average power and RMS values. Polyphase circuits. Complex frequency. Frequency response. Magnetically coupled circuits. General two-port networks. Solving circuit problems using Laplace transform. Introduction to electric filters.	
Pre-/Co-Requisites:	EE 210, EE 260	Department Compulsory
EE 320	**Electronic Circuits**	**3C,3H**

	Small signal analysis of BJT and FET amplifiers. Multistage amplifiers. Frequency response of single and multistage amplifiers. Darlington pair amplifiers Differential amplifiers. Operational amplifier theory and applications: summation, subtraction, integration and differentiation. Fiters. Oscillators.	
Pre-/Co-Requisites:	EE 220	Department Compulsory
EE 321	**Fundamentals of Electronics**	**3C,3H**
	Diode circuit analysis (DC&AC). Bipolar junction transistors: theory, circuits and applications. Field effect transistors: theory, circuits and application. Introduction to operational amplifiers and applications.	
Pre-/Co-Requisites:	EE 212 or EE 303	Non-EE Students
EE 322	**Electronic Circuits Lab**	**1C,3L**
	Diode circuits. DC and AC characteristics of BJT and FET amplifiers. Single- and multi-stage amplifiers and their frequency response. Operational amplifiers and applications. Filters. Oscillators. Lab project.	
Pre-/Co-Requisites:	EE 213, EE 320	Department Compulsory
EE 332	**Electric Machines**	**3C,3H**
	Transformers: performance characteristics, three-phase connections, autotransformers. DC machines: performance equations, generator and motor characteristics, starting and speed control of motors. Synchronous machines: generator and motor operation. Three-phase induction motors: operation, performance calculations, starting and speed control. Single phase induction motors. Small synchronous motors. Universal motors.	
Pre-/Co-Requisites:	EE 207, EE 310	Department Compulsory
EE 341	**Instrumentation and Measurements**	**1C,3L**
	Units, Dimensions, and standards; Measurement errors; Statistical analysis of experimental data; Operational amplifier circuits in instrumentation; Transducers: mechanical, thermal, optical; Measurements of basic electrical quantities: electromechanical indicating instruments, electronics multi-meters, digital multi-meters, ac bridges; Digital-signal conditiong: analogue-to-digital convertors, digital-to-analogue converters, sample-and-hold circuits, data acquisition hardware, IEEE 488 instrumentation bus; Oscilloscopes: vertical deflection system, horizontal deflection system, digital storage oscilloscopes; Spectrum analyzers.	

Pre-/Co-Requisites:	EE 320**,** EE 260	Department Compulsory
EE 345	**Introduction to Microcontrollers**	**3C,3H**
	Basics of digital logic systems. Boolean algebra. Combinational circuits. Flip-flops and sequential circuits. Sequential system design and timing diagrams. Computer organization. Memory. Hardware description language. Microcontroller and assembly language programming.	
Pre-/Co-Requisites:	EE 100	Department Compulsory
EE 346	**Microcontrollers Lab**	**1C,3L**
	Experiments using TTL family via implementation of logic functions using AND, OR, and NOT. Implementation of logic functions using MSI chips such as encoders, decoders, multiplexers, and EPROMS. Software and hardware experiments with a microcontroller system. Assembly language programming and simple input/output interfacing. Lab project.	
Pre-/Co-Requisites:	EE 345	Department Compulsory
EE 360	**Random Signal Analysis**	**3C,3H**
	Probability principles and set theory. Random variables. Operations on random variables. Various distribution functions. Random processes: temporal and spectral characterization. Response of linear time-invariant systems to random inputs.	
Pre-/Co-Requisites:	EE 260	Department Compulsory
EE 407	**Radiowave Propagation & Antennas**	**3C,3H**
	Antenna principles and types; Antenna parameters (gain, beamwidth, aperture, impedance, polarization); ideal and practical dipoles; Friis transmission formula and radar equation; Plane earth propagation; Knife-edge diffraction; Biological effects of radiation; Satellite communications; Urban propagation; Noise in communication systems**.**	
Pre-/Co-Requisites:	EE 307	Communications & Electronics Compulsory
EE 420	**Digital Electronic Circuits**	**3C,3H**
	Diodes and transistors as switches. Switching and speed limitations. RTL. DTL. TTL, ECL, and MOS logic gates. Interfacing and expansion of logic circuits. Comparators and Schmidtt triggers. Multivibrators. Timing circuits. A/D and D/A converters. Sample and hold circuits.	
Pre-/Co-	EE 320	Department Compulsory

Requisites:		
EE 422	**Digital Electronic Circuits Lab**	**1C,3L**
	Transistor as a switch. TTL logic specifications. Interfacing of logic gates. Comparators and Schmidtt triggers. Monostable and astable multivibrators. 555 timers. A/D and D/A converters. Sweep voltage generators. Sample and hold circuits. Lab project.	
Pre-/Co-Requisites:	EE 420	Communications & Electronics Compulsory
EE 435	**Power Electronics**	**3C,3H**
	Power semiconductor devices: types, drive circuits, protection circuits, and power loss calculation. AC-DC converters: uncontrolled and fully-controlled single-phase and three-phase rectifiers, half-controlled rectifiers. AC-AC converters: cycloconverters, ac voltage controllers. DC-AC converters: single-phase and three-phase inverters. DC-DC converters: step-down, step-up, and step-down/up converters.	
Pre-/Co-Requisites:	EE 320, EE 332	Power and Control Compulsory
EE 436	**Power Electronics Lab**	**1C,3L**
	Single-phase fully-controlled bridge rectifier with static/rotating loads. Single-phase half-controlled bridge rectifier. Three-phase controlled bridge rectifier. Single-phase ac voltage controller. Frequency converter. Single-phase bridge inverter with static/rotating loads. Three-phase bridge inverter. Step-down converter. Step-up converter. Step down/up converter. Lab project.	
Pre-/Co-Requisites:	EE 322, EE 435	Power and Control Compulsory
EE 440	**Control Systems**	**3C,3H**
	Transfer functions. Block diagrams. Signal flow graphs. State-space description. Mathematical modeling of physical systems. Time-domain analysis. Root locus techniques. Frequency-domain analysis and design.	
Pre-/Co-Requisites:	EE 260	Department Compulsory
EE 442	**Control Systems Lab**	**1C,3L**
	Measurement of motor characteristics: armature connection and field connection. Transient response of motors. Closed-loop position and speed control systems. Dead band and transient characteristics. Passive network compensation. Stabilization with tachogenerator feedback: frequency response measurement. Lab project.	
Pre-/Co-	EE 440	Power and Control Compulsory

Requisites:		
EE 445	**Microcontrollers and Embedded Systems**	**3C,2H,2L**
	Basic architecture and assembly language of a microcontroller. Principles of microprocessor serial and parallel interfacing. Timers, A/D and D/A relevant chips. Software and hardware interrupt handling routines. Application of top-down design to microcontroller software development in assembly language and a high level language. Evaluation of hardware and software trade-offs. Laboratory experiments on the software and hardware of the microcontroller and a final comprehensive lab project.	
Pre-/Co-Requisites:	EE 322, EE 346	Department Compulsory
EE 447	**Digital Control**	**3C,3H**
	Review of discrete-time systems and the Z-transform. Sampled data systems. Stability. Jury and Schure–Cohn criterion. Controllability and observability. Gain compensation. Direct design methods. Feedback control systems. Dynamic programming.	
Pre-/Co-Requisites:	EE 440	Power and Control Compulsory
EE 450	**Communication Systems**	**3C,3H**
	Equivalent low-pass models. Amplitude modulation and demodulation. Coherent and non-coherent detection. Angle modulation and demodulation. Noise representation and analysis: SNR analysis of AM and FM systems. Sampling, quantization and pulse code modulation. TDM and Pulse modulation techniques: PAM, PPM, PWM.	
Pre-/Co-Requisites:	EE 360	Department Compulsory
EE 452	**Communication Systems Lab**	**1C,3L**
	Tuned circuits and crystals. AM modulators. AM demodulators. Super-heterodyne radio receiver. FM modulators. FM demodulators. Simulation using Matlab/Simulink. Lab project.	
Pre-/Co-Requisites:	EE 322, EE 450	Department Compulsory
EE 460	**Digital Signal Processing**	**3C,3H**
	Review of discrete time signals and systems. Z transform review. Pole and zero placement. Allpass systems and applications. Minimum phase systems. Structure of FIR systems. Design of FIR filters by windowing. Design of discrete time IIR filters from continuous time filters. Impulse invariance and bilinear transformation design methods.	

	Autocorrelation function and the spectral density of discrete-time signals. Stochastic models (AR, MA and ARMA). The Yule-Walker equation.	
Pre-/Co-Requisites:	EE 305, EE 360	Communications & Electronics Compulsory
EE 462	**Digital Signal Processing Lab**	**1C,3L**
	The lab uses Matlab as the simulation package and experiments will be conducted on the available DSP boards. Familiarization experiments with the DSP kit. Experiments include FIR and IIR filter design, quantization effects, and spectral estimation. Real signals are sampled and processed including speech and images. Lab project.	
Pre-/Co-Requisites:	EE 460	Communications & Electronics Compulsory
EE 480	**Power Systems**	**3C,3H**
	Basic Concepts and Per Unit Impedances. Phase shift in transformers. Series impedance of transmission lines. Capacitance of transmission lines. Current and voltage relations of transmission lines. Admittance model and network calculations. Impedance model and network calculations. Power flow solutions. Symmetrical fault analysis.	
Pre-/Co-Requisites:	EE 305, EE 332	Department Compulsory
EE 482	**Electromechanical Systems Lab**	**1C,3L**
	DC machines. Three-phase induction motors. Transformers. Three-phase transformer methods of connection. Synchronous machines. Transmission lines. Voltage and frequency control of power systems. Models for sequence networks. Power system protection. Computer simulation and analysis. Lab project.	
Pre-/Co-Requisites:	EE 213, EE 480	Department Compulsory
EE 483	**Power Transmission and Distribution**	**3C,3H**
	Overhead power lines: construction, sag and tension analysis. Underground power cables. Circuit breakers. Fuses. Disconnect switches. Substation design. Earthing.	
Pre-/Co-Requisites:	EE 480	Power and Control Compulsory
EE 490	**Engineering Training**	**3C**
	The student has to spend at least 8 weeks of electrical engineering training at recognized companies and establishments during the summer semester.	
Pre-/Co-	Passing 117 credit hours	Department Compulsory

Requisites:		
EE 507	**Antennas**	**3C, 3H**
Antenna parameters. Radiation integrals. Wire antennas. Arrays. Broadband and traveling wave antennas. Aperture antennas. Reflector antennas. Microstrip antennas.		
Pre-/Co-Requisites:	EE 407	Communications & Electronics Elective
EE 508	**Introduction to Electromagnetic Compatibility**	**3C,3H**
Causes and effects of interference. Electrical dimensions. EMC units. EMC regulations. Non-ideal behavior of components including: wires, printed circuit boards, resistors, capacitors, inductors, and switches. Bio-electromagnetics.		
Pre-/Co-Requisites:	EE 307, EE 320	Communications & Electronics Elective
EE 509	**Microwave Engineering**	**3C,3H**
Review of Electromagnetics theory. Transmission lines and waveguides. Microwave network analysis. Impedance matching. Passive microwave devices. Stripline and microstrip line circuits. Microwave filters. Microwave laboratory experiments. Design project.		
Pre-/Co-Requisites:	EE 307	Communications & Electronics Elective
EE 521	**Solid State Electronics**	**3C,3H**
Fundamentals of solid-state theory. Continuity equations. Steady state solution. p-n junction characteristics. p-n diode equations and ideality factor. Schottky junctions. Ohmic contacts. Physics of field effect transistors: MOSFET and JFET. Physics of bipolar junction transistors (BJT).		
Pre-/Co-Requisites:	EE 320	Communications & Electroincs Elective
EE 522	**Optoelectronics**	**3C,3H**
Semiconductor materials for optoelectronic devices. Electronic properties in semiconductors. Optical properties. Absorption. Spontaneous emission. Stimulated emission. Light emitting diodes. Lasers. Photoconductors and photodiodes. Responsivity. Phototransistors.		
Pre-/Co-Requisites:	EE 320	Communications & Electroincs Elective

EE 524	**Electronic Communication Circuits**	**3C,3H**
	Large-signal analysis. Network noise analysis. Tuned amplifiers. Intermodulation distortion. RF oscillators. Super-heterodyne receivers. Phase-locked loops. Frequency synthesizers. Mixers, modulators and demodulators. RF power amplifiers.	
Pre-/Co-Requisites:	EE 320, EE 450	Communications & Electronics Compulsory
EE 525	**Electronic Circuit Design**	**3C,3H**
	Feedback amplifiers. Oscillators. Power amplifiers. Current mirrors and active loads. Differential amplifiers. Active filters. Internal structure of operational amplifiers. Integrated analog circuits and applications.	
Pre-/Co-Requisites:	EE 320	Communications & Electroincs Elective
EE 526	**Semiconductor Devices**	**3C,3H**
	Basic properties of semiconductor devices. Selected topics in semiconductor materials: statistics, and transport. Aspects of transport in homo- and hetero-junctions. Charge control in different FETs: transport, modeling. Bipolar transistor models (Ebers-Moll, Gummel-Poon): heterostructure bipolar transistors. Special devices.	
Pre-/Co-Requisites:	EE 320	Communications & Electroincs Elective
EE 528	**Microwave Electronics**	**3C,3H**
	Gunn diaode, Tunneling diodes, Schottky barrier diode, microwave bipolar juncrion transistors and metal semiconductor field-effect transistors. Power added efficiency . Maximum oscillation frequency. Device parameters and optimization. Microwave integrated circuits.	
Pre-/Co-Requisites:	EE 307, EE 320	Communications & Electroincs Compulsory
EE 529	**CMOS Circuit Design**	**3C,3H**
	Analog design with MOS technology. MOS operational amplifier. Wideband amplifiers. Multipliers and modulators. CMOS oscillators. Voltage-controlled osciltrors.	
Pre-/Co-Requisites:	EE 420	Communications & Electroincs Elective
EE 531	**Electric Drive Systems**	**3C,3H**
	DC-motor drives using controlled AC-DC converters. DC-motor drives using DC-DC converters. Frequency-controlled Induction-motor drives. Slip energy recovery.	

	Synchronous motor drives using inverters and cycloconverters. Variable reluctance drives: switched reluctance and stepper-motor drives using bridge inverters.	
Pre-/Co-Requisites:	EE 435, EE 440	Power and Control Compulsory
EE 537	**Switched-Mode Power Supplies**	**3C,3H**
	Types of switched-mode power electronic converters. Feedback control design of switched-mode power supplies. Pulse width modulation controllers. Modelling and simulation of switched-mode power supplies using PSpice and Matlab-Simulink.	
Pre-/Co-Requisites:	EE 435, EE 440	Power and Control Elective
EE 538	**High Voltage Engineering**	**3C,3H**
	Generation and measurement of high voltage. Electrostatic field and field stress control. Electrical breakdown in gases, solids and liquids. Non-destructive insulation test techniques. Overvoltages and insulation coordination.	
Pre-/Co-Requisites:	EE 480	Power and Control Elective
EE 539	**Advanced Electric Machines**	**3C,3H**
	Linear Electric machines: comparison with rotating machines. Linear induction motors: simplified electromagnetic field theory, force equation, characteristics. Superconducting ac generators and motors. Variable reluctance motors: performance and characteristics. Printed circuit motors.	
Pre-/Co-Requisites:	EE 332	Power and Control Elective
EE 540	**Introduction to Robotics**	**3C,3H**
	Introduction. Basic mathematics: transformation, position and orientation, rotation mathematics, Euler angles. Kinematics and inverse kinematics. Jacobians and inverse Jacobians relations. Dynamics of robots & manipulators. End effectors. Sensors with applications. Robot trajectory and task planning. Linear control of robots. Nonlinear control (feedback linearization). Robot programming and control software design.	
Pre-/Co-Requisites:	EE 447	Power and Control Elective
EE 541	**Sensors and Actuators**	**3C,3H**
	Sensors performance terminology. Thermal sensors: metal temperature detectors, thermistors, thermocouples, bimetal switches, electronic temperature sensors. Mechanical sensors: potentiometric, capacitive, inductive, ultrasonic, piezoelectric, strain gauges,	

	proximity and limit switches, digital encoders, Hall-effect sensors. Optical sensors: photoconductive cells, solar cells, photodiodes, spectral response. Actuators: electrical, pneumatic, and hydraulic. Application examples.	
Pre-/Co-Requisites:	EE 320, EE 332, EE 440	Power and Control Elective
EE 546	**Power System Control**	**3C,3H**
	Flow of power in an AC system. Flexible AC transmission systems. Static VAR types and basic characteristics. Static VAR compensator applications to electric power systems: static shunt compensators and statcom. Application examples.	
Pre-/Co-Requisites:	EE 440, EE 480	Power and Control Elective
EE 547	**Computer Control**	**3C,3H**
	Computer role in processes. Digitization. Difference Equations. Discrete form of controllers and their applications in systems. Computer control configurations. Computer Interfacing. Computer instructions for program driven and interrupt driven high-level languages. Real-time operating systems. Interfacing sensors in computer control applications. Command generation in machines & processes. Applications for robot arm motion. Sequential control using programmable logic controller.	
Pre-/Co-Requisites:	EE 445, EE 447	Power and Control Compulsory
EE 551	**Digital Communications**	**3C,3H**
	Quantization. Delta modulation. Noise analysis in PCM and DM systems. Base band digital systems: digital signaling over channels without and with inter-symbol interference and additive gaussion noise. Error probability analysis. Passband digital systems: signal and system models of ASK, PSK, DPSK, FSK and QAM. Signal space representation and receiver model. Error probability analysis of digital modulation techniques for coherent and non-coherent detection. Power spectra of digital signals. Introduction to Information Theory. Introduction to Error control coding.	
Pre-/Co-Requisites:	EE 450	Communications & Electronics Compulsory
EE 552	**Digital Communications Lab**	**1C,3L**
	Digital waveform generators. Waveform analysis. Pulse amplitude modulators and demodulators. Sample and hold circuits. Delta modulation. PCM. ASK, FSK, PSK, DPSK systems.	
Pre-/Co-	EE 452, Co-EE 551	Communications & Electronics

Requisites:		Compulsory
EE 555	**Optical Fiber Communication Systems**	**3C,3H**
	Components, advantages and classifications of fiber communication systems. Dielectric slab wave-guide. Step index fiber. Graded index fiber. Attenuation and dispersion. Light sources. Optical modulation. Photodetectors. Optical detection. Noise in the optical receiver. Heterodyne detection. Bit error rate analysis of direct detection and heterodyne detection systems. Lab experiments. Design project.	
Pre-/Co-Requisites:	EE 307, EE 551	Communications & Electronics Elective
EE 558	**Satellite Communication Systems**	**3C,3H**
	Overview of satellite communication. Earth station technology. Earth-orbiting and geostationary satellites. Channel characterization and link budget calculations. Transponders and transponder model. Channelization. Frequency plans. Propagation and interference considerations. Satellite access techniques. Introduction to satellite networks.	
Pre-/Co-Requisites:	EE 551	Communications & Electroincs Elective
EE 559	**Introduction to Wireless Communications**	**3C,3H**
	Overview of wireless communications. Cellular systems: principles, trunking, grade of service and traffic capacity, power control, and handovers. Characterization of wireless channels: large scale and small scale propagation mechanisms, path loss, multipath and fading. Digital modulation techniques for wireless channels. Power efficiency, nonlinear amplifiers, diversity. Performance in multipath fading channels. Multiple access: fixed (FDMA, TDMA, CDMA) and random (ALOHA, CSMA) access methods.	
Pre-/Co-Requisites:	EE 551	Communications & Electroincs Compulsory
EE 565	**Digital Speech Processing**	**3C,3H**
	Production and classification of speech sounds. Acoustics of speech production. Analysis and synthesis of pole-zero speech models. Short-time Fourier transform analysis and synthesis. Filter-bank analysis and synthesis. Sinusoidal analysis/synthesis. Speech Coding. Speech enhancement.	
Pre-/Co-Requisites:	EE 460	Communications & Electroincs Elective
EE 566	**Digital Image Processing**	**3C,3H**

	Introduction. Image digitization. Human vision system and color imaging. Image enhancement and histogram techniques. Image edge/line detection. Image transformations and filtering. Image denoising. Geometric operations. Image segmentation. Introduction to image compression.	
Pre-/Co-Requisites:	EE 460	Communications & Electroincs Elective
EE 570	**Communication Networks**	**3C,3H**
	Introduction to queuing theory. Physical data link and network layers. Network topologies. Basic performance evaluation methods. Circuit and packet switching. Local area networks.	
Pre-/Co-Requisites:	EE 450	Communications & Electronics Elective
EE 580	**Power System Analysis**	**3C,3H**
	Power system economics. Load and energy forecasting. Computer based load flow calculations and control. Economic operation of power systems. Power system stability. Power system control. Power system planning and reliability calculations.	
Pre-/Co-Requisites:	EE 480	Power and Control Compulsory
EE 582	**Power Systems Lab**	**1C,3L**
	Transmission line performance under different operating conditions. Real and reactive power flow and control for a transmission line. Characteristics of different types of relays. Power system protection using relays. Measurement of sequence components. Balanced and unbalanced faults. Power system transients and stability. Lab Project.	
Pre-/Co-Requisites:	EE 482, Co-EE 580	Power and Control Compulsory
EE 586	**Power System Protection**	**3C,3H**
	Relay operating principles. Current and voltage transformers. Generator protection. Motor protection. Transformer protection. Bus protection. Transmission line protection. Computerized protection of power systems.	
Pre-/Co-Requisites:	EE 580	Power and Control Elective
EE 591	**Graduation Project I**	**1C,1H**
	Project preparation and theory in the semester preceding the graduation semester.	
Pre-/Co-Requisites:	Passing 114 credit hours	Department Compulsory
EE 592	**Graduation Project II**	**3C,2H,2L**

Practical implementation of the project as prepared for in Graduation Project I.		
Pre-/Co-Requisites:	EE 591	Department Compulsory
EE 595	**Special Topics in Communications and Electronics**	**3C,3H**
Content has to be approved by the Electrical Engineering Department Council.		
Pre-/Co-Requisites:	EE 450	Communications & Electroincs Elective
EE 596	**Special Topics in Power and Control**	**3C,3H**
Content has to be approved by the Electrical Engineering Department Council.		
Pre-/Co-Requisites:	EE 480	Power and Control Elective

➢ *PROPOSED STUDY PLAN FOR THE B.SC. DEGREE IN ELECTRICAL ENGINEERING*

○ *FIRST YEAR*

First Term

Course No.	Course Title	Cr. hr.	Pre/Co Requisite
CIS 100	Computer Skills	3	
Math 101	Calculus 1	3	
Phys 101	General Physics I	3	
Chem 101	General Chemistry I	3	
Eng 111	English Language	3	Passing Eng 099
	University Elective Course	3	
	Total	18	

Second Term

Course No.	Course Title	Cr. hr.	Pre/Co Requisite
EE 100	Introduction to Electrical Engineering	3	CIS 100, Co-Phys 102
Arb 101	Arabic Language	3	
Math 102	Calculus 2	3	Math 101
Phys 102	General Physics II	3	Phys 101
Chem 102	General Chemistry II	3	Chem 101
Arb 103	Applied Arabic Language Studies	1	
Phys 107	General Physics Lab	1	Co-Phys 102
Chem 107	General Chemistry Lab	1	Co-Chem 102
	Total	18	

○ *SECOND YEAR*

First Term

Course No.	Course Title	Cr. hr.	Pre/Co Requisite
CS 115	C++ Language Programming	3	CIS 100
Math 201	Intermediate Analysis	3	Math 102
Math 203	Ordinary Differential Equations	3	Math 102
EE 210	Electric Circuits I	3	EE 100, Co-Math 203
ME 215	Engineering Mechanics	3	Phy 101
EE 220	Introduction to Electronics	3	Co-EE 210

Second Term

Course No.	Course Title	Cr. hr.	Pre/Co Requisite
Eng 112	Communication Skills 2	3	Eng 111
ME 200	Engineering Drawing A	1	CIS 100
EE 202	Communication Skills for Engineers	2	2nd Year Standing
EE 207	Electromagnetics I	3	Phys 102, Math 201, Math 203
EE 213	Electric Circuits Lab	1	EE 210
EE 240	Introduction to Linear Systems	3	EE 100, Math 201
EE 260	Signal and System Analysis	3	EE 210, Co-EE 240

	Total	18	

	Total	16	

- ***THIRD YEAR***

First Term

Course No.	Course Title	Cr. hr.	Pre/Co Requisite
MS 100	Military Science	3	
EE 310	Electric Circuits II	3	EE 210, EE 260
EE 320	Electronic Circuits	3	EE 220
EE 345	Introduction to Microcontrollers	3	EE 100
EE 360	Random Signal Analysis	3	EE 260
	Total	15	

Second Term

Course No.	Course Title	Cr. hr.	Pre/Co Requisite
EE 305	Numerical Methods for Engineers	3	Math 203, CS 115
EE 307	Electromagnetics II	3	EE 207
EE 322	Electronic Circuits Lab	1	EE 213, EE 320
EE 332	Electric Machines	3	EE 207, EE 310
EE 341	Instrumenttaions and Measurements	3	EE 260, EE 320
EE 346	Microcontrollers Lab	1	EE 345
	University Elective Course	3	
	Total	17	

- ***FOURTH YEAR – COMMUNICATIONS AND ELECTRONICS***

First Term

Course No.	Course Title	Cr. hr.	Pre/Co Requisite
IE 341	Engineering Economy	2	Math 201
ChE 400	Professional Ethics for Engineers	1	Passing 90 credit hours
EE 420	Digital Electronic Circuits	3	EE 320
EE 440	Control Systems	3	EE 260
EE 450	Communication Systems	3	EE 360
EE 460	Digital Signal Processing	3	EE 305, EE 360
EE 480	Power Systems	3	EE 305, EE 332
	Total	18	

Second Term

Course No.	Course Title	Cr. hr.	Pre/Co Requisite
EE 407	Radiowave propagation and Antennas	3	EE 307
EE 422	Digital Electronic Circuits Lab	1	EE 420
EE 445	Microcontrollers and Embedded Systems	3	EE 322, EE 346
EE 452	Communication Systems Lab	1	EE 322, EE 450
EE 462	Digital Signal Processing Lab	1	EE 460
EE 482	Electromechanical Systems Lab	1	EE 213, EE 480
	University Elective Course	3	
	Total	13	

○ *FOURTH YEAR – POWER AND CONTROL*

First Term

Course No.	Course Title	Cr. hr.	Pre/Co Requisite
IE 341	Engineering Economy	2	Math 201
ChE 400	Professional Ethics for Engineers	1	Passing 90 credit hours
EE 420	Digital Electronic Circuits	3	EE 320
EE 435	Power Electronics	3	EE 320, EE 332
EE 440	Control Systems	3	EE 260
EE 450	Communication Systems	3	EE 360
EE 480	Power Systems	3	EE 305, EE 332
	Total	18	

Second Term

Course No.	Course Title	Cr. hr.	Pre/Co Requisite
EE 436	Power Electronics Lab	1	EE 322, EE435
EE 442	Control Systems Lab	1	EE 440
EE 445	Microcontrollers and Embedded Systems	3	EE 322, EE 346
EE 447	Digital Control	3	EE 440
EE 452	Communication Systems Lab	1	EE 322, EE 450
EE 482	Electromechanical Systems Lab	1	EE 213, EE 480
EE 483	Power Transmission and Distribution	3	EE 480
	Total	13	

○ *FOURTH YEAR - SUMMER SEMESTER*

Course No.	Course Title	Cr. hr.	Pre/Co Requisite
EE 490	Engineering Training	3	Passing 117 Credit Hours

○ *FIFTH YEAR – COMMUNICATIONS AND ELECTRONICS*

First Term

Course No.	Course Title	Cr. hr.	Pre/Co Requisite
EE 524	Electronic Communication Circuits	3	EE 320, EE 450
EE 551	Digital Communications	3	EE 450
EE 552	Dgitial Communications Lab	1	EE 452, Co-EE 551
EE 591	Graduation Project I	1	Passing 114 Cr.Hr.
	Specialization Elective	3	
	Total	11	

Second Term

Course No.	Course Title	Cr. hr.	Pre/Co Requisite
EE 528	Microwave Electronics	3	EE 307, EE 320
EE 559	Introduction to Wireless Communications	3	EE 551
EE 592	Graduation Project II	3	EE 591
	Specialization Elective	3	
	Total	12	

○ *FIFTH YEAR – POWER AND CONTROL*

First Term

Course No.	Course Title	Cr. hr.	Pre/Co Requisite
EE 547	Computer Control	3	EE 445, EE 447
EE 580	Power System Analysis	3	EE 480
EE 582	Power Systems Lab	1	EE 482, Co-EE 580
EE 591	Graduation Project I	1	Passing 114 Cr.Hr.
	Specialization Elective	3	
	Total	11	

Second Term

Course No.	Course Title	Cr. hr.	Pre/Co Requisite
EE 531	Electric Drive Systems	3	EE 435, EE 440
EE 592	Graduation Project II	3	EE 591
	Specialization Elective	3	
	University Elective	3	
	Total	12	

○ *YEARLY DISTRIBUTION OF CREDIT HOURS*

First Year	36
Second Year	34
Third Year	32
Fourth Year	34
Fifth Year	23
Total	159