

الخطة الدراسية لبرنامج الهندسة الكهربائية

Curriculum Study Plan Table of the Electrical Engineering Program

1st Year Preparatory			
1 st Semester			
Course #	Course Title	Credits	Pre- Requisite
140 TECH-3	Computer Skills	3	
140 MATH-2	Introduction of Mathematics	2	
140 SKL-2	Learning, Thinking and Research Skills	2	
140 ENGL-2	English Language Reading Skills	2	
141 ENGL-2	English Language Writing Skills	2	
142 ENGL-2	English Language Listening and Speaking Skills	2	
143 ENGL-2	English Language Grammars	2	
Total Credits		15	
2 nd Semester			
Course #	Course Title	Credits	Pre- Requisite
150 MAN-1	Occupational Ethics	1	
150 MATH-4	Algebraic Sciences	4	
150 SKL-2	Communication Skills	2	
150 ENGL-3	English Language Speaking	3	
151 ENGL-2	Report Writing	2	
Total Credits		12	
2nd Year			
1 st Semester-3 rd Level			
Course #	Course Title	Credits	Pre- Requisite
101 CHEM-3	General Chemistry	3	
104 PHYS-4	Principles of Physics	4	
106 MATH-3	Introduction to Integration	3	
107 MATH-3	Algebra & Analytical Geometry	3	
107 ENGL-3	Technical Writing	3	
Total Credits		16	
2 nd Semester-4 th Level			
Course #	Course Title	Credits	Pre- Requisite
111 IC-2	Introduction to Islamic Culture	2	
101 GE-3	Statics	3	107 MATH-3
203 MATH-3	Advance Calculus	3	106 MATH-3
102 GE-2	Introduction of Engineering Design	2	
108 ENGL-2	Communication Skills for Engineers	2	107 ENGL-3
105 PHYS-4	Advanced Physics	4	104 PHYS-4
Total Credits		16	

3rd Year			
1 st Semester-5 th Level			
Course #	Course Title	Credits	Pre- Requisite
112ISL-2	Introduction to Islamic Culture 2	2	
204MATH-3	Differential Equations	3	106MATH-3
204GE-3	Computer Programming for Engineers	3	
211EE-3	Fundamentals of Electric Circuits	3	106MATH-3 105PHIS-4
212EE-3	Electromagnetism (1)	3	105PHIS-4 203MATH-3
203GE-3	Engineering Drawing	3	
Total Credits		17	
2 nd Semester-6 th Level			
Course #	Course Title	Credits	Pre- Requisite
214EE-3	Electric Circuit Analysis	3	211EE-3
215EE-3	Electromagnetism (2)	3	212EE-3
213EE-1	Electric Circuits Lab	1	211EE-3
324STAT-3	Probability and Engineering Statistics	3	
201ARAB-2	Arabic Language Skills	2	
205GE-3	Dynamics	3	101GE-3
254MATH-3	Numerical Methods	3	204MATH-3
Total Credits		18	

4th Year			
1 st Semester-7 th Level			
Course #	Course Title	Credits	Pre- Requisite
306GE-2	Engineering Economy	2	
331EE-3	Logic Design	3	
332EE-1	Logic Design Laboratory	1	
321EE-3	Signals and Systems Analysis	3	214EE-3
333EE-3	Basics of Electronic Devices	3	214EE-3
334EE-1	Basic Electronics Laboratory	1	
325EE-3	Electrical Machines	3	214EE-3 212EE-3
Total Credits		16	
2 nd Semester-8 th Level			
Course #	Course Title	Credits	Pre- Requisite
341EE-3	Communications Principles	3	321EE-3
342EE-1	Communications Lab	1	
323EE-3	Automatic Control	3	321EE-3
324EE-1	Automatic Control Lab	1	
335EE-3	Introduction to Microprocessors	3	
336EE-1	Microprocessor and Microcontroller Lab	1	331EE-3
351EE-3	Computer programming for Electrical	3	204GE-3

	Engineering		
113ISL-2	Islamic Culture 3	2	
490EE-0	Summer field-training*	0	
Total Credits		17	

5thYear			
1st Semester-9th Level			
Course #	Course Title	Credits	Pre- Requisite
491EE-2	Graduation Project I	2	323EE-3 351EE-3
426EE-3	Fundamentals of Power Systems	3	214EE-3
416EE-3	Electrical measurements	3	213EE-1
437EE-3	Digital Signal Processing	3	321EE-3
422EE-3	Electromechanical Energy Conversion	3	325EE-3
202ARAB-2	Arabic Writing	2	
Total Credits		16	
2nd Semester-10th Level			
Course #	Course Title	Credits	Pre- Requisite
492EE-3	Graduation Project II	3	491EE-2
407GE-2	Management of Engineering Projects	2	306GE-2
427EE-3	Electric Drives	3	323EE-3
417EE-3	Utilization of Electric Energy	3	426EE-3
428EE-3	Applied Control	3	323EE-3
114ISL-2	Islamic Culture 4	2	
Total Credits		16	

104PHYS-4 Principles of General Physics**4 (3,2,1)**

Vectors, Newton's Laws of Motion, Work and Energy, properties of matter, and their flow, principles of heat, Static and Dynamic electricity, Sound and Optics.

101CHEM-3 General Chemistry**3 (3,0,1)**

Stoichiometry Chemical Arithmetic. Gaseous state - The liquid state – Solutions - properties of the combined solutions - Chemical equilibrium - Introduction to organic chemistry: History of organic chemistry, Chemistry of carbons, homologous series, functional groups, Hydrocarbons.

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

Integration: indefinite integral (definition, geometric meaning, basic properties). Techniques of integral: integration by parts, trigonometric substitutions, partial fractions, quadratic expressions etc . Integration of certain classes of trigonometric functions. Definite integral: Riemann integral - Upper and lower sums, geometric meaning of definite integral, some properties of definite integral. Intermediate value theorem for integrals. Fundamental theorem of Calculus. Applications of the definite integral: area, volume, work, arc length. Approximations by the Trapezoidal and Simpson rules.

107MATH-3 Algebra & Analytical Geometry**3 (3,0,1)**

Systems of linear equations, matrices, types of matrices, algebraic of matrices, inverse of matrices, determinants, Cramer's rule. Vectors in two and three dimensions and properties of vectors, scalar (dot) and cross products. Distance formula, gradient (or slope), positive and negative slopes, Inclination, parallel and perpendicular lines, straight line general formula, perpendicular distance from a point to a line, the general formula of circle. Conic sections: the parabola, the ellipse, the hyperbola. Rectangular, polar and spherical coordinates; curves in polar coordinates. Equations of lines and planes in space, surfaces.

107ENG-3 Technical Writing for Engineers**3 (3,0,1)**

Provide English Language instruction to enhance students' proficiency and enable them to understand the technical language offered in English as a medium of instruction. Build students' confidence and motivation through exposure to the technical language. Expose students to wide range of topics. Build knowledge of key vocabulary in their relevant field.

203MATH-3 Advanced Calculus**3 (3,0,1)**

Infinite Sequences, Infinite series, convergence and divergence of infinite series, integral test, ratio test, root test and comparison test. Conditional convergence and absolute convergence, alternating series test. Power Series, Taylor and Maclaurin series, Vector valued functions, their

limits, continuity, derivatives and integrals. Motion of particle in space, tangential and normal components of acceleration. Function in two or three variables, their limits, continuity, partial derivatives, chain Rule, directional derivatives, tangent planes and normal lines to equations, Extrema of Functions of Several Variables, Lagrange Multipliers, Double integral and its applications to area, volume, moments and center of mass. Double integrals in polar coordinates, triple integral in rectangular, cylindrical and spherical coordinates and applications to volume, the moment and center of mass. Vector fields, line integrals, surface integrals, Green's theorem, and the divergence theorem. Stoke's theorem.

Prerequisites: 106Math-3

108ENG-2 Communication Skills for Engineers

2 (2,0,1)

Provide English Language instruction to enhance students' proficiency and enable them to understand the technical language offered in English as a medium of instruction.

Build students' confidence and motivation through exposure to the technical language. Expose students to wide range of topics. Build knowledge of key vocabulary in their relevant field.

Prerequisites: 107ENG

105PHYS-4 Advanced Physics

4 (3,2,1)

Atomic structure: electronics configuration, classification of elements, energy levels. Crystal structure: lattice, symmetry, space group, examples for simple structure. Electrical properties of materials and electricity: classification of materials. Magnetic properties of materials and magnetism. Thermal properties of materials: thermal energy, thermoelectric power (Seebeck Effect). Mechanical properties of matter (Young's modulus, tensile materials).

The experiments required for 105 Phys. (Advanced physics):

1. Decay of current in a RC circuit
2. LCR circuit.
3. Amplifiers;
4. Circuit in series and in parallel (with Ohm's law).
5. Solar cell
6. Stefan-Boltzman's law
7. Magnetic field along the axis of coils
8. Thermal properties materials
9. Spring Constant (Hook's law).

Prerequisites: 104 PHIS -4

204MATH-3 Differential Equations**3 (3,0,1)**

The course introduces basic concepts, theorems and knowledge of the linear algebra of matrices, special functions, Fourier analysis and partial differential equations with application to engineering problems. Matrices and Vectors, linear system of equations (Gauss Eliminations) - Determinates, Cramer rule, inverse of matrix Gauss, Jordan elimination - Introduction to vector differential calculus, Dot product and Cross product - Vector differential calculus, Gradient, Divergence and Curl of a vector field) - Special function, Gamma function, Beta function - Introduction to Fourier analysis, Fourier series, Fourier sine series, Fourier cosine series - Partial differential equations, Classifications and methods of solution, heat equation, wave and potential equation.

Prerequisites: 106 Math-3**254MATH-3 Numerical Methods****3 (3,0,0)**

Types of errors, errors analysis. Numerical solutions of nonlinear equations of single variables: fixed point iteration method, bisection method, false position method, Newton-Raphson method, secant method. Numerical solutions of a system of linear equations: Gauss Jordan iterative method. Gauss-Jordon iterative method with partial and complete pivoting. Interpolation: Lagrange interpolation formula, divided differences, Newton interpolation, Numerical differentiation. Numerical integration. Introduction to numerical solutions of ordinary differential equations.

Prerequisites: 204Math-3**324STAT-3 Engineering Statistics and Probability****3 (3,0,1)**

Concepts of statistics and its applications in science and engineering, measure of central tendency, measure of dispersion, regression, correlation, and their applications. Concepts of probability and its applications in science and engineering, probability axioms, conditional probability, independent probability for events, some probability distributions and random variables: discrete and continuous random variables, distributions for applications in engineering such as Poisson and Weibull distributions and other probability distributions are important for engineers, time series, and computer applications using statistical software.

111ISL-2 Introduction to Islamic Culture**2 (2,0,2)**

Believes based on scientific basis and methodologies deduced from the Holy Qur'an, Biography of Prophet Muhammad, Peace be upon him (PBUH), and other well-known Islamic references. The concept of ethics in Islam. The rules of Islam in dealing with instincts through ethics and moral rules.

The Islamic ethics and values necessary for their daily life. Explain that Islam is a religion that takes care of both daily life and the hereafter through solid historical examples. The Islamic solutions for daily life problems. Explain the effect of applying the Islamic ethics and values on community.

112ISL-2 Islamic Culture 2

2 (2,0,2)

Believes based on scientific basis and methodologies deduced from the Holy Qur'an, Biography of Prophet Muhammad, Peace be upon him (PBUH), and other well-known Islamic references. The concept of ethics in Islam. The rules of Islam in dealing with instincts through ethics and moral rules.

The Islamic ethics and values necessary for their daily life. Explain that Islam is a religion that takes care of both daily life and the hereafter through solid historical examples. The Islamic solutions for daily life problems. Explain the effect of applying the Islamic ethics and values on community.

201ARAB-2 Language Skills

2 (2,0,0)

تعريف الكلمة: لغة واصطلاحاً. أقسام الكلمة: اسم، وفعل، وحرف. علامات الاسم: (أل) التعريف، التنوين، والحديث عنه. أقسام الاسم من حيث الإعراب والبناء: معرب، ومبني. أقسام الفعل: ماض، وأمر، ومضارع. العلامة التي يعرف بها كل فعل، وحكمه من حيث الإعراب والبناء. تعريف الكلام. صور انتلاف الكلام ست. تعريف الإعراب، وبيان أنواعه، مع بيان ما يشترك فيه الاسم والفعل، وما يختص به كل واحد منهما، وبيان العلامات الأصول والفروع. مما خرج عن الأصل في إعرابه سبعة أبواب:

خمسة في الأسماء:

الأسماء الستة، المثني وما ألحق به، جمع المذكر السالم وما ألحق به، الجمع بالألف والتاء المزيدين وما ألحق به في حالة النصب، الممنوع من الصرف في حالة الجر.

واثنان في الأفعال:

الأفعال الخمسة، الفعل المضارع المعتل الآخر في حالة الجزم. الصرف: الميزان الصرفي – المجرد والمزيد. المعاجم: طريقة الكشف في المعاجم العربية المختلفة. الأدب والنصوص: من القرآن لكريم سورة الحجرات من أولها إلى آخر الآية رقم (12)

من الحديث الشريف: خطبة الوداع، أو بعض الأحاديث المختارة ذات التوجيه الاجتماعي والسلوكي. من الشعر والنثر: مختارات شعرية ونثرية تمثل الأدب العربي.

113ISL-2 Islamic Culture 3

2 (2,0,2)

Believes based on scientific basis and methodologies deduced from the Holy Qur'an, Biography of Prophet Muhammad, Peace be upon him (PBUH), and other well-known Islamic references.

The concept of ethics in Islam. The rules of Islam in dealing with instincts through ethics and moral rules.

The Islamic ethics and values necessary for their daily life. Explain that Islam is a religion that takes care of both daily life and the hereafter through solid historical examples. The Islamic solutions for daily life problems. Explain the effect of applying the Islamic ethics and values on community.

202ARAB-2 Arabic Writing

2 (2,0,0)

اصطلاحا. أقسام الكلمة: اسم، وفعل. وحرف تعريف الكلمة: لغة،

عالمات الاسم : (ال) التعريف، التثوين، والحديث عنه. أقسام الاسم من حيث الإعراب والبناء :معرب، ومبني. أقسام الفعل : ماض، وأمر، ومضارع. العالمية التي يعرف بها كل فعل، وحكمه من حيث الإعراب والبناء. تعريف الكالم. صور ائتالف الكالم ست. تعريف الإعراب، وبيان أنواعه، مع بيان ما يشترك فيه الاسم والفعل، وما يختص به كل واحد منهما، وبيان العالمات الأصول والفروع. مما خرج عن الأصل في إعرابه سبعة أبواب :خمسة في السماء السماء الستة المثني وما ألحق به جمع المذكر السالم وما ألحق به الجمع بالالف والتاء المزيديتين وما ألحق به في حالة النصب الممنوع من الصرف في حالة الجر . واثنان في الأفعال :الأفعال الخمسة الفعل المضارع المعتل الآخر في حالة الجزم. الصرف : الميزان الصرفي المجرد والمزيد – المعاجم : طريقة الكشف في المعاجم العربية المختلفة. الأدب والنصوص : من القرآن الكريم سورة الحجرات من أولها إلى آخر الآية رقم 22 من الحديث الشريف : خطبة الوداع، أو بعض الأحاديث المختارة ذات التوجيه الاجتماعي والسلوكي. من الشعر والنثر : مختارات شعرية ونثرية تمثل الأدب العربي.

114ISL-2 Islamic Culture 4

2 (2,0,2)

Believes based on scientific basis and methodologies deduced from the Holy Qur'an, Biography of Prophet Muhammad, Peace be upon him (PBUH), and other well-known Islamic references. The concept of ethics in Islam. The rules of Islam in dealing with instincts through ethics and moral rules.

The Islamic ethics and values necessary for their daily life. Explain that Islam is a religion that takes care of both daily life and the hereafter through solid historical examples. The Islamic solutions for daily life problems. Explain the effect of applying the Islamic ethics and values on community

College Courses Descriptions

101GE-3 Statics

3 (3,0,1)

Basic concepts and principles of statics. Vector operations. Equilibrium of particles in two and three dimensions. definition of moment and couple; reduction of systems forces; equilibrium of

rigid bodies; statically determinate structures including beams, trusses, frames, and machines; internal forces; shear force and bending moment diagrams in beams; friction and its applications, centroid and center of gravity of lines, areas, and volumes; moment of inertia and radius of gyration.

Prerequisites: 107Math-3

102GE-2 Introduction to Engineering Design **2 (2,0,1)**

Introduction to active learning, teamwork, team dynamics, team norms and communication, conducting effects meetings and quality assessment. Understanding the seven habits of highly qualified professionals. Organization of work and design notebook. Reverse engineering and design project. Computer modeling and heuristics for solving problems, stochastic process, optimization and expert systems. Schedule and time management.

204GE-3 Computer Programming for Engineers **3 (2,2,0)**

Computer Algorithms; Developing Algorithms; Programming Preliminaries; Simple computer Programs; Numeric Constants and Variables; Arithmetic Expressions; Input and Output in C Programs; Conditional statements; Implementing loops in Programs; Defining and Manipulation Arrays; Logical Expressions and More Control statements; C Programs Examples; Functions; Enumerated data Type and stacks; Structures; Pointer Data Type and its Applications; Lists and Trees; Recursion; Bit level Operations and Applications;

203GE-3 Engineering Drawing **3 (1,4,1)**

Introduction to drawing, Drawing equipment and use, Skills of Freehand Sketching, Methods of Projection: Orthographic, Isometric Dimensioning of View. Third View Prediction, Primary and Successive Auxiliary Views. Intersections of Surfaces and Bodies. Development of Surfaces. Sectioning. Introduction to Assembly Drawings. Introduction to computer graphics, Engineering Applications.

205GE-3 Dynamics **3 (3,0,1)**

Basic considerations (Vector operations, Newtonian mechanics), Engineering applications of virtual work, Kinematics of particles, Newton's law, Equations of motion, Work and energy, Impulse momentum, and vibrations.

Prerequisites: 101GE-3 Static

306GE-2 Engineering Economy **2 (2,0,1)**

Introduction to Engineering economy. Interest formulas and equivalence. Bases for comparison of alternatives. Decision making among alternatives. Evaluating replacement alternatives. Break even and minimum cost analysis. Cost accounting. Depreciation. Economic analysis of operations. Economic analysis of public projects. Basic management process approach, strategies and planning methods, project planning and scheduling, Bar chart, critical path methods, PERT method, resource leveling and allocation, time cost trade off. Construction and organizational approaches, leadership elements and decision-making, computer applications.

407GE-2 Management of Engineering Projects

2 (2,0,1)

Characteristics of Construction Industry; project delivery systems; the design and construction process; construction contracting; construction planning; project control, conceptual cost estimation; and Quality and Safety Management.

Prerequisites: 306GE-2

Departmental Course Descriptions

211EE-3 Fundamentals of Electric Circuits

3 (3,0,1)

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

Pre-requisite: 106 MATH-3 and 105PHYS-4.

213EE-1 Electric Circuits Laboratory

1 (0,2,0)

General introduction to the laboratory Voltage, current, and power in DC circuits using KVL and KCL. Superposition, Thevenin's, and Maximum power transfer theorems in DC circuits; Series and parallel AC circuits; Resonance in series and parallel circuit; Maximum power transfer

theorem and power factor improvement in AC circuits; Transients in DC circuits; Magnetically-coupled circuits; Three phase circuits.

212EE-3 Electromagnetism (I)

3 (3,0,1)

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

Pre-requisite: 105PHYS-4 and 203MATH-3

214EE-3 Electric Circuit Analysis

3 (3,0,1)

Frequency response of RLC and selective circuit: concept of transfer function, resonance, bode plots, introduction to filters; Two-Port networks; Mutual inductance and transformers; Transient analysis of first and second order circuits; Three phase circuits; Introduction to Op-Amp, ideal characteristics with simple applications; Diode characteristics, clipping and rectification.

Pre-requisite: 211EE-3.

215EE-3 Electromagnetism (II)

3 (3,0,1)

Time varying fields; Faraday's law. Transformer and motional emfs; Displacement current; Maxwell's equations and time harmonic fields; Wave equation; Power transfer and Poynting vector; Plane wave propagation in free space, in lossy dielectrics and in good conductors; Polarization; Reflection of plane wave at normal and oblique incidence; Transmission lines; Impedance matching; Introduction to radiation and antennas; Antenna parameters; Wire antennas.

Pre-requisite: 212EE-3.

331EE-3 Logic Design

3 (3,0,1)

Number systems; Boolean algebra and logic gates; Simplification of Boolean functions; Combinational logic circuits design and analysis; MSI and PLD components; Introduction to synchronous sequential logic; Flip flops; Analysis of clocked sequential circuits; State reduction and assignment; Design of synchronous sequential circuits and PLA's.

332EE-1 Logic Design Laboratory

1 (0,2,0)

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

Pre-requisite: 331EE-3

321EE-3 Signals and systems Analysis

3 (3, 0, 1)

Motivation and Applications, Signal Classifications, Signal Operations, Singularity Functions; Linear time-Invariant Systems and Convolution; Correlation; Fourier Series and Transform for continuous and discrete time signals; Applications; Laplace transform and applications; Introduction to z-transform.

Pre-requisite: 214EE-3

333EE-3 Basics of Electronic Devices

3 (3, 0, 1)

Intrinsic and doped semiconductors, drift and diffusion currents. PN junction diode: basic structure, I-V characteristics, large and small-signal models. Bipolar junction transistor (BJT): basic structure, modes of operation, dc biasing, dc and small-signal models, single stage BJT amplifiers. Field-effect transistors (FET): structure and operation of enhancement and depletion MOSFETs, I-V characteristics, dc biasing. Introduction to JFET.

Pre-requisite: 214EE-3

334EE-1 Basic Electronics laboratory (1)

1 (0,2,0)

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

Pre-requisite: 333EE-3

325EE-3 Electric Machines

3 (2, 2, 1)

Transformers (construction, operation of single-phase transformers, equivalent circuit, voltage regulation and efficiency, auto – transformers, three-phase transformers), AC machinery fundamentals, three-phase induction machines (construction, operation, equivalent circuit, performance calculations, starting of induction motors, speed control), small AC motors (single-phase induction motors, reluctance and hysteresis motors, universal motors, servo motors, stepper motors).

Pre-requisite: 212EE-3 and 214EE-3

341EE-3 Communications Principles

3 (3, 0, 1)

Overview and Basic elements of Communication Systems; Signal Analysis; Transmission through Systems and Channels; Modulation; AM; Frequency Conversion; FM and PM; Superhetrodyne Receiver; FDM; Stereo Broadcasting; Sampling; Pulse Modulation (PAM, PWM, PPM); TDM; Pulse Code Modulation (PCM); DPCM and DM; Regenerative Repeaters; Advantages of Digital Communication; Line Coding (Binary Signaling); Introduction to Digital Modulation (ASK, FSK, PSK).

Pre-requisite: 321EE-3

342EE-1 Communications Lab

1 (0, 2, 0)

AM and FM modulation and detection: PCM and delta modulation; TDM; shift-keyin, basics of modem technology; ASK; FSK; PSK; Line coding and decoding.

Pre-requisite: 341EE-3

323EE-3 Automatic Control

3 (3, 0, 1)

Review of mathematical background (complex variables, Laplace, Diff. Equations); System representation (block diagram, transfer functions, signal flow graph) Modeling of electric and mechanical systems; State variable analysis; Stability; Time domain analysis; Root locus; Frequency domain analysis; Introduction to PID control

Pre-requisite: 321EE-3

324EE-1 Automatic Control Lab

1 (0, 2, 0)

Experiments to support control theory using physical processes (e.g. water level, temperature control, light intensity control, etc); Control system simulation using Matlab; Modeling of physical (experimental) equipment; Static performance; Transient analysis; Measuring devices; Two-position control; Proportional control; PID control;

Pre-requisite: 323EE-3

335EE-3 Introduction to Microprocessors

3 (3, 0, 1)

Microprocessors architecture; Addressing modes and techniques; Instruction set; Assembly language programming; Interrupt systems; Input/output devices and timing; Memory devices; Future trends in microprocessors.

Pre-requisite: 331EE-3

336EE-1 Microprocessor and Microcontroller Laboratory **1 (0, 2, 0)**

Introduction to microprocessors and their architecture; Microprocessor C/Assembly programming and machine code generation; RAM and EPROM; RS-232C; SCI and serial port interface; Parallel I/O interface and DMA; Programmable I/O interfaces and UART; DAC and ADC converters; Real time implementation; Project. Introduction.

Co-requisites: 335EE-3

351EE-3 Computing programming for Engineers **3 (2, 2, 0)**

Introduction to MATLAB system, generate matrices and perform, plot data, annotate graphs, create scripts and functions, construct and manipulate data structures, set up a basic data analysis. How Simulink Software Interacts with the MATLAB, Creating a Simulink Model, Modeling a Dynamic Control Systems. Introduction to LabView, virtual instruments, LabView environments, creating, editing and debugging a VI, creating a sub VI, loops and charts, Arrays, graphs, clusters, case and sequence structures, formula node.

Pre-requisite: 204GE-3

490EE-0 Summer Field Training **0(0, 3, 0)**

A continuous period of 60 days of summer training spent in industry working in any of the fields of electrical engineering. The training should be carried out in an organization with an interest in one or more of these fields. On completion of the program, the student is required to submit a formal written report of his work.

Pre-requisite: Minimum credit hour achieved before training is 90.

491EE-2 Graduation Project I **2 (2, 0, 0)**

The graduation project is a culminating handy course work for which the students are expected to integrate and apply what they have learned through previous academic work and field experiences, with faculty supervision. These projects may be "new," continuation of work done in previous courses; or may be projects started in a previous course that become significantly expanded and enhanced for the thesis. It has two phases- to be taken in consecutive two semesters at senior level.

At the beginning of the semester, the students propose a topic on which they are supposed to work as a group. Project students meet in class weekly, discuss their research, and screen their progresses for peer and faculty critique and suggestions. At the end of the semester, students present their thesis projects to the supervising committee.

Pre-requisite: 323EE-3 and 351EE-3

426EE-3 Fundamental of Power Systems

3 (3, 0, 1)

Power system components and representation; Transmission line and cable parameters; Analysis of transmission and distribution lines; Electric insulators; Grounding systems; High voltage surges

Pre-requisite: 214EE-3

416EE-3 Electrical Measurements

3 (3, 0, 1)

Measurement fundamentals: units and errors, statistical analysis: DC and AC analog digital meters constructions :DC and AC bridge : Oscilloscope: CRT, trigger sweep circuits: Oscilloscopes, Analog and Digital Multi meters to measure electrical parameters: Transducers and sensors; passive and active : specifications of Spectrum analyzer, Liquid crystal displays (LCDs) and optical fiber sensor

Pre-requisite: 213EE-1

437EE-3 Digital Signal Processing

3 (3, 0, 1)

Review of discrete-time signals and systems; The Discrete-Time Fourier transform, Fast Fourier Transform, Z Transform, Recursive and no recursive digital filters design and realization; Decimation and interpolation; Applications of digital signal processing in communications.

Pre-requisite: 321EE-3

422EE-3 Electromechanical Energy Conversion

3 (3, 0, 1)

Synchronous machines (construction, internal voltage, equivalent circuit, phasor diagram, performance of turbo-alternator, generator operating alone, parallel operation of AC generators, synchronous motor, steady-state operation, starting), DC machines (construction, classification, performance, motor characteristics, starting of DC motors, speed control of DC motors).

Pre-requisite: 325EE-3.

492EE-3 Graduation Project II**3 (2, 2, 0)**

The graduation project is a culminating handy course work for which the students are expected to integrate and apply what they have learned through previous academic work and field experiences, with faculty supervision. This is the continuation of graduation project-I, and consequently graduation project-II is supposed to be taken in the consecutive semester.

Throughout the semester, the students try to implement what they proposed in graduation project-I as a group. Project students meet in class or lab weekly, segregate the work into sub-projects, integrate the individual works in order to reach their target, and faculty critique and suggestions. At the conclusion of the semester, students present their design projects along with the thesis to the supervising committee.

Pre-requisite: 491EE-2**427EE-3 Electric Drives****3 (3, 0, 1)**

Principles of electric drive; Definitions; Electrical considerations: running, starting, braking; Mechanical considerations: type of enclosure, noise, drive transmission, motor selection; Electric traction; DC & AC solid state drives.

Pre-requisite: 323EE-3.**417EE-3 Utilization of Electric Energy****3 (3, 0, 1)**

Lighting and electric wiring; Electric heating; Cooling and heating of buildings; Welding; Electrolysis; Power quality issues; Renewable energy sources; Power factor improvement.

Pre-requisite: 426EE-3.**428EE-3 Applied control****3 (3, 0, 1)**

Basics of system modeling and analysis; PID controller design; Transducers and actuators; Real time control; Control applications (power systems, robotics, etc.); Control design project

Pre-requisite:323EE-3.