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ELECTRICAL POWER AND MACHINES CURRICULA

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FIRST YEAR

FIRST SEMESTER

Serial	Course Code	Course Name	Hours			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	EPE 111	Principles of Electrical Engineering	**4**	**2**	**6**	٥٠	-	١٠٠	١٥٠	٣
٢	EPE 112	Lab (1)	-	٤	٤	٣٠	٢٠	٥٠	١٠٠	٢
٣	EPE 113	Properties of Electrical Materials	٤	٢	٦	٥٠	-	١٠٠	١٥٠	٣
٤	EMP 171	Mathematics (2)(A)	٤	٢	٦	٥٠	-	١٠٠	١٥٠	٣
٥	EMP 172	Physics	٤	٢	٦	٣٠	٣٠	٩٠	١٥٠	٣
٦	GEN 171	English Language (2)	-	٢	٢	١٥	-	٣٥	٥٠	٢
		Total	١٦	١٤	٣٠				٧٥٠	

SECOND SEMESTER

Serial	Course Code	Course Name	Hours			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	EPE 121	Lab (2)	**-**	**4**	**4**	30	20	50	100	2
٢	ECE 170	Electronics (1)	4	2	6	30	30	90	150	3
٣	ECE 171	Computer Programming	2	2	4	30	10	60	100	3
٤	MPE 170	Mechanical Engineering	4	2	6	50	-	100	150	3
٥	EMP 173	Mathematics (2)(B)	4	2	6	50	-	100	150	3
٦	GEN 173	Engineering Legislation	4	-	4	20	-	80	100	2
		Total	18	12	30				750	

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SECOND YEAR

FIRST SEMESTER

Serial	Course Code	Course Name	Hours			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	EPE 211	Electrical Circuit	**4**	**2**	**6**	٣٠	٣٠	٩٠	١٥٠	٣
٢	EPE 212	Electromagnetic Fields	٣	٢	٥	٤٥	-	٨٠	١٢٥	٣
٣	EPE 213	Measuring Instruments	٤	٢	٦	٣٠	٣٠	٩٠	١٥٠	٣
٤	MDE 271	Mechanical Engineering (2)	٤	٢	٦	٥٠	-	١٠٠	١٥٠	٣
٥	EMP 271	Mathematics (3)(A)	٣	٢	٥	٤٥	-	٨٠	١٢٥	٣
٦	GEN 271	Technical Reports Writing	-	٢	٢	١٥	-	٣٥	٥٠	٢
		Total	١٨	١٢	٣٠				٧٥٠	

SECOND SEMESTER

Serial	Course Code	Course Name	Hours			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	EPE 221	Lab (3)	-	**4**	**4**	30	20	50	100	2
٢	EPE 222	Electrical Machines	4	2	6	50	-	100	150	3
٣	EPE 223	Electrical power Engineering	4	2	6	50	-	100	150	3
٤	ECE 270	Electronic and Logic Circuits	3	2	5	25	25	75	125	3
٥	EMP 272	Mathematics (3)(B)	3	2	5	45	-	80	125	3
٦	GEN 272	Project Managements	3	1	4	30	-	70	100	3
		Total	17	13	30				750	

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THIRD YEAR

FIRST SEMESTER

Serial	Course Code	Course Name	Hours			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	EPE 311	Transmission & Distribution of Electrical power	**3**	**2**	**5**	45	-	80	125	3
٢	EPE 312	Electrical Machines (2)	٤	٢	٦	50	-	100	150	3
٣	EPE 313	Power Electronics (1)	٤	٢	٦	50	-	100	150	3
٤	EPE 314	Automatic Control (1)	٣	٢	٥	45	-	80	125	3
٥	EPE 315	Lab (4)	-	٤	٤	30	20	50	100	2
٦	GEN 371	Economics of Electrical Energy Utilization	٣	١	٤	30	-	70	100	3
		Total	١٧	١٣	٣٠				750	

SECOND SEMESTER

Serial	Course Code	Course Name	Hours			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	EPE 321	Switchgear and Protection	**4**	**2**	**6**	50	-	100	150	3
٢	EPE 322	Analysis and design of Electrical Machines	4	2	6	50	-	100	150	3
٣	EPE 323	Lab (5)	-	4	4	30	20	50	100	2
٤	EPE 324	Computer Applications in Electrical power and Machines	4	2	6	50	-	100	150	3
٥	EPE 325	High Voltage Engineering (1)	4	2	6	50	-	100	150	3
٦	GEN 37x	Elective Course of Humanities	2	-	2	10	-	40	50	2
		Total	17	13	30				750	

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FOURTH YEAR

FIRST SEMESTER

Serial	Course Code	Course Name	Hours			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	EPE 411	Power Electronics (2)	**4**	**2**	**6**	٣٠	٣٠	٩٠	١٥٠	٣
٢	EPE 412	Automatic Control (2)	٣	٢	٥	٤٥	-	٨٠	١٢٥	٣
٣	EPE 413	Tests and Specifications (A)	١	٣	٤	٣٠	٢٠	٥٠	١٠٠	٢
٤	EPE 414	Project*	-	٤	٤	٤٠	-	-	-	-
٥	EPE 415	High Voltage Engineering (2)	٣	٢	٥	٣٠	١٥	٨٠	١٢٥	٣
٦	EPE 44x	Elective Course(1) from Table(1)	٢	٢	٤	٣٠	-	٧٠	١٠٠	٣
٧	EPE 44x	Elective Course(2) from Table(2)	٢	٢	٤	٣٠	-	٧٠	١٠٠	٣
		Total	١٥	١٥	٣٠				٧٠٠	

- Continues Course

SECOND SEMESTER

Serial	Course Code	Course Name	Hours			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	EPE 421	Utilization of Electrical Energy	**4**	**2**	**6**	50	-	100	150	3
٢	EPE 422	Tests and Specifications (B)	1	3	4	30	20	50	100	2
٣	EPE 414	Project	-	6	6	60	150	-	250	-
٤	EPE 44x	Elective Course(3) from Table(3)	2	2	4	30	-	70	100	3
٥	EPE 44x	Elective Course(4) from Table(4)	2	2	4	30	-	70	100	3
٦	GEN 470	Environmental Impacts of Electrical Energy	3	1	4	30	-	70	100	3
		Total	12	16	28				800	

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FIRST YEAR

FIRST SEMESTER

EPE 111: Fundamentals of Electrical Engineering   (4+2)

Introduction: electric charge, electric current, potential difference, Ohm's law, system units, theories of direct- and alternating-current circuits, single phase alternating current circuits, tuned circuits (series and parallel), power coefficient, improvement of power coefficient, 3-phase circuits (symmetrical and unsymmetrical). Electro-magnetism: magnetic field, field intensity, force on a conductor carrying an electric current, electromotive force, Lenz's law, Faraday's law. Electric field: electric field strength due to a conductor carrying an electric current, electro-magnet, Ohm's law for magnetic circuits, static electricity and electric charge, capacity of a capacitor, charging current of parallel plates capacitor, types of capacitors, force on plates of a charged capacitor, time-constant calculation for the DC current circuits contain resistance, coils and capacitors. Basics of Power Electronics: rectification circuits (half-wave and full-wave), transistors and their circuits.

EPE 112: Testing (1)   (-+4)

Experiments cover: principles of electrical circuits. Principles of electrical engineering. Electronic components. Computer systems; main parts and terminal units. Computer programming and testing methods.

EPE 113: Properties of Electrical Materials   (4+2)

Classification of materials and its construction, Properties of Materials and their symmetry, Free electrons theory, Orbit theory, Electric insulating materials, Effects of light on materials, Magnetic materials, Ferro-magnetic, Heat effects on materials, Super conductivity.

EMP171 Mathematics (2) a   (4+2)

Infinite series, Functions expantion, Diffretiation applications, Maximum and minimum limits, Lagrange multiplications, Restricted maximum and minimum limits applications, Envelops, High order differential equations, Complex variable functions, Vectors analysis, Standards and vector fields, Vector diversion, Standard fields talus, Vector field alignment, Gauss's theory, Green's theory, Stocke's theory.

EMP171 Physics   (4+2)

Traditional physics curriculum that covers; heat, Radiation, Light, Electroluminescent effect, Electromagnetic theory, X-rays, Waves and Particles, Wave theory of light propagation, Bases of

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integration, Diffraction and polarization of light, Basics of laser, Basic concepts of solid state physics.

GEN171 English Language(2)   **(-+2)**

A comprehensive curriculum to teach English language to engineering students with concentrating on electrical engineering and computer terminology, Grammar, Grammatical structures, Writing and essay, Teaching using computers, Using multimedia on computers to teach English, Developing reading capabilities.

EPE 121: Testing (2)   **(-+4)**

Experiments cover: basics of electronic and logic circuits. Use of measuring instruments, measuring techniques. Programming and debugging techniques of computer programs.

ECE 170: Electronics   **(4+2)**

Energy levels. Mobility of charge carrier phenomenon, Diodes, Characteristics and applications for bipolar devices, transistor operations, Static and dynamic characteristics of thyristors, Unipolar devices: basic characteristics of MOSFET and JFET transistors. Photo devices: radiation transmission, radiation absorption, photo-emitting diode, semiconductor LASER, photo detectors, photo cells, LASER characteristics and application. Integrated circuit technology: progressive crystals, film deposit, propagation, printing and etching of circuit boards.

ECE 171: Computer Programming   **(2+2)**

Fundamentals of computer programming: analyzing problems, developing flow charts, Emphasizing the principles of modern programming languages, Structured computer programming using PASCAL: program frames, looping, matrices, procedures, functions, records, dealing with files, pointers, circular lists, recursion, return.

MPE 170: Mechanical Engineering   **(4+2)**

Principles of thermodynamics, Motion of Fluids, Ideal gas, First law of thermodynamics, Reversible processes, Irreversable processes, Second law of thermodynamics, Thermal cycle, Thermal equality degree, Movement theory of gases, Transforming heat through connectivity, Algebra load and radiation, Thermal exchange, Principles of liquid mechanics, Liquids specifications, Bernoulli's equation and its applications, Dimensional analysis, Pattern and analysis dynamics.

EMP171: Mathematics (2) b   **(4+2)**

Laplace and Inverse Lapalce transformations, Laplace transform of derivatives and integration, Solving of differential equations, Delta function, Periodic functions applications, Series solution of diffrential equations, Special functions, Gamma and Beta functions, Bessel's functions and

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Legender's polynomials, , Solution of differential equations, First order and second order partial differential equations, Heat and wave equations-Systems of linear ordinary differential equations, Laplace in polar coordinates

GEN 173: Engineering Legislations (4+-)

The course deals with laws related to the rights and responsibilities of engineers. Discussion of contractual law, Explanation of laws and regulations that are of interest to the engineering profession, Examples includes: engineering syndicate laws, town planning laws, construction laws, high-way engineering laws, land distribution laws, agricultural land laws, industrial safety rules and regulations; industrial operations, cranes, environment protection, insurance laws (against accidents and fire), investment laws, irrigation laws, laws governing the relationship between landlords and tenants, job description, industrial union laws.

SECOND YEAR

FIRST SEMESTER

EPE 211: Electrical Circuits (4+2)

Theory and analysis of DC circuits, Mutual induction, Resonance, Theory and analysis of single-phase AC circuits, Three-phase system, balanced and unbalanced three phase circuits, Single-phase non-sinusoidal AC circuits, Transient performance of electric circuits, Two-port networks, Circuits Analysis have non-linear Elements.

EPE 212: Electromagnetic Fields (3+2)

Vector Analysis, Static magnetic and electric fields in space and medium, Maxwell's equations and its Applications, Wave propagations in loss and lossless media, Wave guides.

EPE 213: Measuring Instruments (4+2)

Measurements and errors, Accuracy of measurements, Statistical analysis of Errors, Unit Systems of Measurements, DC measuring instruments, DC bridges, Cathode Ray Oscilloscopes, Electronic measuring instruments. Function generators, Transducers, Digital instruments.

MDE 271: Mechanical Engineering (4+2)

Machines theory, Joints, Gears, Cams, Balancing of Rotating Mass, Design; Screw Masks, Rotors, Screw Drivers, Interlocks, Power Screws, Belts, Bearings.

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EMP171 Mathematics (4)   **(3+2)**

Fourier series**,** Numerical Analysis, Finite Difference, Netwon Methods for Completion, Oscillating polynomial, Numerical Diffrentiation and Integration, Least Square Method, Curve Fitting, Linear Programming, Probabilities and Statistics, Random Variables, probability Density Function, Moments, Guassian distribution, Possonian distribution, Matrics Analysis.

GEN 271: Language & Technical Reports Writing   **(-+2)**

A comprehensive course in reporting writing in English. The course develops the student capabilities in writing short practical needs. It also trains the students on summarizing information. Gradually introduces more complex structures.

EPE 221: Lab (3)   **(-+4)**

Basics of computer architecture, computer interface and interface circuits, Communication circuits. Electronic instruments, control circuits and computer-controlled circuits, Characteristics of electronic units. Computer Control Processes.

EPE 222: Electrical Machines   **(4+2)**

Direct Current (DC) Machines: classifications of DC machines, magnetic circuit, windings, EMF, armature reaction, commutation. DC motors: excitation methods, magnetization curve, Torque-speed characteristics, starting and speed control of DC motors. DC generators: separately excited, self-excited, parallel operation. Efficiency of DC machines: losses and condition of maximum efficiency. Transformers: classifications, construction, basic principles; electromotive force and magnetomotive force equations. No-load operation, loaded operation. Name plate ratings. Determination of equivalent circuit parameters. Voltage regulation and efficiency. Three-phase transformers. Parallel operation. Special types.

EPE 223: Electrical Power Engineering   **(4+2)**

Introduction of electrical power transmission systems. Tie lines of electrical energy networks. Introduction of electrical distribution systems. Substations and circuit breakers. DC power transmission systems. Transients and dynamics of over voltages in high-voltage systems. Over voltage protection equipments. Electrical insulation co-ordination.

ECE 270: Logic and Electronic Circuits   **(3+2)**

Logic gates. Number systems. Boolean algebra. Karnaugh maps. decision and memory elements. Flip flop. Design of sequential and synchronized circuits. Integrated circuits family: logic integrated circuit, VLSI, integrated circuit test. shift registers, sequential counter circuits, adders, subtractors, memories. Voltage regulators.

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EMP272: Mathematics (5)   **(3+2)**

Series, Algorthems and Coding Assesstant, Vectors, Matrices and Determinants, Relations and functions, Drawing Theory, Grid System, Computer Applications Depend on Interpolation Method, Numerical Integration, Solution of Differential Equation, Linear Algebra and Matrices Processes.

GEN272: Projects Managements   **(3+2)**

Definitions, the project as part of a strategic plan, the relations between the programs, projects, budgets, regulatory plans, organizational processes of project planning, quantitative methods for project management such as, CPM, PERT, project requirements, materials, manpower, facilities, funding, scheduling the project, organizing project, project implementation, project control, performance evaluation.

THIRD YEAR

FIRST SEMESTER

EPE 311: Transmission & Distribution of Electrical Power   **(3+2)**

Transmission lines parameters: resistance, inductance and capacitance. Calculation of short, medium and long transmission lines. Mechanical design. Overhead transmission lines insulators. Corona. Distributors: DC & AC distributors, voltage drop, power losses, underground cables, DC transmission technology.

EPE 312: Electrical Machines (2)   **(4+2)**

AC windings: double-layer lap windings, double-layer wave windings, short-pitch double-layer lap and wave windings, fractional slot windings. Induced EMF in AC coils: full-pitch, chorded, distributed, and short-pitch and distributed. MMF in AC windings: single winding, full-pitch windings, short-pitch windings, three-phase windings. Three-phase synchronous machines: construction, equivalent circuit of unsaturated machines, phasor diagram of unsaturated and saturated cylindrical rotor machines, phasor diagram of unsaturated and saturated salient rotor machines, voltage regulation, power, torque, synchronous power and torque, hunting, parallel operation of synchronous machines, operational characteristics. Three-phase induction machines: construction, principle of operation, standstill and running conditions, equivalent circuit, determination of equivalent circuit parameters, dynamics and stability, induction generator, induction brakes, induction voltage regulator, unbalanced supply operation, protection.

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EPE 313: Power Electronics   (4+2)

Power semiconductors**:** types and construction, performance of switching states of diodes, power transistors and Thyristors. Characteristics and ratings of diodes and Thyristors. Protection of power semiconductors switches and their circuits against temperature rise, over current and over voltage. Rectifier circuits: operation and performance analysis of the uncontrolled and controlled rectifiers (naturally-commutated Thyristor circuits), effect of supply and load inductances on the performance. Forced commutation circuits of Thyristors. Inverter circuits: operation and performance analysis of single-phase and three-phase voltage source inverters, operation and performance analysis of single-phase and three-phase current source inverters.

EPE 314: Automatic Control   (3+2)

Introduction, mathematical basics, block diagrams, signal flow graphs, analog computer, mathematical model for physical systems, analysis of state variables for linear dynamic systems, time domain analysis of control systems, transient response, stability of control system, discrete systems, and Z transform.

EPE 315: Testing   (-+4)

Three-phase transformers: separation of iron loss into hysterias component and eddy current component, harmonic and unbalanced load conditions, the effect of iron core on harmonics, transformation from 3-phase to 2-phase, coil connections, load testing, equivalent circuit and regulation.

DC motors: torque-speed characteristics of separately-excited, series and shunt dc motors, determination of moment of inertia, speed control using thyristor.

High voltage: voltage distribution along chain insulation, measurements of insulation resistance, surface and bulk resistance, corona phenomenon, high voltage ac measurements, measurements of earth resistance.

Measurements of transmission line characteristics: measurements of resistance, inductive and capacitive reactances, measurements of voltage drops, power loss for transmission line under different load conditions, measurements of capacitance/phase for 3-phase cable, corona voltage measurements of transmission line, measurements of voltage distribution over suspended insulators, study of control fundamentals, transfer function derivation for (transformers, motors, … etc), analog computer trainer, logic circuit trainer and its installation.

GEN 371: Economics of Electrical Energy Utilization   (3+1)

Principles of economics, The importance of engineering economics, Kelvin's law, Calculation of towers, conductors and loss of power costs, Calculation of substation and overhead transmission

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lines insulators costs, Determination of transmission voltage in view of the cost, project profits, economic feasibility, economical comparison, economical life time, performance applications, administration definite, schools of administration, quantity and quality in administration. Importance of administration in engineering, manager, leader, criteria for good manager, decision maker. Technical sides and human behaviour for studying the administrative behavior.

EPE 321: Switch Gear and Protection (4+2)

Protection fundamental: inverse minimum definite time (IDMT) relay and its application, high rupturing capacity fuses, Pilot Wire Protection, Impedance Relays, Microwave Protection, Types of circuit breakers, bus bar protection, transformer protection, generators protection, generator and transformer protection, AC motors protection.

EPE 322: Analysis and Design of Electrical Machines (4+2)

Universal motors and their design, 2-phase induction motors, 1-phase induction motors and their design, design of a small 1-phase transformer, linear induction motors, stepper motors and their design.

EPE 323: Testing (-+4)

Three-phase induction machines: winding resistance measurement, no load test, locked rotor test, parameters calculations, determining friction losses and iron losses, direct load test using electro-induction locking, direct load test using loading, slipping measurement, methods of starting, induction generators, single and three phase uncontrolled rectifiers, three phase reversals, ac voltage regulators, characteristics of current transformers, characteristics of reversed time stabilizer in over-current protection (scale, adjusting, undetermined minimum point), characteristic and adjusting the differential protection, characteristics of different types of distance protections, direct current analysis to represent the symmetrical components, alternating current analysis to connect between symmetrical circuits, alternating current analysis for symmetrical studies of load flow.

EPE 324: Computer Applications in Electrical Power and Machines (4+2)

Computer-aided analysis of electrical machines: steady-state performance of DC, induction and synchronous machines, concepts of analog and digital computer, representation using flow chart. Programming principles: direct programming, solution of linear and non-linear equations, methods of solution of linear and algebraic equations, solution of differential equations by partial fraction, programming of different elements in electrical power, programming of element calculation in circuit, programming of symmetrical and unsymmetrical methods in calculation of power flow,

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solution of differential equation by partial fraction with finite time method, finite elements, method of optimal solution, method of charge representation, concept of limits elements.

EPE 325: High Voltage Engineering   (4+2)

Introduction, conduction and breakdown in gases, conduction and breakdown in liquid dielectrics, breakdown in solid dielectrics, generation of high voltages and currents, measurements of high voltages and currents, overvoltage phenomenon and insulation coordination in electric power systems, grounding systems.

GEN 37x: Elective Course of Humanities   (2+-)

FOURTH YEAR

FIRST SEMESTER

EPE 411: Power Electronics   (4+2)

Static switches**:** reversing switches, circuits with non-ideal supply. AC voltage controller: methods of control, operation and performance analysis of single phase and three-phase AC voltage controller, transformer static tap changers. DC choppers**: s**tep-down and step-up choppers, operation and performance of the step-down and step-up choppers, analysis of different types of DC regulators, analysis of thyristor chopper circuits.

EPE 412: Automatic Control   (3+2)

Root locus technique, construction of the complete root loci, roots of a polynomial, applications, root contour (multiple parameter variation), design of P-, PD-, PI– and PID controller using root locus technique, frequency domain characteristics (M_p, ω_p, band width, phase margin and gain margin). frequency domain analysis of control systems, Nyquist stability criterion. applications, stability of multi-loop systems. frequency domain design of control systems, Bode plot, design of phase lead controller, phase lag controller and phase lag – lead controller, applications.

EPE 413: Electric Testing and Standarad Specifications   (1+3)

Synchronous generators: no-load and short-circuit tests for 3-phase generators, load test for 3-phase generators, motoring and generation under rated loads, load and load angle characteristics, synchronous reactance, direct- and quadrature- axis reactance components, transient and sub-transient reactances, synchronizations, voltage step-up and step-down converters using MOSFET transistors. Electrical machines specifications: performance and rated values, experimentally-

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based calculation of losses and efficiency, protection classifications, terminals marks, direction of rotation, noise range.

EPE 414: Project   (0+2)(0+6)

After finishing the selected project, the student presents a detailed report explaining his project.

EPE 415: High Voltage Engineering   (3+2)

Breakdown in gases, breakdown in liquid dielectrics, breakdown in solid dielectrics, distribution of voltage on Suspension Insulators.

EPE 421: Utilization of Electrical Energy   (4+2)

Lighting, Home Illumination, Street Lighting, Electrical Traction, Chemical, Medical and Electrochemical Techniques, Alternative Power Resources, Transportation Using Railways, Agricultural and Orchards Applications.

EPE 422: Electric Testing and Standard Specifications   (1+3)

Electrical machines and power electronics: DC motor control: speed feedback, speed and current feedback. Single-phase Induction Motor (IM): capacitor start IM, permanent capacitor IM, universal motors, stepper motors, brushless dc motors, voltage control of IM, VSI-induction motor drives. Standard specifications: internal thermal protection, performance evaluation of 3-phase squirrel-cage IM (up to 600 V), cooling methods, equipments of power converters, assembly and general requirements, naturally cooled power converters, application guide, transformers, methods of performance specifications and test requirements of UPS, high-voltage semiconductor testing for electric power transmission, reference levels and EMI measurements transmitted by conduction.

GEN 470: Environmental Impacts of Electrical Energy   (3+1)

Introduction to science environment, how to evaluate project according to the environmental rules, evaluation methods, evaluation of environmental performance, Environmental Control law and its applications, case study.

ELECTIVE COURSES

TABLE (1)

EPE 441: Power Electronics (3)   (2+2)

Thyristor forced commutation techniques, dc choppers: analysis and operation of step-up and step-down choppers, analysis of thyristor dc chopper circuits. Inverters: operation and analysis voltage- and current- source inverters, series resonant inverters, thyristor-based forced commutated current

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source inverters, variable dc link inverters, protection of power semiconductor circuits, protection against temperature rise, voltage surges and current spikes.

EPE 442 Electric Motor Drives (1)   **(3+2)**

Elements of motor drive systems, mechanical characteristics of electric motor drive systems, motor ratings in motor drive systems, load-motor drive system stability, single phase rectifiers dc motor drive system, controlled three-phase rectifiers dc motor drive systems.

EPE 444: Electrical Power System Analysis   **(2+2)**

Per unit system, symmetrical components, symmetrical and unsymmetrical faults, load flow studies, economic operation of power systems, stability studies, transient stability, dynamic stability, optimal operation for power systems, control in voltage stabilizers, generator speed control.

EPE 446: Numerical Analysis of Electromagnetic Fields   **(2+2)**

Introduction, digital and mathematical exponential, partial differential equation, field theory, solution of partial differential equation using finite difference method and finite element method and variable method, solution of linear equation.

TABLE (2)

EPE 443: Computer Applications in High Voltage Engineering   **(2+2)**

Introduction, electrical field calculations for different gaps, charge simulation method, finite element method, finite difference method, Monte Carlo method, electric field around high voltage transmission lines, corona losses, radio interference, audible noise, practical applications for gas insulated switches, practical applications for magnetic field calculations around and under electric power transmission lines.

EPE 445: Circuit Breakers and Substation   **(2+2)**

Introduction, high voltage bus bar, current transformer (CT) and its application, potential transformer (PT) and its application, circuit breakers, testing high voltage circuit breakers, isolators, earth switch, load break switch, lightning arresters, sub-stations earthing, gas insulation sub-station (GIS).

EPE 447: Computer Applications in Power System Engineering   **(2+2)**

Programming with different model of generator and transmission lines, short circuit calculation, calculation of power flow with balanced and unbalanced loads, stability study for a generator

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connected to infinite system, study the effect of voltage regulators on unregulated voltage, power system stabilizer studies on dynamic stability.

TABLE (3)

EPE 448: Applications of Power Electronics (4+2)

Design Considerations in rectifiers, inverters, AC voltage controllers and choppers circuits, DC and AC power supplies, DC and AC motors control.

EPE 449: Electric Drive Systems (2) (4+2)

DC motor drive systems using dc choppers - Induction motor drive systems: speed control by varying the terminal voltage, speed control using voltage-source and current-source inverters. Synchronous motor drives, variable frequency motor drives, speed control of reluctance motors.

EPE 450: Control of Electric Machines (2+2)

Principles of variable speed drive systems**:** requirements of a good speed drive system, the main factors affecting the drive system, load torque and speed characteristics, trends in design and application of AC drive systems.

Fully controlled rectifier circuits feeding DC motors**:** separately excited DC motor fed from controlled rectifier which is fed from single phase or three-phase supply, DC motor control using DC choppers, principal equations of motor operation, drive systems using DC choppers.

Closed loop control of DC motors*:* **s**ingle quadrant and four quadrants variable speed drives.

Induction motor control using AC voltage controllers*:* fans, pumps and cranes drive systems, AC voltage controller starters, loss reduction.

Voltage source inverters fed induction motor control*:* three-phase voltage source inverters, breaking and four quadrant control, voltage source inverter drives.

Current source inverter fed induction motor control**:** current source inverter drive systems, variable frequency synchronous machines drive systems, stepper motors drive systems.

TABLE (4)

EPE 451: Advanced Studies in High Voltage Engineering (2+2)

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Introduction: generation of high voltages and currents, over voltage phenomenon, insulation co-ordination in electrical power systems, high voltage testing of electrical apparatus, design, planning and layout of high voltage laboratories, earthing (grounding) systems.

EPE 452: Load Forecasting in Electrical Power Systems   (2+2)

Forecasting and management: introduction, future facing, forecasting rule, introduction to quantitative forecasting, smoothing methods by using simple time series, methods of analysis of predicted time series, simple restitution methods, and multiple restitution methods.

EPE 453: Dynamic Modeling of Power Systems   (4+2)

Two reaction theory, Park's transformation, synchronous generator model, transformer model in voltage space, transmission line modeling, active and reactive power representation, different signal models, dynamic modeling for lumped mass rotor, different models for automatic voltage regulators, different models for stabilizers.

EPE 454: Advanced Studies in Electrical Power System Analysis   (4+2)

Effect of loading on the stability limit in power systems, effect of supplementary signals in increase of dynamic stability limit in power systems, transient voltage and sudden changes due to switching on and switching off for power lines, phenomena of transient magnetizing current on no load, and unsymmetrical opening and closing by using single pole switch.

ELECTIVE COURSES OF HUMANITIES

GEN 371: Economics and Management   (2+-)

Principles of Economics, The importance of Economy for Engineering, Costs, Project Benefits, Economic feasibility, Economic comparison, Economic life, Applications in the performance, Definitions of Directors, School administration, Destinations in the quantitative and qualitative management, Importance of management in engineering, Director, Commander, standards of good manager, Decision-making, technical and humanitarian aspects of the study of managerial behavior.

GEN 372: Business Administration   (2+-)

The study of financial principles and their applications in the projects, focusing on financial analysis and capital management, budget, long-term financing, policy foundations, internal budgets

GEN 373: Engineering economic analysis   (2+-)

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Factors, Engineering Feasibility, Engineering Economic Analysis, Analysis of Alternatives, Estimates of the Engineering Requirements and Cost.

GEN 374: Training visual and Formation   (2+-)
The course aims to develop the imaginative capacity in profile visible to the student through the study of elements of formation and the factors that affect the formation work and aesthetic values and the fundamentals of the compatibility of formation and the elements of understanding the aesthetic of the blocks and the surfaces, colors through the applied models.

GEN 375 Project Feasibility Studies   (2+-)
General Scope of Different Types for Feasibility Studies, Capital Feasibility study, Technical Feasibility Study, Marketing Feasibility Study, Economical Feasibility Study, Administrative Fields, General Applications for the Decisions on Income and Economical Statements.

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ELECTRICAL COMMUNICATION AND ELECTRONICS CURRICULA

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FIRST YEAR

FIRST SEMESTER

Serial	Course Code	Course Name	Hours/week			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	ECE111	Principles of Electronic Engineering	4	2	6	٣٠	30	٩٠	150	3
٢	ECE112	Electrical Circuit (1)	4	2	6	٣٠	30	٩٠	150	3
٣	ECE113C	Computer Programming	4	2	6	٣٠	30	٩٠	150	3
٤	MPE/CVG181	Civil and Mechanical Engineering	3	2	5	٤٥	-	80	125	3
٥	EMP181	Mathematics (2)(A)	3	2	5	٤٥	-	٨٠	١٢٥	٣
٦	GEN181	Engineering Legislation	2	-	2	١٠	-	٤٠	٥٠	٢
		Total	٢٠	١٠	٣٠				٧٥٠	

SECOND SEMESTER

Serial	Course Code	Course Name	Hours/week			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	ECE121	Electronics(1)	4	3	7	٤٥	30	١٠٠	175	3
٢	ECE122	Electrical Circuit (2)	3	2	5	٢٥	25	٧٥	125	3
٣	ECE123	Lab (1)	-	4	4	٣٠	20	٥٠	100	2
٤	ECE124C	Computer Applications(1)	3	4	7	٤٥	30	100	175	3
٥	EMP181	Mathematics (2)(B)	3	2	5	٤٥	-	٨٠	١٢٥	٣
٦	GEN182	English Language(2)	-	2	2	١٥	-	٣٥	٥٠	٢
		Total	١٣	١٧	٣٠				٧٥٠	

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SECOND YEAR

FIRST SEMESTER

Serial	Course Code	Course Name	Hours/week			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	ECE211	Electrical and Electronic Measurements	4	2	6	٣٠	30	٩٠	150	3
٢	ECE212	Principles of Electromagnetic	4	2	6	٣٠	30	٩٠	150	3
٣	ECE213C	Computer Organization(1)	3	2	5	٢٥	25	٧٥	125	3
٤	ECE214C	Computer Programming(2)	4	2	6	٣٠	30	90	150	3
٥	EMP281	Mathematics (3)(A)	3	2	5	٤٥	-	٨٠	١٢٥	٣
٦	GEN28x	Elective Humanities	2	-	2	١٠	-	٤٠	٥٠	٢
		Total	٢٠	١٠	٣٠				٧٥٠	

SECOND SEMESTER

Serial	Course Code	Course Name	Hours/week			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	ECE221	Signal Analysis	4	2	6	٣٠	30	٩٠	150	3
٢	ECE222	Electronics(2)	4	3	7	٤٥	30	١٠٠	175	3
٣	ECE223	Lab (2)	-	4	4	٣٠	20	٥٠	100	2
٤	ECE224C	Logic Circuits	4	2	6	٣٠	30	90	150	3
٥	EMP282	Mathematics (3)(B)	3	2	5	٤٥	-	٨٠	١٢٥	٣
٦	GEN280	Technical Reporting(1)	-	2	2	١٥	-	٣٥	٥٠	٢
		Total	١٥	١٥	٣٠				٧٥٠	

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THIRD YEAR

FIRST SEMESTER

Serial	Course Code	Course Name	Hours/week			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	ECE311	Communication Systems	4	2	6	30	30	90	150	3
٢	ECE312	Electronic Circuits(A)	4	2	6	30	30	90	150	4
٣	ECE313	Electromagnetic Waves	4	2	6	30	30	90	150	3
٤	ECE314	Lab (3)(A)	-	4	4	30	20	50	100	2
٥	ECE34x	Elective Course(1) from table(1)	4	2	6	50	-	100	150	3
٦	GEN38x	Elective Course humanities(1)	2	-	2	10	-	40	50	2
		Total	18	12	30				750	

SECOND SEMESTER

Serial	Course Code	Course Name	Hours/week			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	ECE321	Control System(1)	3	2	5	45	-	80	125	3
٢	ECE322	Electronic Circuit (B)	3	3	6	30	30	90	150	4
٣	ECE323	Communication Networks	3	2	5	45	-	80	125	3
٤	ECE424	Lab (3)(B)	-	4	4	30	20	50	100	2
٥	ECE34x	Elective Course(2) from table(2)	4	2	6	50	-	100	150	3
٦	EPE381	Electrical power and Machines	3	1	4	30	-	70	100	2
		Total	16	14	30				750	

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FOURTH YEAR

FIRST SEMESTER

Serial	Course Code	Course Name	Hours/week			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	ECE411	Antenna and wave propagation	3	2	5	25	25	75	125	3
٢	ECE412	Digital Signal Processing	3	2	5	25	25	75	125	3
٣	ECE413	Microprocessor Systems	3	2	5	25	25	75	125	3
٤	ECE414	Project	-	3	3	50	-	-	-	-
٥	ECE44x	Elective Course(3) from table(3)	4	2	6	50	-	100	150	3
٦	ECE44x	Elective Course(4) from table(4)	4	2	6	50	-	100	150	3
		Total	17	13	30				675	

SECOND SEMESTER

Serial	Course Code	Course Name	Hours/week			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	ECE421	Digital Communication	2	2	4	30	10	60	100	3
٢	ECE422	Advanced Electronic Systems	2	2	4	30	10	60	100	3
٣	ECE423	Optical Communication	3	2	5	25	25	75	125	3
٤	ECE424	Lab (4)	-	4	4	30	20	50	100	2
٥	ECE414	Project	-	5	5	50	150	-	250	-
٦	ECE44x	Elective Course(5) from table(5)	4	2	6	50	-	100	150	3
		Total	11	17	28				825	

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FIRST YEAR

FIRST SEMESTER

ECE 111: Electronic Engineering Fundamentals   (4+2)

Electric conduction mechanisms in conductors and semiconductors-semiconductor doping-energy bands-charges dynamics in semiconductor-bipolar junction and transistor fundamentals-electric machines fundamentals: generators and motors.

ECE 112: Electric Circuits (1)   (4+2)

The wave behavior- passive electric circuits-Kirchhoff's laws- different techniques for solving electrical circuits- node voltage technique-mesh current technique-the power in alternating current circuits-the effective and average value of sinusoidal waves-compound power-maximum power factor-Electric circuits behavior-nonlinear resistance-the effect of temperature on resistances and changing its value with temperature.

ECE 113C: Computer Programming (1)   (4+2)

Introduction to programming concepts, Program flow charts, structured programming in one of the programming languages, Loops, Arrays, Procedures (Functions), Records, Linked lists, Pointers and Recursion.

MPE/CVG 181: Mechanical and Civil Engineering   (3+2)

Principles of thermodynamics, Fluid movement, Ideal gas, First law of thermodynamics, Reversible processes, irreversible processes, Second law of thermodynamics, Heat cycle, Thermal equilibrium degree, Gases movement theory, Conduction, Convection, Radiation, Heat exchange, Principles of fluid mechanics

Principles of Architectural and building construction, Building types, Materials used in construction, partitions and its specifications, Methods of thermal insulations, moisture, noise and environmental effects, Methods to prepare a fire protection buildings, Specifications required to prepare the buildings to be a communication centers and its location of usages, Architectural and civil drawings and their testing and commissioning.

EMP181 Mathematics (2)(A)   (3+2)

Infinite series, Functions expantion, Diffretiation applications, Maximum and minimum limits, Lagrange multiplications, Restricted maximum and minimum limits applications, High order differential equations, Complex variable functions, Vectors analysis, Standards and vector fields,

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Vector diversion, Standard fields talus, Vector field alignment, Gauss's theory, Green's theory, Stocke's theory.

GEN 181: Engineering Legislation (2+-)

Laws and responsibilities concerning with engineers – Decision of law of contracts –explanation of laws concerning of engineering in any of that fields.

Syndicate of engineer laws – contracts town planning laws – building construction laws , High ways laws – land distribution laws – agriculture land laws – safety rules and regulation for industrial fields , operation of cranes – environmental protection , insurance laws (accident , fires) investment laws , irrigation laws , the relation between owners , rental-employment laws – industrial union.

FIRST YEAR

SECOND SEMESTER

ECE 121: Electronic (1) (4+3)

Bipolar junction applications-Transistor theory of operation-transistor dynamic and static characteristics-Thyristor-Unijunction devices-the basic characteristics-light emitting devices principles-Laser from semiconductors- light detectors-photocells-Laser characteristics and applications-the integrated circuits technology-the crystal growing-oxidation-film predeposition - Diffusion-and circuit printing and etching

ECE 122: Electric circuits (2) (3+2)

Three phase system-loads in three phase systems- unbalanced operation in electric circuits-transit and steady state in electric circuits-electric circuits analysis using the computer program PSPICE

ECE 123: Lab (1) (0+4)

Electronics basics-logic circuits-using measurement and testing instruments-measurement techniques-elements and techniques in testing and programming the computer

ECE 124C: Computer Applications (1) (3+4)

Study of computer applications in the field of information systems and the Internet, Study of the languages required to build and manage interactive web sites.

EMP182 Mathematics (2)(B) (3+2)

Complex Variable Functions, Complex Quantities Algebra, Multivalues Functions, Analytical functions and Couchy's theory, Complex Series, Taylor and Lourant's seires, Zeroes and Singular points, Infinite series.

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GEN 182: English Language (2) (-+2)

A comprehensive curriculum to teach English language to engineering students with concentrating on electrical engineering and computer terminology, Grammar, Grammatical structures, Writing and essay, Teaching using computers, Using multimedia on computers to teach English, Developing reading capabilities.

SECOND YEAR

FIRST SEMESTER

ECE 211: Electric and Electronic Measurement (4+2)

Definitions-the functions and characteristics of measurement instruments-the standard measurements- statistical analysis for errors in measurement-oscilloscope- signal generator-digital measurement instruments-recording measurement instruments-transducers-data conversion – computer based testing.

ECE 212: Fundamentals of Electromagnetic (4+2)

Direction analysis-static electric field main relations-Gauss's law-Laplace equation-Poisson equation-electrostatic energy-magnetic field theorem-magnetic induction- Faraday's laws-analogy between the electric and magnetic fields-time continuity equations-boundary conditions-time alternating fields and Maxwell's equations

ECE 213C: Computer organization (1) (3+2)

Introduction, Machine Instructions, Timing methodologies, Operating Systems, Input/Output, Organization, Interrupts, Basic Structures of Computers, Assembly language, Assemblers, Macros, Processing Unit Organization, Buses, Arithmetic and Logic Unit (ALU), Stack, Instruction Set Formats, Addressing Modes, Microprocessor Organization, Micro-programmed Control Organization, Control Memory, Address Sequencing, Micro-program sequencer, Microinstruction Formats, Processor design, Signed Numbers Representations, Memory Hierarchy, Associative Memory, Virtual Memory, Cache Memory, Memory Management Hardware.

ECE 214C: Computer Programming (2) (4+2)

Fundamentals of Object Oriented Programming in any programming language (e.g. Java), Classes, Inheritance, Input and Output Techniques, Programming for Windows

EMP281 Mathematics (3)(A) (3+2)

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Laplace and Inverse Lapalce transformations, Laplace transform of derivatives and integration, Solving of differential and integrating equations, Special Functions, Beta and Gamma Functions, Bessel's functions and Legender's polynomials, Partial Differential Equations, Integral Conversion: Fourier, Laplace, Bessel, Hankle, Hulbert.

GEN 28X: Elective Course of Humanities (1)   **(2+0)**

SECOND YEAR

SECOND SEMESTER

ECE 221: Signal Analysis   **(4+2)**
Signal representation in time and frequency domain-Continuous and discrete signals-periodic signals- Continuous and discrete Fourier transformations-spectrum representation-a periodic functions-sampling and spectrum analysis-power and energy spectrum.

ECE 222: Electronics (2)   **(4+3)**
JFET and MOSFET characteristics and theory of operation-MOSFET types-FET biasing-FET digital and analog applications-IC fabrication-VLSI IC –IC testing-power supply circuits design-Unregulated power supply-voltage references-PNPN diode-Thyristor applications-Bidirectional devices-semiconductor cell and related devices.

ECE 223: Lab (2)   **(0+4)**
Using oscilloscope - resonance circuits-zener diode circuits troubleshooting-optical electronics devices-the counters-the amplifiers-the integrated circuits regulators-JFET transistors-computer programming and organization applications

ECE 224C: Logic Circuits   **(4+2)**
Binary Number Systems, Boolean Algebra, Karnaugh Maps, Memory Elements, Latches, Flip-Flops, Synchronous Sequential Circuit, Integrated Circuits Logic Families, Shift Registers, Counters, Sequential Circuits, Combinational Circuits, Adders, Subtractors, Memory.

EMP282: Mathematics (3)(B)   **(3+2)**
Prtial Differential Equations, Wave Equations, Methods of seperation of variables, Laplace and poassoinan equations, Using of Integration Conversion in Solving Differential Equations, Numerical Analysis, Least Square, Numerical integration, Finite Difference Method, Probabilities and

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Statistical Theories, Random Variables, Cummulative Distribution Function, Moments, Gaussian Distibution, possonian Distribution, Matrics Analysis.

GEN 280: Technical Reports (1)   **(0+2)**

A comprehensive curriculum to teach the engineering students on technical English writing. The curriculum develop the ability of the students to write a short practical requirements, training the students on briefing the data.

THIRD YEAR

FIRST SEMESTER

ECE 311: Communication Systems   **(4+2)**

Amplitude, frequency and phase modulation-PCM-DPCM-TDM-FDM-ASK-FSK-PSK

ECE 312: Electronic Circuits (A)   **(4+2)**

Hybrid parameters-high frequency amplifiers impedance-Tuned and intermediate amplifiers-Bode plot and the frequency response-Matched oscillators-Mixing and modulation circuits-Power amplifiers.

ECE 313: Electromagnetic waves   **(4+2)**

Time varying fields-wave propagation in different media- wave propagation in lossless and lossy polarized materials-wave transition and reflection on planner -wave guide fundamentals**.**

ECE 314: Lab (3) (A)   **(0+4)**

Single stage and multistages transistor amplifier circuits-feedback amplifiers-amplifiers frequency response and and bandwidth –operational amplifiers

ECE 34X: Elective Course (1) from Table(1)   **(4+2)**

GEN 38X: Elective Course Humanities (2)   **(2+-)**

THIRD YEAR

SECOND SEMESTER

ECE 321: Control Systems (1)   **(3+2)**

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Classical control systems using frequency response and Laplace's transformations-Design and analysis using Nyquist plots, Bode and root locus-systems stability-time and frequency response-state variables and feedback.

ECE 322: Electronic Circuits (B)   **(3+3)**

Operational amplifier circuits-Differential amplifiers-signal generators-voltage regulators-active filters-phase locked loop circuits-using programming packages in analyzing and designing the electronic circuits

ECE 323: Communication Networks   **(3+2)**

Networks designs fundamentals-Network architecture-the characteristics of WAN, MAN and LAN

ECE 324: Lab (3) (B)   **(0+4)**

Oscillators-mixers-voltage controlled oscillators- Phase locked loop circuits -tuned amplifiers-amplitude modulators and demodulators

ECE 34X: Elective Course (2) from Table(2)   **(4+2)**

EPE 381: Electrical Power and Machines   **(3+1)**

DC Machines, Magnetic circuit, Windings, E.M.F, DC Motors, Exiting methods, B-H curve, Torque and Speed, Starting, Speed Control, DC Generators, separately exited Motors, Self exited machines, Parallel operation, Efficiency of DC machines, Losses, Maximum efficiency, Transformers, Types, Construction, EMF equations, Efficiency.

FOURTH YEAR

FIRST SEMESTER

ECE 411: Antenna and wave propagation   **(3+2)**

Transmitting and receiving antennas fundamentals-linear antennas- array antennas- microwave antennas

ECE 412: Digital Signal Processing   **(3+2)**

Discrete signals-continuous and discrete transformation-fast Fourier transform (FFT)-flow graph-quantization effects-linear transformation-digital filters-windows and sampling- optimal simulation methods.

ECE 413: Microprocessor systems   **(3+2)**

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Design and theory of operation of microprocessor –memory-input and output ports-assembly language.

ECE 414: Project   (-+3)

ECE 34X: Elective Course (3) from Table(3)   (4+2)

ECE 34X: Elective Course (4) from Table(4)   (4+2)

FOURTH YEAR

SECOND SEMESTER

ECE 421: Digital Communication   (2+2)
Digital and analog communication systems-analysis and simulation of discrete –communication channels coding-time and frequency domain in digital modulation- Interference and noise effects

ECE 422: Advanced Electronic Systems   (2+2)
Design and analysis of digital and analog electronic systems-audio and visual systems using microwaves- satellites- Mobile telephone and personal computer technologies

ECE 423: Optical Communication   (3+2)
Physical principles-light emitting and laser junctions-optical detectors-optical fibers-optical communication techniques-performing optical communication session

ECE 424: Lab (4)   (0+4)
Basic Active filters-phase locked loop circuits- frequency synthesizers-sampling and encryption-TDMA-FDMA.

ECE 414: Project   (-+5)

ECE 34X: Elective Course (5) from Table (5)   (4+2)

ELECTIVE COURSES OF HUMANITIES

GEN 281: Industrial Sociology   (2+0)

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How to organize the work under the different Establishments, topics including the integration of the development of science and technology of social organization of labor, labor relations, management strategies and the interaction of workers.

GEN 282: Organizational Behavior (2+0)

Human performance in organizations, theories of motivation, the movement of groups, power and communications, ethical performance in organizations.

GEN 381: Project Management (2+0)

Definitions, the project as part of a strategic plan, the relations between the programs, projects, budgets, regulatory plans, organizational processes of project planning, quantitative methods for project management such as, CPM, PERT, project requirements, materials, manpower, facilities, funding, scheduling the project, organizing project, project implementation, project control, performance evaluation.

GEN 382: Environmental Effect (2+0)

Introduction to science environment, how to evaluate project according to the environmental rules, evaluation methods, evaluation of environmental performance, Environmental Control law and its applications, case study.

GEN 383: Engineering Ethics (2+0)

The nature of values and ethical considerations, theories of moral values of the engineer in society, ethics in the professional work environment, safety, risk, responsibility, career choice, code of ethics, case study.

ELECTIVE COURSES

TABLE (1)

ECE 341: Introduction in Large Scale Integration Circuits (4+2)

Basic units in analog and digital integrated circuits-analysis and synthesis of analog and digital systems-analog and digital system architecture-basic cells planning and simulation methods -using programming packages in design.

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ECE 342: Advanced electronic measurements **(4+2)**

Integrated measurement Amplifiers .Comparators – S/H circuits-Digital to Analog converters-Analog to Digital converters. Electrical variables. Filtering & Signals conditioning-passive components-sensors and systems

ECE 343: Computer aided Electronic design **(4+2)**

The electronic systems-the standard components in electronics and communication-schematics and printed circuits design-using the programming packages

TABLE (2)

ECE 344: Microwaves Fundamentals **(4+2)**

Cylindrical and rectangular wave guides-main passive elements-microstrip

ECE 345: Optical Semiconductor **(4+2)**

The dynamic of charge carriers in semiconductors- Light emitting junction frequency response-laser characterstics and fundamentals

ECE 346: Transmission Lines Techniques and Theory **(4+2)**

Electromagnetic wave propagation over Transmission Lines-reflection Standing waves -terminal matching techniques- Smith chart application

TABLE (3)

ECE 441: Microwaves Electronics **(3+2)**

Microwaves transistors and amplifiers-low noise amplifiers-microwaves oscillators- microstrip-mixers and detectors.

ECE 442: Principles of Medical Engineering **(3+2)**

Safety and Isolation in Medical Devices, Methods of Deleting Noises, Heart Assistant Devices, Measurements of Physiological and Bio-Sensors, Bio-Signal Processing, Scanning Methods

ECE 443: Selected Topics (1) **(3+2)**

TABLE (4)

ECE 444: Industrial Electronics **(3+2)**

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Four layer devices- power electronic devices gate control- dc to Ac converter and vice versa- Different industrial control systems.

ECE 445: Adaptive filtering (3+2)

Optimum linear filter-Calman and Fayner filters-steepest roll-off method-LSM-algorithms.

ECE 446: Surface acoustic wave devices (3+2)

Elastic SAW, Inter-digital transducers, SAW filter types, RADAR applications, Spread Spectrum Systems

TABLE (5)

ECE 447: Robot Engineering (3+2)

Coordinate systems and transformation- robot kinematics-inverse kinematics-robot dynamics-motion path planning-robot motion control-control of robot derivers.

ECE 448: Selected Topics (2) (3+2)

ECE 449: Radar Systems (3+2)

Discrimination techniques in radar measurement-Range, angle and speed measurement-analysis of searching methods and tracking -the characteristics of reflected signals from targets

TABLE (6)

ECE 450: Space communication (3+2)

Geostationary orbit satellites-stability of angular motion- propagation loss and antenna directivity-noise and losses in atmospheric air-pulse modulation and band width-base band communications-multiple access and coding-channel bandwidth and filtering- Satellites and direct broadcasting.

ECE 451: High Frequencies Electronics (3+2)

High frequencies oscillators and amplifiers designing Techniques-Tuned circuits with distributed elements-Introduction to high frequency and microwaves

ECE 452: Mobile phones communication (3+2)

Mobile Phone Communications-The probability of signal losing-VHF & UHF ground communications-channel properties-digital mobile communications-network capacity calculations-space call distribution.

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COMPUTER ENGINEERING CURRICULA

FIRST YEAR

FIRST SEMESTER

Serial	Course Code	Course Name	Hours/week			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	ECE111	Principles of Electronic Engineering	4	2	6	٣٠	30	٩٠	150	3
٢	ECE112	Electrical Circuit (1)	4	2	6	٣٠	30	٩٠	150	3
٣	ECE113C	Computer Programming	4	2	6	٣٠	30	٩٠	150	3
٤	MPE/STRU181	Civil and Mechanical Engineering	3	2	5	٤٥	-	80	125	3
٥	EMP181	Mathematics (2)(A)	3	2	5	٤٥	-	٨٠	١٢٥	٣

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٦	GEN181	Engineering Legislation	2	-	2	١٠	-	٤٠	٥٠	٢
		Total	٢٠	١٠	٣٠				٧٥٠	

SECOND SEMESTER

Serial	Course Code	Course Name	Hours/week			Grades				Test Time
			Lecture	Practical/practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	ECE121	Electronics(1)	4	3	7	٤٥	30	١٠٠	175	3
٢	ECE122	Electrical Circuit (2)	3	2	5	٢٥	25	٧٥	125	3
٣	ECE123	Lab (1)	-	4	4	٣٠	20	٥٠	100	2
٤	ECE124C	Computer Applications(1)	3	4	7	٤٥	30	100	175	3
٥	EMP181	Mathematics (2)(B)	3	2	5	٤٥	-	٨٠	١٢٥	٣
٦	GEN182	English Language(2)	-	2	2	١٥	-	٣٥	٥٠	٢
		Total	١٣	١٧	٣٠				٧٥٠	

SECOND YEAR

FIRST SEMESTER

Serial	Course Code	Course Name	Hours/week			Grades				Test Time
			Lecture	Practical/practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	ECE211	Electrical and Electronic Measurements	4	2	6	٣٠	30	٩٠	150	3
٢	ECE212	Principles of Electromagnetic	4	2	6	٣٠	30	٩٠	150	3
٣	ECE213C	Computer Organization(1)	3	2	5	٢٥	25	٧٥	125	3
٤	ECE214C	Computer Programming(2)	4	2	6	٣٠	30	90	150	3
٥	EMP281	Mathematics (3)(A)	3	2	5	٤٥	-	٨٠	١٢٥	٣

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٦	GEN28x	Elective Humanities	2	-	2	١٠	-	٤٠	٥٠	٢
		Total	٢٠	١٠	٣٠				٧٥٠	

SECOND SEMESTER

Serial	Course Code	Course Name	Hours/week			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	ECE221	Signal Analysis	4	2	6	٣٠	30	٩٠	150	3
٢	ECE222	Electronics(2)	4	3	7	٤٥	30	١٠٠	175	3
٣	ECE223	Lab (2)	-	4	4	٣٠	20	٥٠	100	2
٤	ECE224C	Logic Circuits	4	2	6	٣٠	30	90	150	3
٥	EMP282	Mathematics (3)(B)	3	2	5	٤٥	-	٨٠	١٢٥	٣
٦	GEN280	Technical Reporting(1)	-	2	2	١٥	-	٣٥	٥٠	٢
		Total	١٥	١٥	٣٠				٧٥٠	

THIRD YEAR

FIRST SEMESTER

Serial	Course Code	Course Name	Hours/week			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	ECE311C	Microprocessor Systems	4	2	6	٣٠	30	٩٠	150	3
٢	ECE312C	Control Systems (1)	4	2	6	٣٠	30	٩٠	150	3
٣	ECE313C	Operating Systems	4	2	6	٣٠	30	٩٠	150	3
٤	ECE314C	System Analysis and Design (1)	3	2	5	٤٥	-	80	125	3
٥	ECE315C	Data Structures	3	2	5	٤٥	-	٨٠	١٢٥	٣

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٦	GEN38x	Elective Course Humanities (3)	2	-	2	١٠	-	٤٠	٥٠	٢
		Total	٢٠	١٠	٣٠				٧٥٠	

SECOND SEMESTER

Serial	Course Code	Course Name	Hours/week			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	ECE321C	Electronic Circuits(1)	3	2	5	٤٥	-	٨٠	125	3
٢	ECE322C	Computer Architecture	4	2	6	٥٠	-	١٠٠	150	3
٣	ECE323C	Database Design	3	2	5	٢٥	25	٧٥	125	٣
٤	ECE324C	Lab (3)	-	4	4	٣٠	20	50	100	2
٥	ECE34xC	Elective Course(1)	4	2	6	٥٠	-	١٠٠	١٥٠	٣
٦	EPE381	Electrical power and Machines	3	1	4	٣٠	-	٧٠	١٠٠	٣
		Total	١٧	١٣	٣٠				٧٥٠	

FOURTH YEAR

FIRST SEMESTER

Serial	Course Code	Course Name	Hours/week			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	ECE411C	Computer Graphics	3	2	5	٢٥	25	٧٥	125	3
٢	ECE412C	Artificial Intelligence	3	2	5	٢٥	25	٧٥	125	3
٣	ECE413C	Computer Networks(1)	3	2	5	٢٥	25	٧٥	125	3
٤	ECE414C	Project	-	3	3	٦٠	-	-	-	-
٥	ECE44xC	Elective Course(1)	4	2	6	٥٠	-	١٠٠	١٥٠	٣

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٦	ECE44xC	Elective Course(2)	4	2	6	٥٠	-	١٠٠	١٥٠	٢
		Total	١٧	١٣	٣٠				٦٧٥	

SECOND SEMESTER

Serial	Course Code	Course Name	Hours/week			Grades				Test Time
			Lecture	Practical/ practice	Total	Course Work	Oral or Practical	Written Exam	Total	
١	ECE421C	Compilers	4	2	6	٤٠	20	٩٠	150	3
٢	ECE422C	Lab(4)	-	5	5	٢٥	25	٧٥	125	2
٣	ECE414C	Project	-	5	5	٧٠	120	-	250	-
٤	ECE44xC	Elective Course(1)	4	2	6	٥٠	-	١٠٠	١٥٠	٣
٥	ECE44xC	Elective Course(2)	4	2	6	٥٠	-	١٠٠	١٥٠	٣
		Total	١٢	١٦	٢٨				٨٢٥	

FIRST YEAR

FIRST SEMESTER

ECE 111: Electronic Engineering Fundamentals 			**(4+2)**

Electric conduction mechanisms in conductors and semiconductors-semiconductor doping-energy bands-charges dynamics in semiconductor-bipolar junction and transistor fundamentals-electric machines fundamentals: generators and motors.

ECE 112: Electric Circuits (1) 			**(4+2)**

The wave behavior- passive electric circuits-Kirchhoff's laws- different techniques for solving electrical circuits- node voltage technique-mesh current technique-the power in alternating current circuits-the effective and average value of sinusoidal waves-compound power-maximum power factor-Electric circuits behavior-nonlinear resistance-the effect of temperature on resistances and changing its value with temperature.

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ECE 113C: Computer Programming (1)   **(4+2)**

Introduction to programming concepts, Program flow charts, Structured programming in one of the programming languages, Loops, Arrays, Procedures (Functions), Records, Linked lists, Pointers and Recursion.

MPE/STRU 181: Mechanical and Civil Engineering   **(3+2)**

Principles of thermodynamics, Fluid movement, Ideal gas, First law of thermodynamics, Reversible processes, irreversible processes, Second law of thermodynamics, Heat cycle, Thermal equilibrium degree, Gases movement theory, Conduction, Convection, Radiation, Heat exchange, Principles of fluid mechanics

Principles of Architectural and building construction, Building types, Materials used in construction, partitions and its specifications, Methods of thermal insulations, moisture, noise and environmental effects, Methods to prepare a fire protection buildings, Specifications required to prepare the buildings to be a communication centers and its location of usages, Architectural and civil drawings and their testing and commissioning.

EMP181 Mathematics (2)(A)   **(3+2)**

Infinite series, Functions expantion, Diffretiation applications, Maximum and minimum limits, Lagrange multiplications, Restricted maximum and minimum limits applications, High order differential equations, Complex variable functions, Vectors analysis, Standards and vector fields, Vector diversion, Standard fields talus, Vector field alignment, Gauss's theory, Green's theory, Stocke's theory.

GEN 181: Engineering Legislation   **(2+-)**

Laws and responsibilities concerning with engineers – Decision of law of contracts –explanation of laws concerning of engineering in any of that fields.

Syndicate of engineer laws – contracts town planning laws – building construction laws , High ways laws – land distribution laws – agriculture land laws – safety rules and regulation for industrial fields , operation of cranes – environmental protection , insurance laws (accident , fires) investment laws , irrigation laws , the relation between owners , rental-employment laws – industrial union.

FIRST YEAR

SECOND SEMESTER

ECE 121: Electronic (1)   **(4+3)**

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Bipolar junction applications-Transistor theory of operation-transistor dynamic and static characteristics-Thyristor-Unijunction devices-the basic characteristics-light emitting devices principles-Laser from semiconductors- light detectors-photocells-Laser characteristics and applications-the integrated circuits technology-the crystal growing-oxidation-film predeposition -Diffusion-and circuit printing and etching

ECE 122: Electric circuits (2)   **(3+2)**

Three phase system-loads in three phase systems- unbalanced operation in electric circuits-transit and steady state in electric circuits-electric circuits analysis using the computer program PSPICE

ECE 123: Lab (1)   **(0+4)**

Electronics basics-logic circuits-using measurement and testing instruments-measurement techniques-elements and techniques in testing and programming the computer

ECE 124C: Computer Applications (1)   **(3+4)**

Study of computer applications in the field of information systems and the Internet, Study of the languages required to build and manage interactive web sites.

EMP182 Mathematics (2)(B)   **(3+2)**

Complex Variable Functions, Complex Quantities Algebra, Multivalues Functions, Analytical functions and Couchy's theory, Complex Series, Taylor and Lourant's seires, Zeroes and Singular points, Infinite series.

GEN 182: English Language (2)   **(-+2)**

A comprehensive curriculum to teach English language to engineering students with concentrating on electrical engineering and computer terminology, Grammar, Grammatical structures, Writing and essay, Teaching using computers, Using multimedia on computers to teach English, Developing reading capabilities.

SECOND YEAR

FIRST SEMESTER

ECE 211: Electric and Electronic Measurement   **(4+2)**

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Definitions-the functions and characteristics of measurement instruments-the standard measurements- statistical analysis for errors in measurement-oscilloscope- signal generator-digital measurement instruments-recording measurement instruments-transducers-data conversion – computer based testing.

ECE 212: Fundamentals of Electromagnetic   (4+2)

Direction analysis-static electric field main relations-Gauss's law-Laplace equation-Poisson equation-electrostatic energy-magnetic field theorem-magnetic induction- Faraday's laws-analogy between the electric and magnetic fields-time continuity equations-boundary conditions-time alternating fields and Maxwell's equations

ECE 213C: Computer organization (1)   (3+2)

Introduction, Machine Instructions, Timing methodologies, Operating Systems, Input/Output, Organization, Interrupts, Basic Structures of Computers, Assembly language, Assemblers, Macros, Processing Unit Organization, Buses, Arithmetic and Logic Unit (ALU), Stack, Instruction Set Formats, Addressing Modes, Microprocessor Organization, Micro-programmed Control Organization, Control Memory, Address Sequencing, Micro-program sequencer, Microinstruction Formats, Processor design, Signed Numbers Representations, Memory Hierarchy, Associative Memory, Virtual Memory, Cache Memory, Memory Management Hardware.

ECE 214C: Computer Programming (2)   (4+2)

Fundamentals of Object Oriented Programming in any programming language (e.g. Java), Classes, Inheritance, Input and Output Techniques, Programming for Windows

EMP281 Mathematics (3)(A)   (3+2)

Laplace and Inverse Lapalce transformations, Laplace transform of derivatives and integration, Solving of differential and integrating equations, Special Functions, Beta and Gamma Functions, Bessel's functions and Legender's polynomials, Partial Differential Equations, Integral Conversion: Fourier, Laplace, Bessel, Hankle, Hulbert.

GEN 28X: Elective Course of Humanities (1)   (2+0)

SECOND YEAR

SECOND SEMESTER

ECE 221: Signal Analysis   (4+2)

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Signal representation in time and frequency domain-Continuous and discrete signals-periodic signals- Continuous and discrete Fourier transformations-spectrum representation-a periodic functions-sampling and spectrum analysis-power and energy spectrum.

ECE 222: Electronics (2)   (4+3)
JFET and MOSFET characteristics and theory of operation-MOSFET types-FET biasing-FET digital and analog applications-IC fabrication-VLSI IC –IC testing-power supply circuits design-Unregulated power supply-voltage references-PNPN diode-Thyristor applications-Bidirectional devices-semiconductor cell and related devices.

ECE 223: Lab (2)   (0+4)
Using oscilloscope - resonance circuits-zener diode circuits troubleshooting-optical electronics devices-the counters-the amplifiers-the integrated circuits regulators-JFET transistors-computer programming and organization applications

ECE 224C: Logic Circuits   (4+2)
Binary Number Systems, Boolean Algebra, Karnaugh Maps, Memory Elements, Latches, Flip-Flops, Synchronous Sequential Circuit, Integrated Circuits Logic Families, Shift Registers, Counters, Sequential Circuits, Combinational Circuits, Adders, Subtractors, Memory.

EMP282: Mathematics (3)(B)   (3+2)
Prtial Differential Equations, Wave Equations, Methods of seperation of variables, Laplace and poassoinan equations, Using of Integration Conversion in Solving Differential Equations, Numerical Analysis, Least Square, Numerical integration, Finite Difference Method, Probabilities and Statistical Theories, Random Variables, Cummulative Distribution Function, Moments, Gaussian Distibution, possonian Distribution, Matrics Analysis.

GEN 280: Technical Reports (1)   (0+2)
A comprehensive curriculum to teach the engineering students on technical English writing. The curriculum develop the ability of the students to write a short practical requirements, training the students on briefing the data.

THIRD YEAR

FIRST SEMESTER

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ECE 311C: Microprocessor Systems   (4+2)

Microprocessor theory and design, Semiconductors technology , Architecture, Assembly language, Input/Output, Peripheral design, Applications and connections.

ECE 312C: Control Systems (1)   (3+2)

Introduction of control systems and feedback systems concepts, Modeling of discrete-time systems using difference equations and the Z-transform, Samples of test signals, State-space analysis, Time-response of control systems, Control systems stability, Digital controller design.

ECE 313C: Operating Systems   (4+2)

Hardware principles, processes concepts, processes scheduling, Memory Organization and management for single user and multi user systems, virtual memory organization and management, hard disk scheduling and usage in an optimum method, file systems management, studying of some of the most commonly used operating systems.

ECE 314C: System Analysis and Design (1)   (4+2)

Information requirements analysis, Physical and logical data flow diagrams, Processes' specifications, Writing and presenting systems proposal, Some practical applications.

ECE 315C: Data Structures   (3+2)

Practical data structures and its analysis, Lists, Sets, Trees, Priority queue, Stacks, Linked stacks, Balanced trees data structures, Advanced tree structures, Recurrence relations, Advanced sorting algorithms, Big *O,* Worst case analysis, Lower bounds analysis, Basic principles of Algorithm design, Divide and conquer, Backtracking, Dynamic Programming.

GEN 38X: Elective Course Humanities (3)   (2+0)

THIRD YEAR

SECOND SEMESTER

ECE 321C: Electronic Circuits (1)   (3+2)

Hybrid parameters-high frequency amplifiers impedance-Tuned and intermediate amplifiers-Bode plot and the frequency response-Matched oscillators-Mixing and modulation circuits-Power amplifiers.

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ECE 322C: COMPUTER ARCHITECTURE   **(4+2)**

High performance of computer architecture including pipeline architecture, High speed memory systems, Vector processors, Parallel processors and interconnection networks.

ECE 323C: Database Design   **(3+2)**

Introduction to database concepts and operations, basic principles, database architecture, storage structure and indexing, database structure: hierarchal, network, relational, Relational database and SQL languages, relational Algebra and calculus, Normalizations, Keys, functional dependency, Multi-valued functional dependency, Design of a simple Database, Overview of data retrieval languages.

ECE 324C: Laboratory (3)   **(-+4)**

The experiments in this course include the following topics: Data Communication, Control Systems, computer circuits, signal analysis, operating systems, computer architecture, programming analysis.

EPE 381: Electrical Power and Machines   **(3+1)**

DC Machines, Magnetic circuit, Windings, E.M.F, DC Motors, Exiting methods, B-H curve, Torque and Speed, Starting, Speed Control, DC Generators, separately exited Motors, Self exited machines, Parallel operation, Efficiency of DC machines, Losses, Maximum efficiency, Transformers, Types, Construction, EMF equations, Efficiency.

FOURTH YEAR

FIRST SEMESTER

ECE 411C: Computer Graphics   **(3+2)**

Computer graphics concepts, Graphics packages and its binding with standard software languages, 2D and 3D algorithms, Mathematics for modeling, Mathematics for transformation, Mathematics for projection, Mathematics for clipping, introduction to modeling, texture mapping, rendering, shading and lighting, different practical applications.

ECE 412C: ARTIFICIAL INTELLIGENCE   **(3+2)**

Principles of Artificial Intelligence, probabilistic search, knowledge coding, expert system engineering, natural language processing, knowledge representation, Robot, AI languages application, Neural networks.

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ECE 413C: Computer Networks(1)   **(3+2)**

An introduction to the principles of communication networks, Network Standards, Phone Networks, ISDN and B-ISDN, Signals, LANS and WANS, Evaluating Networks performance.

ECE 414C: Graduation Project   **(-+3)**

The Student is asked to design and implement a project in one of the areas related to his study, The project should represent a real Engineering application and encourage the ability to work and produce within a team. The student should follow an Engineering approach based on a scientific basis to implement the project. When finishing it, should make and present a detailed report about his work.

FOURTH YEAR

SECOND SEMESTER

ECE 421C: COMPILERS   **(4+2)**

simple sentence construction, symbol tables, scanning tokens, scanning sentences, code generation, error identification, code optimization, runtime environment, bootstrapping and porting

ECE 422C: Laboratory (٤)   **(-+5)**

The experiments in this course include the following topics: components of computer networks, network protocols, computer architecture, Applications Of Artificial Intelligence, Database design.

ELECTIVE COURSES FOR THIRD YEAR

ECE 341C: System Analysis and design (2)
Data coding, task scheduling, training, system test and update, some practical applications.

ECE 342C: Programming languages
Principles of programming languages, architecture of programming languages, processing time, memory management, study of one programming language.

ECE 343C: Software Engineering
Lifecycle of programs and applications, Customer needs evaluation, Different program structures, Program properties and measurement techniques, Project management and its applications.

ECE 344C: Selected topics in computer engineering

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This course includes some topics which meet special interests of students and the department. It is a flexible course that could include recent topics which are not covered in other subjects. It could include topics related to software, hardware and systems.

ELECTIVE COURSES FOR FOURTH YEAR

ECE 441C: Image processing

Fundamentals, Digital image processing, Applications, 2D transformations, preprocessing techniques, edge detection, Applications of some practical problems.

ECE 442C: Peripheral Devices

Input and Output devices, Monitors, audio output, keyboard and related devices, printers, plotters, Tape devices, storage media, magnetic disks and tapes, Optical devices, maintenance of peripheral devices.

ECE 443C: Computer security

Security attacks and methods of defense, Encryption and decryption techniques, Viruses, security of operating systems and databases, Security of PCs, networks and communications, Ethics of security.

ECE 444C: Operations Research and Management Systems

Quantitative decision-making, Modeling of the classical selection, Replacement, Maintenance, Reliability Problems, Stochastic Methods, Simulation, Expert Systems, Decision analysis, Project management, PERT Techniques, Computer Methods in Project Management, Scheduling, Resources Analysis.

ECE 445C: Distributed Processing

Architecture of distributed systems, operating systems of distributed systems, Networks and distributed databases.

ECE 446C: Advanced Control Systems

Differentiation of maximum values, Variable differentiation and continuous ideal differentiation, Value principle and Hamiliton-Jacobian theory, Examples of ideal control systems, Separate variable differentiation and the principle of the separate maximum value, Linear and non-linear programming, dynamic programming methods, Applications on Artificial intelligence in control systems.

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ECE 447C: Neural networks

Introduction to human and artificial neural networks, Parallel processing, Main components of neural networks, Classification of neural networks, Backpropagation and counter propagation techniques, Supervised and unsupervised learning algorithms, Processing data for learning, Different architectures of neural networks, Hopfield and Boltzmann models, Some applications of neural networks.

ECE 448C: Information systems

Concepts and components of information systems, Factors of engineering feasibility, Engineering economic analysis, Analyzing alternatives, Cost estimation techniques.

ECE 449C: Selected topics in computer engineering

This course includes some topics which meet special interests of students and the department. It is a flexible course that could include recent topics which are not covered in other subjects. It could include topics related to software, hardware and systems.

ECE 451C: Robotics Systems

Statics and dynamics of robots, Path planning, Sensors, Control of robots (Force and motion), Robotics vision, Robotics programming languages.

ECE 452C: Engineering Systems Simulation

Introduction to modeling and simulation of continuous and interrupted systems, and hybrid systems, Simulation languages, Practical applications.

ECE 453C: Artificial Intelligence programming

Introduction to LISP and Prolog, Programming applications in AI.

ECE 454C: EXPERT SYSTEMS

review of AI principles, knowledge representation methods, logical programming, expert system architecture (knowledge base, working memory, inference engine, inference methods)

ECE 455C: Management Information Systems

Structures rules and organizational policy, Sources of Computer Systems: computer Systems, Distributed Systems, Information Foundations, the user final computation, Management and Organization, foundations of management information systems, information support systems,

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decision support systems, information executive systems, Artificial Intelligence applications, Expert Systems, Library Information Systems, Development and Management of Information Systems.

ECE 456C: Software Engineering

Design Quality Assurance, Design Review, Quality Matrix Design, Evaluation of the dealing with users, programming training, Computer-Aided Engineering Programming, Software Testing, Software Management, Measuring the efficiency of programs.

ECE 457C: Systems Engineering

Systems Sciences, introduction about historical evolution and relations with skills, Operations Research, Systems Analysis and System Engineering, The principles of the basic structure: System Applications in different domains, computer multi-systems, Communication Systems, Industrial Systems, Commercial Systems.

ECE 458C: Computer Vision

Image features, the discovery of lines and contours,   Image segmentation and transformation, Features Extraction of Images, Practical Application of computer vision for Pattern Recognition and Classification.

ECE 459C: Selected Topics in Computer Engineering

This course includes some topics which meet special interests of students and the department. It is a flexible course that could include recent topics which are not covered in other subjects. It could include topics related to software, hardware and systems.

ECE 460C: Computer Networks (2)

Advanced topics in computer networks, Computer networks protocol, Distribution systems, Engineering and applications, Introduction in internet protocol, Transmission engineering protocol, Security in networks.

ELECTIVE COURSES OF HUMANITIES

GEN 281: Industrial Sociology   (2+0)

How to organize the work under the different Establishments, topics including the integration of the development of science and technology of social organization of labor, labor relations, management strategies and the interaction of workers.

GEN 282: Organizational Behavior   (2+0)

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جامعة بنها

Human performance in organizations, theories of motivation, the movement of groups, power and communications, ethical performance in organizations.

GEN 381: Project Management   (2+0)

Definitions, the project as part of a strategic plan, the relations between the programs, projects, budgets, regulatory plans, organizational processes of project planning, quantitative methods for project management such as, CPM, PERT, project requirements, materials, manpower, facilities, funding, scheduling the project, organizing project, project implementation, project control, performance evaluation.

GEN 382: Environmental Effect   (2+0)

Introduction to science environment, how to evaluate project according to the environmental rules, evaluation methods, evaluation of environmental performance, Environmental Control law and its applications, case study.

GEN 383: Engineering Ethics   (2+0)

The nature of values and ethical considerations, theories of moral values of the engineer in society, ethics in the professional work environment, safety, risk, responsibility, career choice, code of ethics, case study.