

University of Mosul



First Cycle - Bachelor's Degree - B.Sc.

Electrical Engineering

Electronics and Communications - Power and Machines

بكالوريوس الهندسة الكهربائية - الإلكترونيك والاتصالات - والقدرة والمكائن



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1. Overview

This catalogue presents the modules offered by the two Electrical Engineering programmes - Electronics and Communications, and Power and Machines - leading to the Bachelor of Science degree. Each programme comprises 59 modules, a total student workload of 6,000 hours, and 240 ECTS credits. Module delivery follows the Bologna Process.

2. Undergraduate Courses 2026-2027 - Electronics and Communications -

Module 1

Code	Course/Module Title	ECTS Credits	Semester
EE101	Basics of Electrical Engineering I	8	One
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)

3	3	93	107
Module Description			
Basic Concepts and Units: Electricity & atomic structure of substance, current and current density, current flow, electric circuit, EMF & potential difference, International System of Units, abbreviation for multiples & sub-multiples, quantities derived from SI units, units of force-energy-torque and power, relation between energy and heat, electric units, efficiency & percentage efficiency, electromechanical equivalent of element. Analysis of DC Circuit: Ohm's law, resistivity & conductivity, effect of temperature, internal resistance of a source, open circuit & short circuit, equivalent resistance: Series-parallel, delta and star, grouping of EMF sources, power calculation in DC circuit, introduction to network theorems, types of source: independent and dependent voltage and current sources and their transformation, Kirchhoff's laws: KVL-KCL, Maxwell's circulating currents (mesh analysis), nodal analysis, superposition theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Millman's theorem, substitution theorem, reciprocity theorem.			

Module 2

Code	Course/Module Title	ECTS Credits	Semester
EE102	Mathematics I	6	One
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			
Matrices: Basic Definitions, Addition, Subtraction and Multiplication, Determinants, The Inverse of a 3 x 3 Matrix, Cramer's Rule, Solve equations by Matrices: Gaussian Elimination. the method of finding the inverse of a square matrix, solution of simultaneous linear equations by matrix method. Coordinates and Graphs in the Plane: Directions and Quadrants, Distance between Points, Graphs of Equations, Intercepts and More about Graphing, Slope and Equations for Lines: Slope of Non-vertical Lines, Lines that are Parallel or Perpendicular, Point – Slope Equations, Slope – Intercept Equations, Functions and their Graphs, Domains and Ranges are Often Intervals, Even Functions and Odd Functions, Functions Defined in Pieces, Shifts, Circles, and Parabolas: How to Shift a Graph, Equations for Circles in the Plane, Equations for Parabolas, A Review of Trigonometric Functions: Radian Measure, The Six Basic Trigonometric Functions, Calculating Sines and Cosines, Graphs of Trigonometric Functions, Limits and Continuity: Limits, Examples of Limits, The Sandwich Theorem and $\lim_{x \rightarrow a} f(x) = L$, Limits Involving Infinity, Continuous Functions. Derivatives: Slopes, Tangent Lines, and Derivatives, Defining Slopes and Tangent Lines, The Derivative of a function, The Slope of Lines, Differentiation Rules: Integer Powers, Multiples, Sums, and Differences, Second and Higher Order Derivatives, Negative Integer Powers of x, Velocity, Speed, and Other Rate of Change: Velocity, Speed, Acceleration, Derivatives of Trigonometric Functions: The Derivative of the Sine, The Derivative of the Cosine, The Derivative of the Other Basic Functions, The Chain Rule: Integer Powers of Differentiable Functions, Derivative Formulas that Include the Chain Rule, Implicit Differentiation and Fractional Powers: Lenses, Tangents, and Normal Lines, Using Implicit Differentiation to Find Derivatives of Higher Order, Fractional Powers of Differentiable Functions, Linear Approximations and Differentials.			

Module 3

Code	Course/Module Title	ECTS Credits	Semester
EE103	Engineering Drawing	4	One
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)

2	2	63	37
Module Description			
Engineering Instruments, Lettering, Types of Lines, Orthographic Projection I, Graphic Geometry, Dimensions. Orthographic Projection II, Isometric Drawing. Computer Drawing: Introduction to Auto CAD, Dimension Units Commands, Drawing Commands, Drawing Files, Text commands.			

Module 4

Code	Course/Module Title	ECTS Credits	Semester
EE104	Physics I	4	One
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	67
Module Description			
Introduction to physics; measuring things, quantities, units systems, dimensional analysis, vector and scalar quantities, vector properties, resultant addition and subtraction of vector quantities. Motion in one and two dimensions, position and displacement, velocity, acceleration. Force and motion; Newton's first law, force, mass, Newton's second law, gravitational force, weight, normal force, and tension force. Newton's third law, applying Newton's laws, Force and motion, friction, uniform circular motion. Work; Kinetic and Potential Energy; The work-kinetic energy theorem; Conservation of total mechanical energy. Spring forces and Hooke's law; Power and Efficiency. Linear momentum; Momentum and kinetic energy; Rate of change of linear momentum and Newton's laws; Law of conservation of linear momentum; Impulse; and Simple Harmonic Motion. Universal gravitation; Newton's law of universal gravitation; Free-fall acceleration and the gravitational force; and Solve problems using Newton's law of universal gravitation and calculate the gravitation for different locations. Fluid mechanics; Pressure and density of fluid at different depths; Hydrostatic pressure; Pascal's principle and the operation of a hydraulic lift; Buoyant forces and Archimedes's principle; the equation of continuity for fluids; and the Bernoulli's equation. Heat Transfer (Conduction, Convection, and Radiation). Basics of Architectural Physics; and Solar Radiation. Sound; Noise; Sound Intensity. Sound Insulation; and Thermal Behaviour of Materials. Current and Voltage; electrical circuit; and Ohm's Law. Power and Energy; and Parallel and Series Networks.			

Module 5

Code	Course/Module Title	ECTS Credits	Semester
EE105	Engineering Mechanics	3	One
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	42
Module Description			
Static: Force system, Units system, Forces + Components, Resultant, Moment and Couples, Equilibrium, Centroid, Moment of Inertia, Friction. Dynamics: Rectilinear motion, Curvilinear motion, Projectile, Circular motion, Acceleration Components (Rectangular Comp., Normal Tangential Comp.), Newton's second law of motion. Thermodynamics: Properties of Substance, Pressure and Temperature, Work and Energy, Ideal Gas, First Law of Thermodynamics, 2nd Law of Thermodynamics. Hooke's law.			

Module 6

Code	Course/Module Title	ECTS Credits	Semester
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UOM1031	Computer 1	3	One
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	2	63	12
Module Description			
Introduction to engineering computing and basic computer use; software systems and digital productivity tools; digital data representation for engineering applications; data and information management; computer networks and internet technologies; cybersecurity fundamentals and digital ethics; cloud computing, the Internet of Things, artificial intelligence, and emerging technologies; computational thinking and engineering problem solving; algorithms and pseudocode; flowcharts and structured problem representation; introduction to programming concepts and a Python preview; conditional logic, iteration, and basic data handling; an integrated mini-application and course review.			

Module 7

Code	Course/Module Title	ECTS Credits	Semester
UOM1011	Arabic Language 1	2	One
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
The goal of this semester is to introduce students to the main topics of the Arabic language course. The semester will cover the basic requirements of Arabic language definitions, grammar of tenses, the development of grammatical abilities for singular, plural, and forbidden forms of inventory, as well as rhetoric and application. At the end of the semester, students will have a broad knowledge of the concepts and this will be achieved through theoretical lectures, lessons, pit assignments, and reports related to the topics being discussed.			

Module 8

Code	Course/Module Title	ECTS Credits	Semester
EE108	Basics of Electrical Engineering II	8	Two
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	3	93	107
Module Description			
Alternating quantities, generating of single phase voltage, waveforms instantaneous value and real, RMS and Average values, analysis of AC Circuit: Ohm's law, impedance & admittance, conductance and susceptance, internal impedance of a source, open circuit & short circuit, equivalent impedance: Series-parallel, delta and star, power calculation in AC circuit, introduction to network theorems, types of source: independent and dependent voltage and current sources and their transformation, Kirchhoff's laws: KVL-KCL, Maxwell's circulating currents (mesh analysis), nodal analysis, superposition theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, resonant circuits.			

Module 9

Code	Course/Module Title	ECTS Credits	Semester
EE109	Mathematics II	6	Two
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			
Polar coordinates system: Polar coordinates system and the graphs of polar equations, plane area in polar coordinates, arc length of curves in polar coordinates. Brief Review: about differentiation and integration law, Applications of definite integral: Area between curves. Volume of solid revolution. Arc length of a plane curve. Surface area of arc length revolution. Methods of integration: Trigonometric substitutions. Partial fractions. Integration by parts. Further substitutions. First order differential equations: variable separable differential equations. Homogeneous differential equations. Linear differential equations. Exact differential equations. Numerical integration: Simpson's approximation methods. Limit: L'Hopital method and its applications.			

Module 10

Code	Course/Module Title	ECTS Credits	Semester
EE110	Computer Programming	6	Two
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	2	63	87
Module Description			
Introduction to MATLAB. Types of variables, numbers. Expressions, operation and function. Matrix and its applications. Solving set of linear equations. Solving of Electrical circuit. Control flow in MATLAB program. Curve fitting, interpolation. Function and its application (pulse & ramp functions). Numerical application (numeric differentiation and numerical integration. Engineering graphics (two dimension and three dimensions) such as vector diagram mesh, bar plots). Solving equation by symbols. Solving of transient response in electrical circuit. Fourier series and Fourier transform. Solving of ordinary differential equation. Capacitor smoothing circuit analysis. Three phase analysis.			

Module 11

Code	Course/Module Title	ECTS Credits	Semester
EE111	Digital Techniques	3	Two
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	1	48	27
Module Description			
Introduction to Digital Techniques, Basic Definitions, System of Numbers, General number formula: Binary, octal, decimal & hexadecimal numbers, Number-base conversion (Arithmetic operation in different numbers complements, binary codes, BCD, Ex-3, gray codes), Boolean algebra: (Basic definitions, basic theorem & properties, Boolean functions), Canonical & Standard Forms Digital Logic Gates, Karnaugh Maps (AND & OR implementation, don't care condition), Adders Arithmetic Operation (Subtractors, half & full adders & Subtractors,			

binary parallel adders), Code Conversion (Even and odd parity logic, decoders, encoders comparator, multiplexers & demultiplexers), Sequential Logic (Flip Flops (RS, T, D, JK...) Master slave FF, Counters, Shift registers).

Module 12

Code	Course/Module Title	ECTS Credits	Semester
EE112	Physics II	3	Two
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	1	48	27
Module Description			
Energy Level and Atomic Structure: The atom, models, wave nature of light, dual nature of matter, energy-band theory of metals, insulators and semiconductors, crystal structure, ionic, covalent and metallic bonding, energy band of crystals, Internal structure of materials cell, packing miller indices, crystal planes and directions. Electrical Conduction in Metals: Mobility and conductivity, energy distribution of electrons, Fermi levels, work function, electronic emission. Semiconductors: Semiconductors materials (Si, Ge and compound semiconductors), extrinsic semiconductors, Fermi-level in semiconductor, diffusion and carrier lifetime, Hall effect. Semiconductor p-n Junction: p-n junction in equilibrium, current-voltage characteristics, charge-control description of a diode, Transition and diffusion capacitances, diode switching times, diode models, small-signal model and load line concept, and introduction to Hetero-junctions and double Hetero-junctions. Diode Circuit Applications: Rectifiers, Zener diodes voltage regulators, clipping circuits, clamping circuits and waveform generation. Other Types of Semiconductor Diodes: Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal-semiconductor devices. Principles of transistor operation and types, Transistor biasing circuits, Application Circuit.			

Module 13

Code	Course/Module Title	ECTS Credits	Semester
UOM1040	Democracy and Human Rights	2	Two
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
Definition and sources of democracy and human rights (international, regional, national, religious). Characteristics of democracy and human rights: universality, indivisibility, interdependence, inalienability. Emergence and evolution of human rights: historical development, key milestones, influential movements. Types of human rights: civil and political, economic and social, environmental, cultural, and developmental. Guarantees to prevent human rights violations: legal, institutional, societal safeguards, Islamic guarantees, national and international levels. Concept of democracy: principles, values, forms of governance (direct, semi-direct, indirect). Islamic stance on democracy: compatibility, strengths, weaknesses. Critique of the democratic system: analysis of strengths and weaknesses. Administrative corruption: definition, types, societal impact. Methods to combat administrative corruption.			

Module 14

Code	Course/Module Title	ECTS Credits	Semester
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UOM1021	English Language 1	2	Two
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
Pronunciation, reading and writing. General knowledge of fundamental grammatical structures and functions (e.g. sentence types, tenses, voice, parts of speech, word order. Acquiring fundamental vocabulary to fulfill the above-mentioned functions in roles, topics and discussions.			

Module 15

Code	Course/Module Title	ECTS Credits	Semester
EEEC201	Electrical Circuits Analysis I	5	Three
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
4	2	93	32
Module Description			
Transient Circuits: The Transient Circuits: RC, RL, RLC circuit in series and parallel and their complete response in time and Frequency. Poly-phase Circuits: Poly-phase Circuits: single-phase and three-phase systems, balanced and unbalanced three-phase systems, star and delta connections. Power in 3-phase circuits. Magnetic coupling circuit: Magnetic coupling circuit: Coefficient of coupling, Linear and ideal transformers.			

Module 16

Code	Course/Module Title	ECTS Credits	Semester
EEEC202	Mathematics III	5	Three
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
4	1	78	47
Module Description			
Vectors: Vectors component and Units, Space coordinate and Space Vector, Scalar Product and Vector Product, Units and plane equation, equations of lines and planes, Product of Three Vectors, Applications. Vector Functions and Their Derivatives gradient of a scalar field; Divergence of Vector Field; Curl of Vector Field; Directional Derivatives; Gradient, Divergence and Curl in Curvilinear Coordinates. Differential Equations: Introduction to Differential Equations, 1st and 2nd order linear differential equations with constant coefficients, solution via the auxiliary equation, nonhomogeneous equations, application to electrical systems. Coupled 1st order linear differential equations; transformation of higher order linear differential equations into coupled differential equations. Homogeneous differential of higher order. Fourier series: The need for Fourier series, Periodic functions, Fourier Series-Euler formulas. Even and odd functions, Half-Range expansions, Application in electrical engineering			

Module 17

Code	Course/Module Title	ECTS Credits	Semester
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EEEC203	Electronics Principles	4	Three
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	37
Module Description			
Transistor Construction. Transistor Symbols. Transistor Operation. Transistor Connections: Common Base CB Connection, Common Emitter CE Connection. Transistor Curves, Cutoff and Saturation. Transistor as a switch. Common Collector Connection Transistor Load Line Analysis Operating Point Transistor Parameters and Rating Amplification. Practical Circuit of Transistor Amplifier, DC and AC Equivalent Circuits. Transistor AC equivalent Circuits h-parameters, Hybrid Equivalent Circuit. The Linear Amplifier The AC Load Line AC Analysis Using re Model for Transistor Common – Emitter Fixed – Bias Configuration Common – Emitter Emitter – Bias Configuration Common – Emitter Collector Feedback Configuration Common – Emitter Voltage Divider Configuration the Common – Collector Amplifier the Common – Base Amplifier Multistage Transistor Amplifiers.			

Module 18

Code	Course/Module Title	ECTS Credits	Semester
EEEC204	Communication Principles	5	Three
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	62
Module Description			
Transmission Lines basics: Reflection in transmission line, Space-Time diagram (zig-zag), Discharge of transmission line. Transmission line equation, Propagation constant, Transmission line distortion, AC Steady state transmission line, Standing wave in transmission line. Transmission Lines analysis: Graphical solution of lossless transmission line using lattice diagram. Graphical solution of lossless transmission line using Smith chart. Graphical solution of lossy transmission line using Smith chart. Transmission line matching using Quarter Wave Transformer ($\lambda/4$). Transmission line matching using single stub. Signals and Systems: Signal classifications. Fourier series. Fourier Transform. Signals and linear systems. Power spectral density and Correlation.			

Module 19

Code	Course/Module Title	ECTS Credits	Semester
EEEC205	Electromagnetic Fields	4	Three
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	1	48	52
Module Description			
coordinate systems: rectangular coordinate system, cylindrical coordinate system, spherical coordinate system. vector analysis: scalars and vectors, vector algebra, vector components and unit vectors, vector addition and subtraction, vector multiplication. coulomb's law and electric force: the experimental law of coulomb. electric field intensity: electric field of a point charge, electric field of n point charges. electric fields due to continuous charge distributions: electric field of a line charge. electric fields due to continuous charge distributions: electric field of a sheet of charge. electric fields due to continuous charge distributions: electric field of a volume of charge. electric flux density and gauss's law: gauss's law application on a point charge, gauss's law application on a line charge. electric flux density and gauss's law: gauss's law application on a surface charge. electric flux density and gauss's			

law: gauss's law application on a volume charge. work, potential & potential difference: work done in moving a point charge. work, potential & potential difference: potential & potential difference. conductors, dielectrics, and capacitance: electric fields in material space. conductors, dielectrics, and capacitance: dielectric – dielectric boundary conditions, conductor – dielectric boundary conditions, conductor – free space boundary conditions. conductors, dielectrics, and capacitance: capacitance and capacitors.

Module 20

Code	Course/Module Title	ECTS Credits	Semester
EEEC206	Electrical Engineering Lab. I	3	Three
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
0	2	33	42
Module Description			
Circuit Components and values: DC circuits, Current and voltage definitions, Passive sign convention and circuit elements, Resistive networks, real and ideal elements, voltage and current sources. Circuit reduction: combining sources, Combining resistive elements in series and parallel, delta and star transformation. Circuit Theory: Kirchhoff's laws and Ohm's law. Introduction to mesh and nodal analysis, Introduction to Thevenin and Norton theory, maximum power transfer, introduction to superposition theory.			

Module 21

Code	Course/Module Title	ECTS Credits	Semester
UOM2050	The crimes of the Baath regime in Iraq	2	Three
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			

Module 22

Code	Course/Module Title	ECTS Credits	Semester
UOM2012	Arabic Language 2	2	Three
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			

Active and passive voice and conversion between them; classes of Arabic verbs and their meanings; the subjunctive and jussive moods of the present tense, their particles, and grammatical signs; numbers, their types, gender agreement, and inflection; distinguishing the Arabic letters dad and za in pronunciation and writing; punctuation and its use in scientific texts; treatment of common grammatical, spelling, and morphological errors; adverbial objects and the comitative object and their parsing; applications in text analysis, sentence parsing, and writing accurate scientific and functional Arabic.

Module 23

Code	Course/Module Title	ECTS Credits	Semester
EEEC208	Electrical Circuits Analysis II	5	Three
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
4	2	93	32
Module Description			
Two-Port Networks: Two-Port Networks: one-port networks, y-z-h-g and ABCD parameters. Frequency Response: Complex Frequency and Circuit Analysis in the s-Domain. Frequency Response. Filters: Constant k-filters, Low pass and high pass modern filter design, Butterworth filters, Network transformations, and all-pass filter, Active filter. Fourier circuit analysis.			

Module 24

Code	Course/Module Title	ECTS Credits	Semester
EEEC209	Mathematics IV	5	Four
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
4	1	78	47
Module Description			
Eigenvalues and eigenvectors; diagonalization. Sequence and series, sequence convergence, series geometric series, nth partial sum, test of convergence, Laplace Transforms: Introduction to transforms and operators, Laplace transforms of basic functions; unit step function, transforms of 1st and 2nd derivatives, Application to electric circuits; Transforms of piecewise continuous functions. Inverse Laplace transforms, derivation using partial fractions. Direct (s-domain) analysis of electrical circuits, Interpretation of s-domain functions Initial & final value theorems. Fourier transform for different functions (unit step function, unit impulse function, singularity function, applications in electrical engineering. Fourier transform for different functions (unit step function, unit impulse function, singularity function, applications in electrical engineering.			

Module 25

Code	Course/Module Title	ECTS Credits	Semester
EEEC210	Electronic Circuits	4	Four
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	37
Module Description			
Types of Field Effect Transistors Junction Field Effect Transistor JFET Basic Structure, Basic Operation, JFET Symbols. Difference Between JFET and Bipolar Transistor, Relation Among JFET Parameters, Variation of Trans conductance g_m of JFET Biasing: JFET Biasing by Bias Battery, Self – Bias for JFET, JFET with Voltage – Divider Bias JFET Connections: Common Source Connection, Common Gate Connection, Common Drain Connection. Practical JFET Amplifier, DC And AC Equivalent Circuits of JFET. DC Load Line Analysis JFET Small – Signal Model JFET AC Equivalent Circuit Fixed – Bias Configuration Self – Bias Configuration Voltage – Divider Configuration Common – Gate Configuration Source – Follower (Common – Drain) Configuration JFET Applications Metal Oxide Semiconductor FET (MOSFET) Types of MOSFET D – MOSFET, Circuit Operation of D – MOSFET, Depletion Mode, Enhancement Mode D – MOSFET Transfer Characteristic D – MOSFET Biasing D – MOSFET Small – Signal Model E – MOSFET, Operation, Schematic Symbols, Equation for Trans conductance Curve. E – MOSFET Biasing Circuits E – MOSFET Small – Signal Model, E – MOSFET Drain – Feedback Configuration, E – MOSFET Voltage – Divider Configuration E – MOSFET Versus D – MOSFET Tuned Amplifiers, Single – Tuned Amplifiers, Double – Tuned Amplifiers Introduction to Four – Layer Devices Description and Operation of Silicon Controlled Rectifier, Diac, Thyristor, GTO and Triac. High Frequency Equivalent Circuit, Low – Frequency Equivalent Circuit			

Module 26

Code	Course/Module Title	ECTS Credits	Semester
EEEC211	Analog Communications	5	Four
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	62
Module Description			
Modulation/Demodulation of AM-DSB, AM-DSB/SC, AM-SSB/SC, and AM-VSB frequency spectrum, average power, FDM. Frequency Modulation: Phase modulation, Frequency modulation, Single tone frequency modulation, Modulation/Demodulation of Narrow Band FM, frequency spectrum, average power, Modulation/Demodulation of Wide Band FM, frequency spectrum, average power. Noise: Definition of Noise, Statistical Description of Signals, Noise in Linear Systems, Naturally Occurring Noise, and Representation of Band limited Noise. Signal to Noise Ratios in AM and FM Reception.			

Module 27

Code	Course/Module Title	ECTS Credits	Semester
EEEC212	Electrical Measurements	3	Four
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	1	48	27
Module Description			
Electrical Measurement Principle: Basics, instruments classifications, linearity, Errors. Electromechanical operating principles of electromechanical instruments, types of torque, PMMC, multi-range voltmeters, ammeters, ohmmeters, rectifier type voltmeter. Oscilloscope and bridges. Oscilloscopes and their applications, DC and AC bridges. Transducers: types and applications.			

Module 28

Code	Course/Module Title	ECTS Credits	Semester
EEEC213	Electrical Engineering Lab. II	3	Four
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
0	2	33	42
Module Description			
Circuit Components and values: DC circuits, Current and voltage definitions, Passive sign convention and circuit elements, Resistive networks, real and ideal elements, voltage and current sources. Circuit reduction: combining sources, Combining resistive elements in series and parallel, delta and star transformation. Circuit Theory: Kirchhoff's laws and Ohm's law. Introduction to mesh and nodal analysis, Introduction to Thevenin and Norton theory, maximum power transfer, introduction to superposition theory.			

Module 29

Code	Course/Module Title	ECTS Credits	Semester
UOM2022	English Language 2	2	Four
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
Classification of Essays: Independent essays based on personal thoughts. Dependent essays based on data, figures, diagrams. Integrated essays. Structure of academic essays: Analyzing academic essays according to the standard structure of academic essays. Idea Maps: Filling the idea maps from the major information extracted while reading an essay. Responding to an essay question: Building an outline using personal ideas in response to an essay question. Writing Paragraphs: Writing thesis statement. The Introduction Paragraph, The Body Paragraphs. Essay Conclusion: Writing the conclusion paragraph considering the main ideas stated in the introduction and body			

paragraphs, Transition words and connection phrases: Dependent essays: Introduction to essays based on figures, tables, diagrams, and processes.

Module 30

Code	Course/Module Title	ECTS Credits	Semester
UOM2032	Computer 2	3	Four
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	2	63	12
Module Description			
Review of Python and the engineering programming workflow; functions and modular programming; data structures for engineering data; numerical arrays and basic operations using NumPy; file handling and CSV data processing; engineering data analysis and descriptive statistics; data visualization for electrical engineering applications; numerical computation methods; matrices and engineering calculations; introduction to databases and SQL; electrical engineering data case studies; concepts of artificial intelligence and machine learning; practical machine-learning applications using ready-made libraries; an integrated mini-project.			

Module 31

Code	Course/Module Title	ECTS Credits	Semester
EEEC301	Mathematical Analysis	4	Five
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	37
Module Description			
The concepts of z transform and to solve the difference equations. The basic principles of function of complex variables. Discrete time system analysis Z-transforms Inverse Z-transform Difference equations. Series solution of differential equation. Power series Frobenius method Bessel differential equation Solutions of Bessel's Equation Applications of Bessel's Equation, functions of complex variables,; integration of analytic functions.			

Module 32

Code	Course/Module Title	ECTS Credits	Semester
EEEC302	Electronics I	6	Five

Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			
Frequency Response of the Amplifiers: Frequency Response of single stage and Multistage Amplifiers used as a BJT transistors and FET. Differential Amplifier, and Differential Amplifier Applications. Operational amplifiers and its types: Operational amplifiers and its types, Operational-amplifier internal circuits, Inverting amplifiers non-inverting amplifiers, Differentiator and integrator circuits. A/D and D/A converter circuit and active filter design: A/D converter and D/A converter. Logarithmic amplifier. Analog computer circuit. Passive filter design. Active filter design and its applications.			

Module 33

Code	Course/Module Title	ECTS Credits	Semester
EEEC303	Microprocessors	6	Five
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			
Microprocessor: Central Processing Unit, memory and input/output interfacing. Memory classification: volatile and non-volatile memory, Primary and secondary memory, Static and Dynamic memory, Logical, Virtual and Physical memory. Architecture of the Intel 8086: (Bus Interface Unit, Execution unit), register organization, memory addressing, memory segmentation, Operating Modes. 8086 microprocessor instruction set: Instruction Set of 8086: Addressing Modes: Instruction format: Discussion on instruction Set: Groups: data transfer, arithmetic, logic string, branch control transfer, processor control. Interrupts: Hardware and software interrupts, responses, and types.			

Module 34

Code	Course/Module Title	ECTS Credits	Semester
EEEC304	Digital Communication	6	Five
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			
Probability, Random Processes, and Information. Probability theory, Random variables, CDF, PDF, random processes, Correlation, Information, Capacity. Sampling Theory and Digital Modulations. Sampling theory, PAM, PCM, DM, Matched filter, ASK, FSK, PSK, and QAM.			

Module 35

Code	Course/Module Title	ECTS Credits	Semester
EEEC305	Digital Electronics	4	Five
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	37
Module Description			
Flip-flops: SR, JK, T, D, Master/Slave FF, Triggering of FF, Analysis of clocked sequential circuits and their design, Synchronous and asynchronous sequential circuits state assignment, State minimization Circuit implementation, Registers-Shift registers, Ripple counters, Synchronous counters, Timing signal, RAM, Semiconductor memories, Fundamental Mode Sequential Circuits, Memory decoding.			

Module 36

Code	Course/Module Title	ECTS Credits	Semester
EEEC306	Electronics and Communications Lab. I	4	Five
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
0	4	63	37
Module Description			
Circuit Components and values: Operational amplifier, Operational amplifier application, Active Filter, Frequency Modulation Single Phase Transformer Open and Short Circuit Tests and Three Phase Power Measurements and No-load test of DC shunt generator. Circuit reduction: Class A Power Amplifier and Phase Splitter, Push-Pull & Complementary Power Amplifiers (Class AB power amplifier), Transmission line characteristics (Coaxial Cable), Three Phase Power Measurements, Speed and Direction Control of DC shunt Motor using voltage control method and encoder and decoder.			

Module 37

Code	Course/Module Title	ECTS Credits	Semester
EEEC307	Numerical Analysis	4	Six
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	37
Module Description			
Solving the 2nd order differential equation and Bessel differential equations by series solutions. The principles of the wave equation for one and two dimensions. To introduce the fundamentals of numerical methods used for the solution of engineering problems and to improve the computer skills of the students. Partial Differential Equations. One-dimensional wave equation Separation of variables, Vibrating string, two-dimensional wave equation, transmission line, Introduction to Complex Variables Complex number system and its operations, Limits and sequences Continuous functions and their properties, Derivatives complex integration and Cauchy integral theorems. Concepts and role for the numerical method in engineering, Numerical Solution of Nonlinear Algebraic Equations, Open Methods, Numerical Solution of linear algebraic equations, Curve Fitting.			

Module 38

Code	Course/Module Title	ECTS Credits	Semester
EEEC308	Electronics II	5	Six
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	62
Module Description			
Classes of power amplifiers: Power Amplifier Class (A), Power Amplifier Class (B, AB), Power Amplifier Class (C). Power Amplifier Class (D). Amplifiers Circuit and timer integrated circuit: Inverting and non-inverting amplifier circuits. Oscillator (Radio Frequency) and its types. 555 timer integrated-circuit design. Integrated circuit design and power supply: The voltage controlled oscillators VCO IC566. The phase locked loop PLL IC655. Frequency Synthesizer. Power Supply Circuit. Types of Voltage Regulator Power Supply Circuit.			

Module 39

Code	Course/Module Title	ECTS Credits	Semester
EEEC309	Antennas and Wave Propagation	5	Six
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	62
Module Description			
Fundamental Parameters of Antennas (radiation pattern lobes, field region, radiation intensity, directivity, gain, half power beamwidth, bandwidth, input impedance, efficiency, and Friis transmission equation). Linear Wire Antennas (infinitesimal dipole). Linear Wire Antennas (finite length dipole). Array Theory (two element array, broadside array, end-fire array). N-Element Linear Array-Uniform Amplitude and Spacing. N-Element Linear Array -Phased Array. Non-Uniform Array (Binomial array). Broadband Dipoles (biconical antenna, cylindrical dipole antenna). Broadband Dipoles (dish antenna). Microstrip Antenna (characteristics and design). Plane Wave (normal incidence and oblique incidence). Radio Wave Propagation (propagation of radio waves at different frequencies). Radio Wave Propagation (ground wave propagation). Radio Wave Propagation (sky wave propagation). Radio Wave Propagation (space wave propagation).			

Module 40

Code	Course/Module Title	ECTS Credits	Semester
EEEC310	Control Systems	6	Six
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			

Introduction to control system, Basic Components of a Control System, Open loop and closed loop control system, Block diagram and block diagram reduction, Signal flow graph; Mason's gain formula, transfer function, Mathematical model, State space representation of control system, State Space representation: State equation, output equation, state transition Matrix, state transition equation, Characteristic Equations, state diagram, Controllability Canonical Form (CCF), Observability Canonical Form (OCF), Diagonal Canonical Form (DCF), Jordan Canonical Form (JCF), controllability, observability of control system, Time domain analysis of control system, Stability of control system, Routh-Hurwitz criterion.

Module 41

Code	Course/Module Title	ECTS Credits	Semester
EEEC311	Programmable Controllers	2	Six
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
Introduction to PLCs, PLC basics, PLC Addressing and Basic Instructions, Basic Ladder Logic Programming, Programming word level logic instructions, Relation of digital gate logic to contact/coil logic, Relay logic, Relay Sequencers, PLC Timer Functions, ladder diagram elements. Instructions: Relay type instructions, Instruction addressing, Branch Instructions, Internal Relay Instructions, Programming. Data Handling and Program Control Flow Instructions, Shift and Sequencer Instructions, PLC I/O Module Types and PLC Trainer Configuration.			

Module 42

Code	Course/Module Title	ECTS Credits	Semester
EEEC312	Electronics and Communications Lab. II	4	Six
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
0	4	63	37
Module Description			
Circuit Components and values: Digital Counter, Amplitude Modulation and Demodulation, Analysis of FM, 8086 Study of Finite Length Dipole Antenna, PCM, Design of a timer using the IC-555, No-load test of DC shunt generator, Digital-to-analog Converters, Voltage regulators No-load test of DC shunt generator and Speed and Direction Control of DC shunt Motor using voltage control. Circuit reduction: Class A Power Amplifier and Phase Splitter, Push-Pull & Complementary Power Amplifiers (Class AB power amplifier), Transmission line characteristics (Coaxial Cable), Three Phase Power Measurements, Speed and Direction Control of DC shunt Motor using voltage control method and encoder and decoder.			

Module 43

Code	Course/Module Title	ECTS Credits	Semester
EEEC313	Engineering Project Design & Planning	2	Six
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
1	1	33	17

Module Description
Engineering project concepts, types, life cycle, and the role of the electrical engineer; project idea identification, problem formulation, and requirements analysis; generation of engineering solutions and comparison of alternatives using technical and economic criteria; the engineering design process; preparation of the project proposal, objectives, scope, deliverables, and constraints; work breakdown structure (WBS), Gantt charts, and PERT/CPM networks; resource and cost estimation and risk management; consideration of IEC and IEEE standards, safety, reliability, and sustainability; quality management and engineering documentation; teamwork, communication, and ethics; implementation monitoring, performance evaluation, and project presentation.

Module 44

Code	Course/Module Title	ECTS Credits	Semester
EEEC314	English Language 3	2	Six
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
This course develops further knowledge of the grammar and of essential vocabulary in order to lead the students to an advanced level of proficiency. Emphasis is placed on developing listening, speaking, reading and writing skills through an integrated approach. It focuses on grammar and fundamental writing skills. By the end of the course, students are expected to: Understand the main ideas of a variety of written and spoken texts. Participate effectively in a short conversation using appropriate language. Produce a range of text types in the form of a logical and cohesive paragraph. Select appropriate vocabulary to talk about feelings, opinions and experiences. Recognize, understand and use a number of phrasal verbs and collocations. Use effective organizational strategies that include introductions, paragraphs, transitions, and conclusion.			

Module 45

Code	Course/Module Title	ECTS Credits	Semester
EEEC401	Satellite Communications	6	Seven
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			
Introduction to satellite communications, their development, applications, and frequency allocations; calculation of elevation and azimuth angles; orbit types - GEO, LEO, MEO, HEO, and polar - and satellite examples; Kepler's laws; components of a satellite communication system and wave propagation; ionospheric, rain, and other propagation impairments and propagation delay; satellite structure, transponder, and telemetry, tracking, command, and monitoring (TT&C); link parameters, equivalent isotropically radiated power (EIRP), transmission			

losses, and noise temperature; uplink and downlink budgets and interference; multiple-access techniques - FDMA, TDMA, CDMA, and SDMA; TDM/PCM systems and companding; centralized and decentralized control and the SPADE system.

Module 46

Code	Course/Module Title	ECTS Credits	Semester
EEEC402	Digital Signal Processing	5	Seven
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	62
Module Description			
Introduction to the theory of digital signal processing (DSP). Introduction to discrete linear systems. Digital Signals and Systems: Classification of Systems, Linear System, Time-Invariant System, Causal System, Stability. Digital Convolution: Graphical Method, Table Lookup Method, Matrix by Vector Method, Linear Convolution and Circular Convolution, Deconvolution. Fourier transforms AND Z- transforms. Discrete-Time Fourier Transform and Linear Time Invariant Systems. The Z transform, Regions of convergence and Z-transform properties and Inverse Z-transform. The discrete Fourier transform and fast Fourier transform. The discrete Fourier transform. The fast Fourier transform. Digital filter design. Digital filter design (Finite impulse response (FIR) filters). Infinite impulse response (IIR) filters). Structures and properties of FIR and IIR filters and review.			

Module 47

Code	Course/Module Title	ECTS Credits	Semester
EEEC403	Microelectronics I	6	Seven
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			
Microwave devices: Energy and band theory, Diode, PN, IMPATT, Gunn diode, IGBT, Thyristor, Triac, DIAC, TTL, RTL, ECL, LED, MS. Digital circuit analyses: DTL, MOS, CMOS, DMOS, NMOS.			

Module 48

Code	Course/Module Title	ECTS Credits	Semester
EEEC404	Computer Networks	5	Seven
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	62
Module Description			
OSI and TCP/IP models and their associated protocols to explain how data flows in a network. Wired LANs: Ethernet: Networks of networks and inter-networking. Forwarding and routing IP (local and ISP-based - interdomain). Router. Multicasting. Application layer: Examples of protocols and services at the application layer.			

SMTP (email), http (WWW), DNS, streaming video, gaming, P2P, VoIP.

Module 49

Code	Course/Module Title	ECTS Credits	Semester
EEEC405	Electronics and Communications Lab. III	4	Seven
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
0	4	63	37
Module Description			
PAM and PCM systems, sampling, quantization, and the encoding. PCM Transmission Bandwidth, PCM Signal-to-Quantization-Noise Ratio. Learn Arduino programming using C-language. Binary line coding, extract the differences between the NRZ and RZ. Digital carrier modulation On-Off Keying (OOK) and Amplitude Shift Keying (ASK). Network connection topologies. Data acquisition concept. System transfer function characteristics in MATLAB.			

Module 50

Code	Course/Module Title	ECTS Credits	Semester
EEEC406	Graduation Project I	2	Seven
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
Selection and approval of a graduation-project topic; problem definition and formulation of objectives and scope; literature review and study of previous work; identification of system requirements; proposal of the methodology and preliminary design; identification of the required tools, software, and components; preparation of the work plan, schedule, and milestones; presentation of the project proposal and review with the supervisor.			

Module 51

Code	Course/Module Title	ECTS Credits	Semester
EEEC400	Chemistry	2	Seven
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
Chemical principles related to electrical engineering materials; atomic structure and bonding and their relationships to electrical conductivity, dielectric strength, and thermal stability; metals, alloys, polymers, ceramics, and composites used in cables, insulation, and machines; chemical ageing, thermal degradation, moisture, electrical treeing, and water treeing; insulating gases and environmentally safer alternatives to SF ₆ ; insulating oils, contamination, and ageing; electrochemistry and corrosion in			

grounding systems and protection methods; battery chemistry, energy storage, safety, and recycling; sustainability and green materials in power systems.

Module 52

Code	Course/Module Title	ECTS Credits	Semester
EEEC407	Mobile Communications	6	Eight
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			
Wireless communication systems, types of mobile communications, and the cellular concept; frequency reuse, channel allocation, and handoff strategies; co-channel and adjacent-channel interference, system capacity, and power control; trunking, grade of service, Erlang B and Erlang C models, and coverage and capacity improvement; cellular generations and GSM, CDMA, and LTE architectures; frequency-hopping and direct-sequence spread spectrum - FHSS and DSSS; large-scale propagation models, link budgets, and Okumura, Hata, and Walfisch-Bertoni models; indoor propagation, multipath fading, Doppler effect, shadowing, and Rayleigh and Rician distributions; plane-wave incidence and ground-wave, tropospheric, and ionospheric propagation.			

Module 53

Code	Course/Module Title	ECTS Credits	Semester
EEEC408	Microelectronics II	6	Eight
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			
Semiconductor Materials and Diodes + The Bipolar Junction Transistor. The Field-Effect Transistor. Basic FET Amplifiers. Integrated Circuit Biasing and Active Loads + Basic BJT Amplifiers.			

Module 54

Code	Course/Module Title	ECTS Credits	Semester
EEEC409	Design of Control Systems	5	Eight
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)

3	1	63	62
Module Description			
Root locus PID Controller structure and design using root locus. Frequency response specifications. Nyquist stability, relative stability, gain margin, phase margin Nichols chart, and implementing it in the design. Bode plot, Gain, Lead, lag, Lead lag, and PID compensator design.			

Module 55

Code	Course/Module Title	ECTS Credits	Semester
EEEC410	Microwave Devices	4	Eight
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	--	48	52
Module Description			
Maxwell's Equations (solution of Maxwell's equations for free space condition). Wave Equations. Rectangular Waveguides (transverse modes, TE mode, TM mode). Rectangular Waveguides (propagation constant, wave impedance, characteristic impedance, transmitted power, attenuation factor). Scattering Parameters (S-parameters, scattering matrix). Passive Microwave Components (wave guide sections, waveguide Tees). Passive Microwave Components (attenuators, directional coupler). Passive Microwave Components (isolators, circulators). Microwave Transistors and Tunnel Diodes (microwave tunnel diodes). Transferred Electron Devices (Gunn effect diodes). Microwave Linear Beam Tubes (two cavity klystron). Microwave Linear Beam Tubes (reflex klystron). Microwave Linear Beam Tubes (helix traveling wave tubes) Microwave Crossed Field Tubes (magnetrons). Microwave Strip Lines (microstrip lines).			

Module 56

Code	Course/Module Title	ECTS Credits	Semester
EEEC411	Electronics and Communications Lab. IV	4	Eight
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
0	4	63	37
Module Description			
PAM and PCM systems, sampling, quantization, and the encoding. PCM Transmission Bandwidth, PCM Signal-to-Quantization-Noise Ratio. Learn Arduino programming using C-language. Understanding Control theory using MATLAB. Binary line coding, extract the differences between the NRZ and RZ. Digital carrier modulation On-Off Keying (OOK) and Amplitude Shift Keying (ASK). Network connection topologies. Data acquisition concept. System transfer function characteristics in MATLAB. Intersymbol interference.			

Module 57

Code	Course/Module Title	ECTS Credits	Semester
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EEEC412	Graduation Project II	2	Eight
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
Completion of the detailed design and system implementation; simulation, modelling, or experimental work; testing, measurement, and performance validation; analysis and discussion of results and comparison with objectives and previous studies; resolution of technical problems and documentation of modifications; preparation and submission of the final report in accordance with academic requirements; preparation of the oral presentation and project discussion and defence.			

Module 58

Code	Course/Module Title	ECTS Credits	Semester
EEEC413	Professional Ethics	1	Eight
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
1	--	18	7
Module Description			
Introduction to ethics and distinctions among ethics, values, and conduct; ethical theories - utilitarianism, duty, virtue, rights, and justice; integrity, honesty, responsibility, accountability, fairness, and respect for others; professional ethics, codes of conduct, and professional obligations; identification of ethical dilemmas, decision-making, and management of conflicts of interest; human rights, environmental ethics, and social responsibility; ethics in technology, engineering, business, and scientific research; contemporary issues including artificial intelligence, data privacy, security, sustainability, and climate ethics.			

Module 59

Code	Course/Module Title	ECTS Credits	Semester
EEEC414	Computer Network Security	2	Eight
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
This course provides students with basic knowledge in: Basic concepts of network security; History of encryption techniques; AES symmetric encryption technique; public-key encryption and RSA; Message Authentication and Hash Functions; Authentication Protocols; Cryptographic Systems: Secure Socket Layer (SSL), Virtual Private Network (VPN), and Kerberos; Access Control of Computer Resources; Computer Viruses, Malicious and Antivirus Software; Network Security Tools: Firewall, Intrusion Detection System (IDS) and Intrusion Prevention System (IPS); Web Security, Email Security and Password Management; and Security of Wireless Networks.			

3. Undergraduate Courses 2026-2027 - Power and Machines -

Module 1

Code	Course/Module Title	ECTS Credits	Semester
EE101	Basics of Electrical Engineering I	8	One
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	3	93	107
Module Description			
Basic Concepts and Units: Electricity & atomic structure of substance, current and current density, current flow, electric circuit, EMF & potential difference, International System of Units, abbreviation for multiples & sub-multiples, quantities derived from SI units, units of force-energy-torque and power, relation between energy and heat, electric units, efficiency & percentage efficiency, electromechanical equivalent of element. Analysis of DC Circuit: Ohm's law, resistivity & conductivity, effect of temperature, internal resistance of a source, open circuit & short circuit, equivalent resistance: Series-parallel, delta and star, grouping of EMF sources, power calculation in DC circuit, introduction to network theorems, types of source: independent and dependent voltage and current sources and their transformation, Kirchhoff's laws: KVL-KCL, Maxwell's circulating currents (mesh analysis), nodal analysis, superposition theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Millman's theorem, substitution theorem, reciprocity theorem.			

Module 2

Code	Course/Module Title	ECTS Credits	Semester
EE102	Mathematics I	6	One
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			
Matrices: Basic Definitions, Addition, Subtraction and Multiplication, Determinants, The Inverse of a 3 x 3 Matrix, Cramer's Rule, Solve equations by Matrices: Gaussian Elimination. the method of finding the inverse of a square matrix, solution of simultaneous linear equations by matrix method. Coordinates and Graphs in the Plane: Directions and Quadrants, Distance between Points, Graphs of Equations, Intercepts and More about Graphing, Slope and Equations for Lines: Slope of Non-vertical Lines, Lines that are Parallel or Perpendicular, Point – Slope			

Equations, Slope – Intercept Equations, Functions and their Graphs, Domains and Ranges are Often Intervals, Even Functions and Odd Functions, Functions Defined in Pieces, Shifts, Circles, and Parabolas: How to Shift a Graph, Equations for Circles in the Plane, Equations for Parabolas, A Review of Trigonometric Functions: Radian Measure, The Six Basic Trigonometric Functions, Calculating Sines and Cosines, Graphs of Trigonometric Functions, Limits and Continuity: Limits, Examples of Limits, The Sandwich Theorem and $(\frac{0}{0})/0$, Limits Involving Infinity, Continuous Functions. Derivatives: Slopes, Tangent Lines, and Derivatives, Defining Slopes and Tangent Lines, The Derivative of a function, The Slope of Lines, Differentiation Rules: Integer Powers, Multiples, Sums, and Differences, Second and Higher Order Derivatives, Negative Integer Powers of x, Velocity, Speed, and Other Rate of Change: Velocity, Speed, Acceleration, Derivatives of Trigonometric Functions: The Derivative of the Sine, The Derivative of the Cosine, The Derivative of the Other Basic Functions, The Chain Rule: Integer Powers of Differentiable Functions, Derivative Formulas that Include the Chain Rule, Implicit Differentiation and Fractional Powers: Lenses, Tangents, and Normal Lines, Using Implicit Differentiation to Find Derivatives of Higher Order, Fractional Powers of Differentiable Functions, Linear Approximations and Differentials.

Module 3

Code	Course/Module Title	ECTS Credits	Semester
EE103	Engineering Drawing	4	One
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	2	63	37
Module Description			
Engineering Instruments, Lettering, Types of Lines, Orthographic Projection I, Graphic Geometry, Dimensions. Orthographic Projection II, Isometric Drawing. Computer Drawing: Introduction to Auto CAD, Dimension Units Commands, Drawing Commands, Drawing Files, Text commands.			

Module 4

Code	Course/Module Title	ECTS Credits	Semester
EE104	Physics I	4	One
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	67
Module Description			
Introduction to physics; measuring things, quantities, units systems, dimensional analysis, vector and scalar quantities, vector properties, resultant addition and subtraction of vector quantities. Motion in one and two dimensions, position and displacement, velocity, acceleration. Force and motion; Newton's first law, force, mass, Newton's second law, gravitational force, weight, normal force, and tension force. Newton's third law, applying Newton's laws, Force and motion, friction, uniform circular motion. Work; Kinetic and Potential Energy; The work-kinetic energy theorem; Conservation of total mechanical energy. Spring forces and Hooke's law; Power and Efficiency. Linear momentum; Momentum and kinetic energy; Rate of change of linear momentum and Newton's laws; Law of conservation of linear momentum; Impulse; and Simple Harmonic Motion. Universal gravitation; Newton's law of universal gravitation; Free-fall acceleration and the gravitational force; and Solve problems using Newton's law of universal gravitation and calculate the gravitation for different locations. Fluid mechanics; Pressure and density of fluid at different depths; Hydrostatic pressure; Pascal's principle and the operation of a			

hydraulic lift; Buoyant forces and Archimedes's principle; the equation of continuity for fluids; and the Bernoulli's equation. Heat Transfer (Conduction, Convection, and Radiation). Basics of Architectural Physics; and Solar Radiation. Sound; Noise; Sound Intensity. Sound Insulation; and Thermal Behaviour of Materials. Current and Voltage; electrical circuit; and Ohm's Law. Power and Energy; and Parallel and Series Networks.

Module 5

Code	Course/Module Title	ECTS Credits	Semester
EE105	Engineering Mechanics	3	One
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	42
Module Description			
Static: Force system, Units system, Forces + Components, Resultant, Moment and Couples, Equilibrium, Centroid, Moment of Inertia, Friction. Dynamics: Rectilinear motion, Curvilinear motion, Projectile, Circular motion, Acceleration Components (Rectangular Comp., Normal Tangential Comp.), Newton's second law of motion. Thermodynamics: Properties of Substance, Pressure and Temperature, Work and Energy, Ideal Gas, First Law of Thermodynamics, 2nd Law of Thermodynamics. Hooke's law.			

Module 6

Code	Course/Module Title	ECTS Credits	Semester
UOM1031	Computer 1	3	One
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	2	63	12
Module Description			
Introduction to engineering computing and basic computer use; software systems and digital productivity tools; digital data representation for engineering applications; data and information management; computer networks and internet technologies; cybersecurity fundamentals and digital ethics; cloud computing, the Internet of Things, artificial intelligence, and emerging technologies; computational thinking and engineering problem solving; algorithms and pseudocode; flowcharts and structured problem representation; introduction to programming concepts and a Python preview; conditional logic, iteration, and basic data handling; an integrated mini-application and course review.			

Module 7

Code	Course/Module Title	ECTS Credits	Semester
UOM1011	Arabic Language 1	2	One
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			

The goal of this semester is to introduce students to the main topics of the Arabic language course. The semester will cover the basic requirements of Arabic language definitions, grammar of tenses, the development of grammatical abilities for singular, plural, and forbidden forms of inventory, as well as rhetoric and application. At the end of the semester, students will have a broad knowledge of the concepts and this will be achieved through theoretical lectures, lessons, pit assignments, and reports related to the topics being discussed.

Module 8

Code	Course/Module Title	ECTS Credits	Semester
EE108	Basics of Electrical Engineering II	8	Two
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	3	93	107
Module Description			
Alternating quantities, generating of single phase voltage, waveforms instantaneous value and real, RMS and Average values, analysis of AC Circuit: Ohm's law, impedance & admittance, conductance and susceptance, internal impedance of a source, open circuit & short circuit, equivalent impedance: Series-parallel, delta and star, power calculation in AC circuit, introduction to network theorems, types of source: independent and dependent voltage and current sources and their transformation, Kirchhoff's laws: KVL-KCL, Maxwell's circulating currents (mesh analysis), nodal analysis, superposition theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, resonant circuits.			

Module 9

Code	Course/Module Title	ECTS Credits	Semester
EE109	Mathematics II	6	Two
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			
Polar coordinates system: Polar coordinates system and the graphs of polar equations, plane area in polar coordinates, arc length of curves in polar coordinates. Brief Review: about differentiation and integration law, Applications of definite integral: Area between curves. Volume of solid revolution. Arc length of a plane curve. Surface area of arc length revolution. Methods of integration: Trigonometric substitutions. Partial fractions. Integration by parts. Further substitutions. First order differential equations: variable separable differential equations. Homogeneous differential equations. Linear differential equations. Exact differential equations. Numerical integration: Simpson's approximation methods. Limit: L'Hopital method and its applications.			

Module 10

Code	Course/Module Title	ECTS Credits	Semester
EE110	Computer Programming	6	Two
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)

2	2	63	87
Module Description			
Introduction to MATLAB. Types of variables, numbers. Expressions, operation and function. Matrix and its applications. Solving set of linear equations. Solving of Electrical circuit. Control flow in MATLAB program. Curve fitting, interpolation. Function and its application (pulse & ramp functions). Numerical application (numeric differentiation and numerical integration. Engineering graphics (two dimension and three dimensions) such as vector diagram mesh, bar plots). Solving equation by symbols. Solving of transient response in electrical circuit. Fourier series and Fourier transform. Solving of ordinary differential equation. Capacitor smoothing circuit analysis. Three phase analysis.			

Module 11

Code	Course/Module Title	ECTS Credits	Semester
EE111	Digital Techniques	3	Two
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	1	48	27
Module Description			
Introduction to Digital Techniques, Basic Definitions, System of Numbers, General number formula: Binary, octal, decimal & hexadecimal numbers, Number-base conversion (Arithmetic operation in different numbers complements, binary codes, BCD, Ex-3, gray codes), Boolean algebra: (Basic definitions, basic theorem & properties, Boolean functions), Canonical & Standard Forms Digital Logic Gates, Karnaugh Maps (AND & OR implementation, don't care condition), Adders Arithmetic Operation (Subtractors, half & full adders & Subtractors, binary parallel adders), Code Conversion (Even and odd parity logic, decoders, encoders comparator, multiplexers & demultiplexers), Sequential Logic (Flip Flops (RS, T, D, JK...) Master slave FF, Counters, Shift registers).			

Module 12

Code	Course/Module Title	ECTS Credits	Semester
EE112	Physics II	3	Two
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	1	48	27
Module Description			
Energy Level and Atomic Structure: The atom, models, wave nature of light, dual nature of matter, energy-band theory of metals, insulators and semiconductors, crystal structure, ionic, covalent and metallic bonding, energy band of crystals, Internal structure of materials cell, packing miller indices, crystal planes and directions. Electrical Conduction in Metals: Mobility and conductivity, energy distribution of electrons, Fermi levels, work function, electronic emission. Semiconductors: Semiconductors materials (Si, Ge and compound semiconductors), extrinsic semiconductors, Fermi-level in semiconductor, diffusion and carrier lifetime, Hall effect. Semiconductor p-n Junction: p-n junction in equilibrium, current-voltage characteristics, charge-control description of a diode, Transition and diffusion capacitances, diode switching times, diode models, small-signal model and load line concept, and introduction to Hetero-junctions and double Hetero-junctions. Diode Circuit Applications: Rectifiers, Zener diodes voltage regulators, clipping circuits, clamping circuits and waveform generation. Other Types of Semiconductor Diodes: Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal-semiconductor devices. Principles of transistor operation and types, Transistor biasing circuits,			

Module 13

Code	Course/Module Title	ECTS Credits	Semester
UOM1040	Democracy and Human Rights	2	Two
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
Definition and sources of democracy and human rights (international, regional, national, religious). Characteristics of democracy and human rights: universality, indivisibility, interdependence, inalienability. Emergence and evolution of human rights: historical development, key milestones, influential movements. Types of human rights: civil and political, economic and social, environmental, cultural, and developmental. Guarantees to prevent human rights violations: legal, institutional, societal safeguards, Islamic guarantees, national and international levels. Concept of democracy: principles, values, forms of governance (direct, semi-direct, indirect). Islamic stance on democracy: compatibility, strengths, weaknesses. Critique of the democratic system: analysis of strengths and weaknesses. Administrative corruption: definition, types, societal impact. Methods to combat administrative corruption.			

Module 14

Code	Course/Module Title	ECTS Credits	Semester
UOM1021	English Language 1	2	Two
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
Pronunciation, reading and writing. General knowledge of fundamental grammatical structures and functions (e.g. sentence types, tenses, voice, parts of speech, word order. Acquiring fundamental vocabulary to fulfill the above-mentioned functions in roles, topics and discussions.			

Module 15

Code	Course/Module Title	ECTS Credits	Semester
EEPM201	Electrical Circuits Analysis I	5	Three
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
4	2	93	32
Module Description			
Transient Circuits: The Transient Circuits: RC, RL, RLC circuit in series and parallel and their complete response in time and Frequency. Poly-phase Circuits: Poly-phase Circuits: single-phase and three-phase systems, balanced and unbalanced three-phase systems, star and delta connections. Power in 3-phase circuits. Magnetic coupling circuit: Magnetic coupling circuit: Coefficient of coupling, Linear and ideal transformers.			

Module 16

Code	Course/Module Title	ECTS Credits	Semester
EEPM202	Mathematics III	5	Three
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
4	1	78	47
Module Description			
Vectors: Vectors component and Units, Space coordinate and Space Vector, Scalar Product and Vector Product, Units and plane equation, equations of lines and planes, Product of Three Vectors, Applications. Vector Functions and Their Derivatives gradient of a scalar field; Divergence of Vector Field; Curl of Vector Field; Directional Derivatives; Gradient, Divergence and Curl in Curvilinear Coordinates. Differential Equations: Introduction to Differential Equations, 1st and 2nd order linear differential equations with constant coefficients, solution via the auxiliary equation, nonhomogeneous equations, application to electrical systems. Coupled 1st order linear differential equations; transformation of higher order linear differential equations into coupled differential equations. Homogeneous differential of higher order. Fourier series: The need for Fourier series, Periodic functions, Fourier Series-Euler formulas. Even and odd functions, Half-Range expansions, Application in electrical engineering			

Module 17

Code	Course/Module Title	ECTS Credits	Semester
EEPM203	Electromagnetic Fields	4	Three
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	37
Module Description			
coordinate systems: rectangular coordinate system, cylindrical coordinate system, spherical coordinate system. vector analysis: scalars and vectors, vector algebra, vector components and unit vectors, vector addition and subtraction, vector multiplication. coulomb's law and electric force: the experimental law of coulomb. electric field intensity: electric field of a point charge, electric field of n point charges. electric fields due to continuous charge distributions: electric field of a line charge. electric fields due to continuous charge distributions: electric field of a sheet of charge. electric fields due to continuous charge distributions: electric field of a volume of charge. electric flux density and gauss's law: gauss's law application on a point charge, gauss's law application on a line charge. electric flux density and gauss's law: gauss's law application on a surface charge. electric flux density and gauss's law: gauss's law application on a volume charge. work, potential & potential difference: work done in moving a point charge. work, potential & potential difference: potential & potential difference. conductors, dielectrics, and capacitance: electric fields in material space. conductors, dielectrics, and capacitance: dielectric – dielectric boundary conditions, conductor – dielectric boundary conditions, conductor – free space boundary conditions. conductors, dielectrics, and capacitance: capacitance and capacitors.			

Module 18

Code	Course/Module Title	ECTS Credits	Semester
EEPM204	Electrical Transformers	5	Three
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	62
Module Description			

Transformers working, principle of transformers. Transformer construction, EMF equation. Transformer on no load and on load. Transformer equivalent circuit. Open-circuit and short-circuit tests. Separation of core losses. Regulation of transformer. Losses and efficiency. All-Day efficiency. Auto transformer. Parallel operation. Three-phase transformer, connections. Open-delta Scott connection, cooling of transformers.

Module 19

Code	Course/Module Title	ECTS Credits	Semester
EEPM205	Electronics Principles	4	Three
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	1	48	52
Module Description			
Transistor Construction. Transistor Symbols. Transistor Operation. Transistor Connections: Common Base CB Connection, Common Emitter CE Connection. Transistor Curves, Cutoff and Saturation. Transistor as a switch. Common Collector Connection. Transistor Load Line Analysis. Operating Point. Transistor Parameters and Rating Amplification. Stabilization, Stability Factor Methods of Transistor Biasing. Practical Circuit of Transistor Amplifier, DC and AC Equivalent Circuits. Transistor AC equivalent Circuits h-parameters, Hybrid Equivalent Circuit. r-parameters, r-parameters Equivalent Circuit. The Linear Amplifier The AC Load Line AC Analysis Using re Model for Transistor Common – Emitter Fixed – Bias Configuration Common – Emitter Emitter – Bias Configuration Common – Emitter Collector Feedback Configuration Common – Emitter Voltage Divider Configuration the Common – Collector Amplifier the Common – Base Amplifier Multistage Transistor Amplifiers.			

Module 20

Code	Course/Module Title	ECTS Credits	Semester
EEPM206	Electrical Engineering Lab. I	3	Three
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
0	2	33	42
Module Description			
Circuit Components and values: DC circuits, Current and voltage definitions, Passive sign convention and circuit elements, Resistive networks, real and ideal elements, voltage and current sources. Circuit reduction: combining sources, Combining resistive elements in series and parallel, delta and star transformation. Circuit Theory: Kirchhoff's laws and Ohm's law. Introduction to mesh and nodal analysis, Introduction to Thevenin and Norton theory, maximum power transfer, introduction to superposition theory.			

Module 21

Code	Course/Module Title	ECTS Credits	Semester
UOM2050	The crimes of the Baath regime in Iraq	2	Three

Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			

Module 22

Code	Course/Module Title	ECTS Credits	Semester
UOM2012	Arabic Language 2	2	Three
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
Active and passive voice and conversion between them; classes of Arabic verbs and their meanings; the subjunctive and jussive moods of the present tense, their particles, and grammatical signs; numbers, their types, gender agreement, and inflection; distinguishing the Arabic letters dad and za in pronunciation and writing; punctuation and its use in scientific texts; treatment of common grammatical, spelling, and morphological errors; adverbial objects and the comitative object and their parsing; applications in text analysis, sentence parsing, and writing accurate scientific and functional Arabic.			

Module 23

Code	Course/Module Title	ECTS Credits	Semester
EETM208	Electrical Circuits Analysis II	5	Four
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
4	2	93	32
Module Description			
Two-Port Networks: Two-Port Networks: one-port networks, y-z-h-g and ABCD parameters. Frequency Response: Complex Frequency and Circuit Analysis in the s-Domain. Frequency Response. Filters: Constant k-filters, Low pass and high pass modern filter design, Butterworth filters, Network transformations, and all-pass filter, Active filter. Fourier circuit analysis.			

Module 24

Code	Course/Module Title	ECTS Credits	Semester
EEPM209	Mathematics IV	5	Four
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
4	1	78	47
Module Description			
Eigenvalues and eigenvectors; diagonalization. Sequence and series, sequence convergence, series geometric series, nth partial sum, test of convergence, Laplace Transforms: Introduction to transforms and operators, Laplace transforms of basic functions; unit step function, transforms of 1st and 2nd derivatives, Application to electric circuits; Transforms of piecewise continuous functions. Inverse Laplace transforms, derivation using partial fractions. Direct (s-domain) analysis of electrical circuits, Interpretation of s-domain functions Initial & final value theorems. Fourier transform for different functions (unit step function, unit impulse function, singularity function, applications in electrical engineering. Fourier transform for different functions (unit step function, unit impulse function, singularity function, applications in electrical engineering.			

Module 25

Code	Course/Module Title	ECTS Credits	Semester
EEPM210	DC Machines	5	Four
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	62
Module Description			
Principles of Electro-Mechanical Energy Conversion. Classification of Electrical machines. DC generator. General principle. Construction and working, EMF equation. Armature Winding Armature. armature reaction and commutation, types of generation. Losses in generator. The efficiency, generation characteristics. Parallel operation of DC generator. DC Motors principle. Voltage equation of motor, torque, types of motors. Motor characteristics, power stages, losses and efficiency. Speed control and braking of DC motors. Starters, testing of DC Machines Permanent-magnet DC machines.			

Module 26

Code	Course/Module Title	ECTS Credits	Semester
EEPM211	Distribution Systems	5	Four
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	62
Module Description			

Introduction, Classification of Distribution System, Methods of Connection, Comparison among Distribution Systems. Type of DC Distributions: - DC Distributor fed at One End-Concentrated Loading. - DC Distributor fed at Both End- Concentrated Loading. - DC Distributor fed at One End with Uniformly Distributed Load. - DC Distributor fed at Both Ends with Uniformly Distributed Load. Ring Distributor with Inter-Connector, Stepped Distributor, 3 wire DC System Introduction. Classification of A. C. Distribution Systems. Methods of Connection. Single Phase Distribution Systems, Three Phase Distribution Systems. Types of A. C. Distribution Systems. A. C. Radial Systems: A. C. Distributor fed at one end. A. C. Distributor fed at both ends. A. C. Ring Systems Protection of Distribution Systems: Protection of Distribution Lines. Protection of Distribution Transformers.

Module 27

Code	Course/Module Title	ECTS Credits	Semester
EEPM212	Renewable Energy Sciences	2	Four
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
Traditional power plants, Introduction to Renewable Energy, Solar Energy and Physics of Energy Conversion in Solar Cell (Current and Voltage), Understanding basic terminologies of a PV cell (I-V curve, Efficiency, FF), Wind Energy, Biogas Energy and Ocean Energy, Small hydro Power Plant, Geothermal Energy, Photovoltaic Energy Systems, Energy Storage devices, Integration of Renewable Energy Resources, Distributed Generation, Economics of Renewable Energy, Future Trends and Challenges.			

Module 28

Code	Course/Module Title	ECTS Credits	Semester
EEPM213	Electrical Engineering Lab. II	3	Four
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
0	2	33	42
Module Description			
Circuit Components and values: DC circuits, Current and voltage definitions, Passive sign convention and circuit elements, Resistive networks, real and ideal elements, voltage and current sources. Circuit reduction: combining sources, Combining resistive elements in series and parallel, delta and star transformation. Circuit Theory: Kirchhoff's laws and Ohm's law. Introduction to mesh and nodal analysis, Introduction to Thevenin and Norton theory, maximum power transfer, introduction to superposition theory.			

Module 29

Code	Course/Module Title	ECTS Credits	Semester
UOM2022	English Language 2	2	Four
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			

Classification of Essays: Independent essays based on personal thoughts. Dependent essays based on data, figures, diagrams. Integrated essays. Structure of academic essays: Analyzing academic essays according to the standard structure of academic essays. Idea Maps: Filling the idea maps from the major information extracted while reading an essay. Responding to an essay question: Building an outline using personal ideas in response to an essay question. Writing Paragraphs: Writing thesis statement. The Introduction Paragraph, The Body Paragraphs. Essay Conclusion: Writing the conclusion paragraph considering the main ideas stated in the introduction and body paragraphs, Transition words and connection phrases: Dependent essays: Introduction to essays based on figures, tables, diagrams, and processes.

Module 30

Code	Course/Module Title	ECTS Credits	Semester
UOM2032	Computer 2	3	Four
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	2	63	12
Module Description			
Review of Python and the engineering programming workflow; functions and modular programming; data structures for engineering data; numerical arrays and basic operations using NumPy; file handling and CSV data processing; engineering data analysis and descriptive statistics; data visualization for electrical engineering applications; numerical computation methods; matrices and engineering calculations; introduction to databases and SQL; electrical engineering data case studies; concepts of artificial intelligence and machine learning; practical machine-learning applications using ready-made libraries; an integrated mini-project.			

Module 31

Code	Course/Module Title	ECTS Credits	Semester
EEPM301	Mathematical Analysis	4	Five
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	37
Module Description			
Discrete-time system analysis and sampling; the Z-transform, region of convergence, transform properties, and inverse Z-transform; convolution and difference equations; series solutions of differential equations, power series, and the Frobenius method; Bessel differential equations, solutions, and applications; functions of a complex variable, analytic functions, and complex integration.			

Module 32

Code	Course/Module Title	ECTS Credits	Semester
EEPM302	Transmission Systems	6	Five
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
4	1	78	72
Module Description			
Introduction to power transmission systems, their importance, components, line parameters, and safety and environmental considerations; selection of transmission voltage; overhead transmission lines, including electrical and mechanical calculations, insulators, and corona; representation of short, medium, and long transmission lines, incident and reflected voltage, and general circuit constants; electrical power cables, including capacitance and current rating.			

Module 33

Code	Course/Module Title	ECTS Credits	Semester
EEPM303	AC Machines	6	Five
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
4	1	78	72
Module Description			
Rotating magnetic fields and the principles of AC machines; induction-machine construction, equivalent circuits, power and torque equations, torque-speed characteristics, parameter tests, speed-control, starting and braking methods, and induction-generator operation; synchronous-machine construction, equivalent circuits, phasor diagrams, power and torque equations, and voltage regulation; standalone, parallel, and infinite-bus operation, stability and rating limits, governor, field-current and load effects, synchronous motors, V-curves, and starting methods.			

Module 34

Code	Course/Module Title	ECTS Credits	Semester
EEPM304	Electrical Measurements	4	Five
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	37
Module Description			
Fundamentals of electrical measurement and instrumentation systems, units, resolution, accuracy, precision,			

linearity, sources of error, and error reduction; classification of measuring instruments; operating principles of electromechanical instruments, torque types, and the permanent-magnet moving-coil instrument (PMMC); design of multi-range voltmeters, ammeters, and ohmmeters and rectifier-type voltmeters; oscilloscopes and their applications; DC and AC bridges; transducers, their classification, and applications.

Module 35

Code	Course/Module Title	ECTS Credits	Semester
EEPM305	Power Electronics I	6	Five
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			
Switch-based conversion in power electronics; power computation and figures of merit for nonsinusoidal waveforms, including ripple factor, total harmonic distortion, form factor, power factor, and conversion efficiency; characteristics, losses, and ratings of semiconductor power switches, including power diodes, SCRs, triacs, GTOs, MOSFETs, and IGBTs; analysis of single- and three-phase diode and controlled rectifiers with R, RL, RLE, and capacitor-filter loads, line-inductance effects, dual converters, and device rating selection; single- and three-phase AC controllers, integral-cycle control, and cycloconverters.			

Module 36

Code	Course/Module Title	ECTS Credits	Semester
EEPM306	Power and Machines Lab. I	4	Five
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
0	4	63	37
Module Description			
Power and machines experiments: open-circuit, short-circuit, and load tests of a single-phase transformer and three-phase transformer connections; three-phase power measurement; DC shunt-generator tests; and speed and direction control of a DC shunt motor by armature-voltage and field-control methods. Power-electronics experiments: thyristor-controlled rectification, a three-phase full-wave rectifier, a triac light dimmer, Boost and Buck DC-DC converters, and SCR triggering using an operational amplifier. Electronics experiments: the operational amplifier, decoder and encoder circuits, the 555 timer, integrator and differentiator circuits, and a digital counter.			

Module 37

Code	Course/Module Title	ECTS Credits	Semester
EEPM307	Numerical Analysis	4	Six
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	37
Module Description			

Partial differential equations; one- and two-dimensional wave equations, Laplace equation, separation of variables, the vibrating string, and transmission-line applications; complex variables and numbers, limits, sequences, continuous functions, complex integration, and Cauchy integral theorems; numerical-method concepts, approximation, round-off and truncation errors; numerical solution of nonlinear equations using bisection, false-position, Newton-Raphson, and secant methods; direct and iterative solution of linear systems, including Jacobi, Gauss-Seidel, relaxation, and tridiagonal systems; curve fitting, regression, interpolation, least squares, and an introduction to finite-difference, finite-volume, and finite-element methods.

Module 38

Code	Course/Module Title	ECTS Credits	Semester
EEPM308	Generation Systems	5	Six
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	62
Module Description			
Primary and secondary energy, commercial and non-commercial energy, renewable and non-renewable energy, and load, utilization, capacity, diversity, demand, and availability factors; generation in hydro, thermal, steam, gas, combined-cycle, nuclear, and diesel power plants; renewable-energy systems based on solar, wind, geothermal, biomass, and fuel cells; introduction to distribution systems, classification of DC and AC distribution, connection methods, radial and ring systems, single- and three-phase distribution, distribution protection, distribution transformers, substation types, and substation measuring devices.			

Module 39

Code	Course/Module Title	ECTS Credits	Semester
EEPM309	Electrical Machine Drives	5	Six
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
4	1	78	47
Module Description			
Electrical-drive components and classification; motor-load dynamics, load torques, electrical braking, steady-state stability, multi-quadrant operation, and converter and motor ratings; DC-motor characteristics, speed control, starting and braking, and single- and three-phase converter-fed DC drives, including semi-controlled, fully controlled, and dual converters; two- and four-quadrant chopper drives, regenerative control, and rheostatic braking; induction-motor drives using stator-voltage, frequency, and V/f control; synchronous-motor drives and starting methods; reluctance, permanent-magnet, brushless, and stepper-motor drives; scalar and vector control of induction motors; and modern electric-vehicle drive applications.			

Module 40

Code	Course/Module Title	ECTS Credits	Semester
EEPM310	Power Electronics II	6	Six
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)

3	1	63	87
Module Description			
The second part of Power Electronics I, focusing on PWM control of DC-DC and DC-AC converters and on converter analysis and design; first-, second-, two-, and four-quadrant DC choppers and the bridge switching function; non-isolated Buck, Boost, Buck-Boost, and Cuk converters, including topology and component selection; transformer-isolated Forward and Flyback converters; single-phase voltage-source inverters using half- and full-bridge configurations with square-wave, quasi-square-wave, and PWM operation; and three-phase six-step voltage-source inverters, switching variables, and carrier-comparison PWM strategies.			

Module 41

Code	Course/Module Title	ECTS Credits	Semester
EEPM311	Programmable Controllers	2	Six
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
Introduction to programmable logic controllers, PLC hardware, input/output addressing, and basic instructions; number systems, Boolean algebra, logic gates, and Karnaugh maps; ladder-logic programming and the relationship between relay/contact-coil logic and PLC logic; timers, counters, sequencers, branch and internal-relay instructions, data handling, and program-flow control; electromechanical input/output devices, analog sensors, PLC modules, and networking; design of sequential-control programs and troubleshooting of I/O devices and ladder programs.			

Module 42

Code	Course/Module Title	ECTS Credits	Semester
EEPM312	Power and Machines Lab. II	4	Six
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
0	4	63	37
Module Description			
Power and machines experiments: alternator voltage regulation by the synchronous-impedance method; no-load and locked-rotor tests of a three-phase induction motor; parallel operation of two single-phase transformers; load testing of a DC series generator; induction-motor directional control and star-delta starting; synchronous-generator load testing and synchronous-motor starting. Power-electronics and drive experiments: Arduino-based PWM control of a DC chopper, motor-drive applications, a full-bridge inverter, and automatic drive control. Electronics and control experiments: an IC-555 timer, shift registers, an Arduino-based analog-to-digital converter, and an introduction to PLCs and ladder-logic programming.			

Module 43

Code	Course/Module Title	ECTS Credits	Semester
EEPM313	Engineering Project Design & Planning	2	Six

Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
1	1	33	17
Module Description			
Selection of a realistic graduation-project idea and formulation of the problem statement, objectives, scope, and deliverables; literature review and IEEE-style reference management; analysis of requirements and constraints, including cost, time, component availability, and safety, generation of alternatives, and selection of the preferred solution using a decision matrix; preparation of a preliminary design or simulation model and a block diagram, circuit diagram, or flowchart; identification of laboratory equipment, components, and simulation/design tools; preparation of a work breakdown structure (WBS), Gantt chart, implementation plan, test and verification plan, milestones, and schedule; consideration of ethics, originality, and relevant international standards; preparation of a concise proposal and engineering report and delivery of progress and preliminary project presentations.			

Module 44

Code	Course/Module Title	ECTS Credits	Semester
EEPM314	English Language 3	2	Six
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
Development of listening, speaking, reading, and writing skills, with emphasis on sentence construction, grammar, and vocabulary; main and auxiliary verbs, possessive and subject pronouns, and question words; social expressions, personal information, jobs, and affirmative, negative, and interrogative sentences; adjectives and their position and the use of articles; the present simple, adverbs of frequency, demonstratives, there is/are, and prepositions; the simple past, irregular verbs, negatives, questions, and past-time adverbs; can/cannot, requests and offers, like/would like, and some/any; the present continuous and its distinction from the present simple; and structures used to express future plans.			

Module 45

Code	Course/Module Title	ECTS Credits	Semester
EEPM401	Control Systems	6	Seven
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			

Introduction to control system, Basic Components of a Control System, Open loop and closed loop control system, Block diagram and block diagram reduction, Signal flow graph; Mason's gain formula, transfer function, Mathematical model, State space representation of control system, State Space representation: State equation, output equation, state transition Matrix, state transition equation, Characteristic Equations, state diagram, Controllability Canonical Form (CCF), Observability Canonical Form (OCF), Diagonal Canonical Form (DCF), Jordan Canonical Form (JCF), controllability, observability of control system, Time domain analysis of control system, Stability of control system, Routh-Hurwitz criterion.

Module 46

Code	Course/Module Title	ECTS Credits	Semester
EEPM402	Power System Analysis	6	Seven
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			
basic components of a power system, single line diagram, per unit analysis, generator, transformer, transmission line and load representation for different power system, Construction of Y-bus and Z-bus, Power-flow problem and equations. Gauss-Seidel method for solving power-flow equations, Newton-Raphson method for solving power-flow equations, balanced three-phase fault, short-circuit capacity, Bus impedance matrix, Fault analysis using bus impedance matrix, Symmetrical components and unbalanced faults (Review), Economical Operation of Power System neglecting generator limits and line losses. Economical Operation of Power System with generator limits and line losses. Introduction, Classification of Power System Stability. Dynamic Equation of Synchronous Machine, Stability Analysis Swing equation, Multi machine system, Machines swinging in unison or coherently. Power flow under steady state, Steady-state Stability, Transient Stability-Equal area criterion. Transient Stability Applications of sudden change in power input, Critical clearing angle and critical clearing time, Application of equal area criterion 1- Sudden loss of one parallel line 2- sudden short circuit on one of parallel lines a) Short circuit at one end of line b) Short circuit at the middle of a line.			

Module 47

Code	Course/Module Title	ECTS Credits	Semester
EEPM403	High Voltage Engineering	5	Seven
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)

3	1	63	62
Module Description			
Introduction to High Voltage Engineering: Basic concepts and terminology in high voltage engineering. Electrical Insulation Systems: Insulation testing techniques, breakdown voltage, measurement, dielectric spectroscopy, etc. Generation and Measurement of High Voltages: AC high voltage generation: transformers, resonant circuits, and voltage multipliers. DC high voltage generation: rectifiers, voltage multipliers, and voltage doublers. Impulse high voltage generation: Lightning and Switching impulse, multistage impulse generator. High Voltage Equipment. Transformers: construction, design considerations, and insulation systems. Circuit breakers: types, principles of operation, and arc interruption techniques. Capacitors: types, applications, and dielectric breakdown considerations. Overvoltage Phenomena and Protection: Lightning surges, Switching surges, Insulation coordination. High Voltage Transmission and Distribution: High voltage transmission lines, Substations. High Voltage Testing and Diagnostics: Partial discharge (PD) testing, Dielectric response analysis. Safety and Environmental Aspects. Case Studies and Practical Applications.			

Module 48

Code	Course/Module Title	ECTS Credits	Semester
EEPM404	Special Electrical Machines I	5	Seven
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	62
Module Description			
Starting Problems and distributed field: Introduction, Single phase induction motors (SPIM): Principle of operation, Types of SPIM, Motors with main winding only, Cross field theory, Rotating field theory (Double-field revolving theory), Transformer voltage, Rotational voltage, Torque speed characteristic, Fields in SPIM. Equivalent Circuit and Modeling Cases: Equivalent circuit, Power diagram, two phase induction motor, Symmetrical two-phase motor supplied from two-phase balance system, Symmetrical two-phase motor supplied from two phase unbalance system, Unsymmetrical two-phase motor supplied from two phase unbalance system. Special cases and starting Torque: Special cases, SPIM with main and auxiliary windings, Improvement of torque production in SPIM, starting torque, adding resistance with auxiliary winding, adding capacitor with auxiliary winding, and performance improvement.			

Module 49

Code	Course/Module Title	ECTS Credits	Semester
EEPM405	Power and Machines Lab. III	4	Seven
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)

0	4	63	37
Module Description			
Power and Machines lab consist of sum of laboratories can be listed below: - 1- Machines Laboratory. In this lab. student can perform sum of experiments that related with different types of machines. 2- Control Laboratory. Demonstrate his/her understanding of the basics of control system laboratory including: Basics of transfer function of any control system and represented in MATLAB software, realization, and implementation of control system in time domain and frequency domain response such step response, bode plot response, Nichols. PID controller. State space model represent for transfer function of control system. Implement some controller such state variable feedback design and root locus design for speed control of dc servo motor. Principle of Arduino microcontroller with many applications. 3- Transmission Line Laboratory. To study the behavior of transmission line under open and short circuit tests and show the Ferranti effect of Long Transmission Line model in order to calculate the transmission line parameters for PI representation also to understand the principles of compensation and voltage regulation along with load flow analysis and fault study. 4- Renewable Energy Laboratory. Recently, renewable energy has been more popular in the household and retrial locations application due to reduction of the conventional energy sources. This laboratory helps the student to understand, test and design different types of renewable energy such as photovoltaic energy system, wind energy system etc. 5- High Voltage Laboratory. The first course provides principal knowledge associated with high voltage engineering methods, techniques, and equipment. It is divided into two sections. The first section presents fundamentals of the failure mechanisms gaseous insulation at high voltages. It also discusses consequent design principles for high-voltage equipment; of the generation of high direct, alternating, and impulse voltages for testing high-voltage equipment.			

Module 50

Code	Course/Module Title	ECTS Credits	Semester
EEPM406	Graduation Project I	2	Seven
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
Selection and approval of a graduation-project topic; problem definition and formulation of objectives and scope; literature review and study of previous work; identification of system requirements; proposal of the methodology and preliminary design; identification of the required tools, software, and components; preparation of the work plan, schedule, and milestones; presentation of the project proposal and review with the supervisor.			

Module 51

Code	Course/Module Title	ECTS Credits	Semester
EEPM400	Chemistry	2	Seven
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
Chemical principles related to electrical engineering materials; atomic structure and bonding and their relationships to electrical conductivity, dielectric strength, and thermal stability; metals, alloys, polymers, ceramics, and composites used in cables, insulation, and machines; chemical ageing, thermal degradation, moisture, electrical treeing, and water treeing; insulating gases and environmentally safer alternatives to SF₆; insulating oils, contamination, and ageing; electrochemistry and corrosion in grounding systems and protection methods; battery chemistry, energy storage, safety, and recycling;			

Module 52

Code	Course/Module Title	ECTS Credits	Semester
EEPM407	Design of Control Systems	6	Eight
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			
Root locus PID Controller structure and design using root locus. Frequency response specifications. Nyquist stability, relative stability, gain margin, phase margin Nichols chart, and implementing it in the design. Bode plot, Gain, Lead, lag, Lead lag, and PID compensator design.			

Module 53

Code	Course/Module Title	ECTS Credits	Semester
EEPM408	Power System Protection	5	Eight
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	62
Module Description			
Introduction to power system protection, Fundamental of power system protection. Review on fault analysis, Fundamentals of electromechanical relays and digital protective relaying. Fuse, circuit breakers, and Instrument transformers, Overcurrent protection and coordination. Directional overcurrent protection, Differential protection. Protection of busbar, Transformer protection, Generator protection, Motors protection, Distance protection Summarization on course.			

Module 54

Code	Course/Module Title	ECTS Credits	Semester
EEPM409	Special Electrical Machines II	6	Eight
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	1	63	87
Module Description			
Starting Problems and distributed field: Introduction about Special Electrical Machines, Single phase synchronous motors: Variable Reluctance type motors, Switched Reluctance motors, Hysteresis motor. Equivalent Circuit and Modeling Cases: Single phase AC series commutator motor. The Universal motor. The Repulsion motors. Stepper motors: Types, construction, characteristics, equivalent circuit, applications, advantages and disadvantages.			

Linear induction motors: Types and features and applications. Special cases and starting Torque: Three-phase ac commutator machines. Schrage motor. Permanent Magnet Synchronous Motor (PMSM). Pilot exciter synchronous generator, Generator excitation and voltage control systems.

Module 55

Code	Course/Module Title	ECTS Credits	Semester
EEPM410	Smart Grid	4	Eight
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
3	--	48	52
Module Description			
Introduction to smart-grid technologies and power-system fundamentals; design of renewable-energy systems within the smart grid, including photovoltaic systems, wind turbines, and energy storage; power electronic converters and their role in source integration; smart meters and advanced metering infrastructure; renewable-energy integration and improvement of efficiency and reliability; energy-storage systems; smart-grid control technologies, including distribution automation, energy management systems (EMS), and the Internet of Things (IoT); demand response and load management; two-way communication architecture; cybersecurity; smart-grid modelling and simulation.			

Module 56

Code	Course/Module Title	ECTS Credits	Semester
EEPM411	Power and Machines Lab. IV	4	Eight
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
0	4	63	37
Module Description			
Power and Machines lab consist of sum of laboratories can be listed below: - Machines Laboratory: In this lab. student can perform sum of experiments that related with different types of machines. Control Laboratory: Demonstrate his/her understanding of the basics of control system laboratory including: Basics of transfer function of any control system and represented in MATLAB software, realization, and implementation of control system in time domain and frequency domain response such step response, bode plot response, Nichols. PID controller. State space model represent for transfer function of control system. Implement some controller such state variable feedback design and root locus design for speed control of dc servo motor. Principle of Arduino microcontroller with many applications. High Voltage Laboratory: The first course provides principal knowledge associated with high voltage engineering methods, techniques, and equipment. It is divided into two sections. The first section presents fundamentals of the failure mechanisms gaseous insulation at high voltages. It also discusses consequent design principles for high-voltage equipment; of the generation of high direct, alternating, and impulse voltages for testing high-voltage equipment. AC Motor Drives: To study the methods of controlling the three-phase induction motor, as well as the use of modern methods to start the induction motor and the use of			

modern methods of dynamic braking of the motor.

Module 57

Code	Course/Module Title	ECTS Credits	Semester
EEPM412	Graduation Project II	2	Eight
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	--	33	17
Module Description			
Completion of the detailed design and system implementation; simulation, modelling, or experimental work; testing, measurement, and performance validation; analysis and discussion of results and comparison with objectives and previous studies; resolution of technical problems and documentation of modifications; preparation and submission of the final report in accordance with academic requirements; preparation of the oral presentation and project discussion and defence.			

Module 58

Code	Course/Module Title	ECTS Credits	Semester
EEPM413	Professional Ethics	1	Eight
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
1	--	18	7
Module Description			
Introduction to ethics and distinctions among ethics, values, and conduct; ethical theories - utilitarianism, duty, virtue, rights, and justice; integrity, honesty, responsibility, accountability, fairness, and respect for others; professional ethics, codes of conduct, and professional obligations; identification of ethical dilemmas, decision-making, and management of conflicts of interest; human rights, environmental ethics, and social responsibility; ethics in technology, engineering, business, and scientific research; contemporary issues including artificial intelligence, data privacy, security, sustainability, and climate ethics.			

Module 59

Code	Course/Module Title	ECTS Credits	Semester
EEPM414	Electrical Standards and Engineering Practice	2	Eight
Theory (hr/week)	Other Structured (hr/week)	SSWL (hr/semester)	USSWL (hr/semester)
2	1	48	2
Module Description			
Engineering standards, codes, regulations, specifications, and practice; introduction to IEC, IEEE, BS, NEC, NFPA,			

local requirements, and owner requirements; project documents, including AutoCAD/MEP drawings, single-line diagrams (SLDs), bills of quantities (BOQs), specifications, shop drawings, and requests for information (RFIs); reading single-line diagrams and reviewing load and feeder schedules; load-current calculations, demand and diversity factors, cable selection, derating factors, and installation methods; voltage-drop calculations, circuit-breaker selection, short-circuit level, and breaking capacity; earthing and bonding, DB/SMDB/MDB/MCC panels, motor feeders, ATS, UPS, and generators; lighting, socket-outlet, and small-power circuits; testing, inspection, commissioning, and quality checklists; an integrated case study.

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