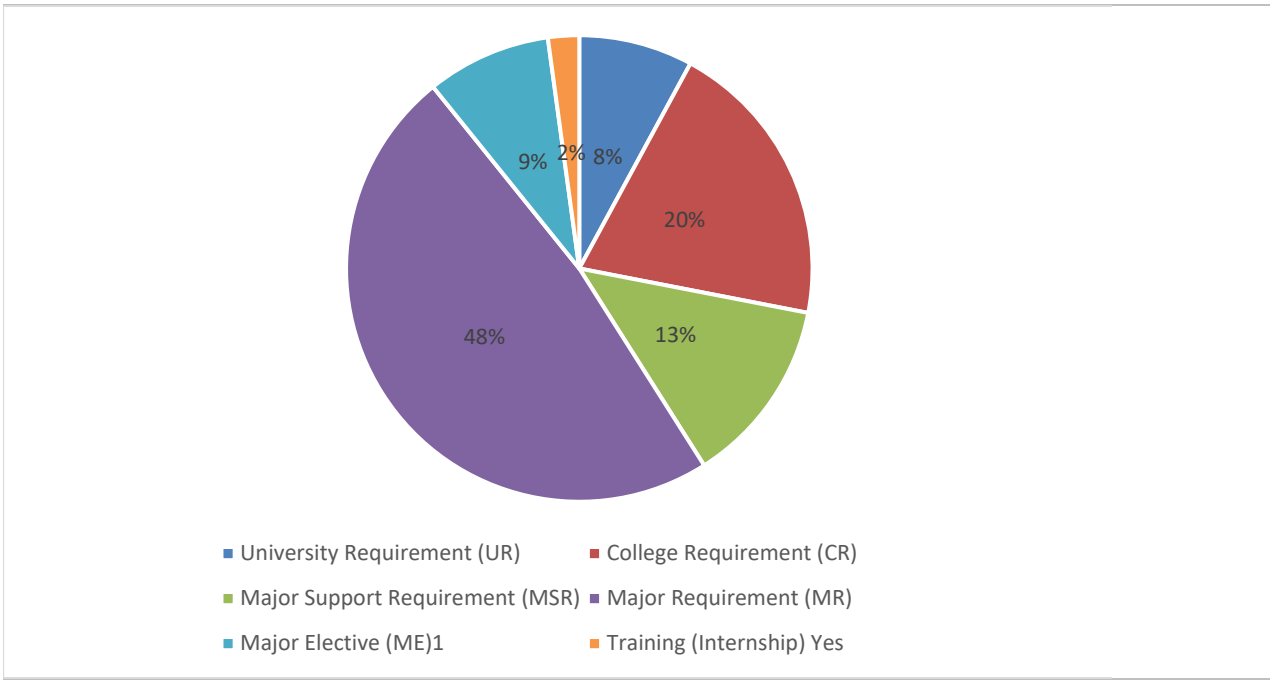
Bachelor of Science in Electronics and Communications Engineering 2025

The Electronics and Communications Engineering 2025 B.Sc. Program for Batch 2025 Onwards

Program Components



Course Type	Credit Hours	No. of Courses
University Requirements (UR)	11	4
College Requirements (CR)	28	9
Major Requirement (MR)	67	23
Major Support Requirement (MSR)	18	5
Major Elective (ME)	12	4
Training (Internship, Practicum) (TR)	3	1
Total Number of Credit Hours	139	
Total Number of Courses	46	

[1] Student must select four (EENG 4XX) courses from Major Elective (ME) List.

Detailed Study Plan

Year 1 - Semester 1

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major CGPA
		LEC	PRAC	CRD			
MATHS101	Calculus I	3	0	3	CR		NO
CHEMY 101	General Chemistry I	3	2	4	CR		NO
PHYCS101	General Physics I	3	2	4	MSR		NO
ITCS110	Computer Programming for Scientists and Engineers	3	2	4	MSR		NO
ENGL101	Communication Skills I	3	0	3	CR		NO
	Total	15	6	18			

Year 1 - Semester 2

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major CGPA
		LEC	PRAC	CRD			
MATHS102	Calculus II	3	0	3	CR	MATHS101	NO
PHYCS102	General Physics II	3	2	4	MSR	PHYS101	NO
ENGL242	Report Writing and Presentation	3	0	3	CR	ENGL101	NO
ISLM 101	Islamic Culture	3	0	3	UR		NO
EENG100	Circuit Theory I	2	2	3	MR	MATHS101	YES
	Total	14	4	16			

Year 2 - Semester 3

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major CGPA
		LEC	PRAC	CRD			
STAT276	Statistical Data Analysis for Engineering	3	0	3	CR	MATHS102	NO
MATHS205	Differential Equations	3	0	3	CR	MATHS102	NO
EENG200	Circuit Theory II	2	2	3	MR	EENG100	YES
EENG251	Digital Systems I	2	2	3	MR	EENG100	YES
EENG261	Electronic Devices and Circuits	2	2	3	MR	EENG100	YES
HRLC107	Human Rights	2	0	2	UR		NO
	Total	14	6	17			

Year 2 - Semester 4

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major CGPA
		LEC	PRAC	CRD			
MATHS203	Calculus III	3	0	3	CR	MATHS102	NO
MATHS342	Linear Algebra and Complex Analysis Variables	3	0	3	MSR	MATHS102	NO
MENG228	Thermal Sciences	2	2	3	MSR	PHYCS102	NO
EENG207	Numerical Methods and Computer Applications	2	2	3	MR	EENG100, ITCS110 & MATHS205	YES
EENG262	Analog Electronics	2	2	3	MR	EENG261	YES
EENG271	Signals and Systems	3	0	3	MR	EENG100, MATHS102	YES
	Total	15	6	18			

Year 3 - Semester 5

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major CGPA
		LEC	PRAC	CRD			
HIST 122	Modern History of Bahrain and Citizenship	3	0	3	UR		NO
EENG382	Control Systems Design	3	0	3	MR	EENG271	YES
EENG335	Power Electronics and Machines	2	2	3	MR	EENG271, EENG262	YES
EENG352	Digital Systems II	2	2	3	MR	EENG251	YES
EENG370	Communication Systems	2	2	3	MR	EENG 271, STAT276	YES
EENG371	Electromagnetics	3	0	3	MR	MATHS203 PHYCS102	YES
	Total	15	6	18			

Year 3 - Semester 6

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major CGPA
		LEC	PRAC	CRD			
ARAB110	Arabic Language Skills	3	0	3	UR		NO
MENG302	Engineering Economics	3	0	3	CR	Completion of 70 Credits	NO
EENG312	Power Systems	2	2	3	MR	EENG335	YES
EENG353	Microprocessors	2	2	3	MR	EENG251	YES
EENG364	Digital Integrated Circuit	2	2	3	MR	EENG262	YES
EENG374	Computer Networks	2	2	3	MR	EENG 370	YES
	Total	14	8	18			

Summer (Training Requirement)

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major CGPA
		LEC	PRAC	CRD			
EENG396	Industrial Training	0	6	3	TR-Training	Completion of 85 Credits	YES

Year 4 - Semester 7

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major CGPA
		LEC	PRAC	CRD			
EENG409	Professional Engineering Practice	2	2	3	MR	Completion of 85 Credits	YES
EENG462	Advanced Electronics	3	0	3	MR	EENG262	YES
EENG458	Embedded System Design	3	0	3	MR	EENG353	YES
EENG497	Senior Design Project I	0	3	1	MR	Completion of 90 Credits	YES
EENG4XX	Elective I	3	0	3	ME		YES
EENG4XX	Elective II	3	0	3	ME		YES
	Total	14	5	16			

Year 4 - Semester 8

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major CGPA
		LEC	PRAC	CRD			
EENG498	Senior Design Project II	0	9	3	MR	EENG497	YES
EENG471	Wireless Communications	3	0	3	MR	EENG370 EENG371	YES
EENG479	Digital Signal Processing	3	0	3	MR	EENG271	YES
EENG4XX	Elective III	3	0	3	ME		YES
EENG4XX	Elective IV	3	0	3	ME		YES
	Total	12	9	15			

Total		113	56	139

Major Elective Courses:

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major CGPA
		LEC	PRAC	CRD			
EENG446	Solar and Wind Renewable Systems	3	0	3	ME	EENG342 and EENG334 or EENG335	YES
EENG450	Introduction to Artificial Intelligence	3	0	3	ME	EENG207 & Completion of 85 Credits	YES
EEGN454	Advance Logic Design	3	0	3	ME	EENG353	YES
EENG456	Computer Interfacing	3	0	3	ME	EENG353	YES
EENG459	Programmable Logic Controllers (PLC)	3	0	3	ME	EENG382	YES
EENG463	Integrated Circuits and Applications	3	0	3	ME	EENG262	YES
EENG468	VLSI Design Circuits	3	0	3	ME	EENG364	YES
EENG470	Satellite Communications	3	0	3	ME	EENG371 & EENG370	YES
EENG475	Introduction to Internet of Things (IoT)	3	0	3	ME	EENG370	YES
EENG478	Microwave and Optical Systems	3	0	3	ME	EENG 370	YES
EENG487	Nonlinear Control Design	3	0	3	ME	EENG207 & EENG382	YES
EENG488	Biomedical Engineering	3	0	3	ME	EENG262 & EENG251	YES
EENG489	Robotics & Intelligent Systems	3	0	3	ME	EENG382	YES
EENG499	Special Topics in Electrical and Electronics Engineering	3	0	3	ME	Completion of 90 Credits	YES

Course Description

Major Requirement Courses Descriptions (MR):

Course Code:	**EENG 100**	Course Title:	**Circuit Theory I**
Course Description:	Basic quantities of electricity: Charge, Current, Voltage, Power, Energy and Resistance. Basic laws of electricity: Ohm's Law, Kirchhoff's Laws (KVL & KCL). Apply circuit theorems: Mesh, Nodal, Superposition, Thevenin's, Norton's, and Maximum Power transfer. Capacitors and inductors in DC circuits. Phasors & complex numbers for AC circuits. Sinusoidal steady-state analysis. Power in AC circuits: Complex, Apparent, Real & Reactive Powers and Power Factor.		

Course Code:	**EENG 200**	Course Title:	**Circuit Theory II**
Course Description:	Natural and forced responses of first and second order RLC networks. Laplace transform and application phase concept. Analysis of linear time invariant circuits. Frequency response, bandwidth and quality factor. Transfer function. State equation and Two-port networks.		

Course Code:	**EENG 207**	Course Title:	**Numerical Methods and Computer Applications**
Course Description:	Introduction to the Matlab environment. Array and matrix operations, graphing, and symbolic processing using M-file coding and Simulink. Efficient uses of Matlab help in exploring different Matlab tool-boxes. Numerical solution of linear and nonlinear simultaneous equations. Numerical differentiation, integration and solution of ordinary differential equations. Interpolation and curve fitting methods.		

Course Code:	**EENG 251**	Course Title:	**Digital Systems I**
Course Description:	Number systems; Basic logic gates; Boolean algebra; Simplification of logic functions: Karnaugh maps, QuineMcCluskey method, NAND and NOR gates networks; Multiple output networks; MSI combinational logic circuits: Multiplexers, Decoders, Adders, Comparators; Tri-State logic; combinational logic circuits design with programmable logic devices: Memories, PLA, PAL; Flip-Flops; Design and analysis of counters and registers.		

Course Code:	**EENG 261**	Course Title:	**Electronic Devices and Circuits**
Course Description:	Semiconductor fundamentals: carrier transport and recombination, doped materials, physics and applications of pn junction diode, Zener diode characteristics and applications, special purpose diodes, fundamentals of BJTs and FETs, DC analysis of transistors circuits, Transistors as a switch, Transistor as an amplifier, Small signal equivalent circuits, Biasing techniques, Basic single stage amplifiers.		

Course Code:	**EENG 262**	Course Title:	**Analog Electronics**
Course Description:	Differential amplifiers, Multistage amplifiers: Cascade, cascade and darlington pair configurations, Basic building blocks of op amp. Ideal op amp characteristics, positive and negative feedback applications of ideal op amp, Non-ideal op amp, Frequency response of amplifiers, Feedback concepts and topologies, Filters, Output stage and power amplifies.		

Course Code:	**EENG 271**	Course Title:	**Signals and Systems**
Course Description:	Elementary continuous and discrete-time signals, Signal decomposition and convolution, sampling theory and Nyquist theorem, Laplace and Z transforms, Fourier series and integral with applications, Linear Time-Invariant (LTI) systems: Properties, impulse and frequency responses, Pole-zero description, input-output difference and differential equations, transient and steady-state time responses to elementary signals.		

Course Code:	**EENG 312**	Course Title:	**Power Systems**
Course Description:	Power generation, types of prime movers. Parallel operation of synchronous machines. Active and reactive power control in synchronous generators. Transmission line parameters, short, medium and long line representation; voltage drop calculations; reactive power compensation. Cables for interior wiring and power transmission. Fuses, Contactors and Circuit breakers. Tariffs.		

Course Code:	**EENG 335**	Course Title:	**Power Electronics and Machines**
Course Description:	Characteristics and brief physics of Power Semiconductor Devices: Power Diodes, Power MOSFET, IGBT, SCR, GTO, Triac, UJT. Single phase controlled AC-DC converters, AC-AC voltage controllers. DC-DC Choppers. Buck and Boost regulators. DC-AC inverters. Magnetic circuits. Transformers: construction and equivalent circuit. Principles of electromechanical energy conversion, force and torque produced by single and multi-excited magnetic field systems, production of rotating magnetic field. Three-phase induction machines. DC Machines. Synchronous motor.		

Course Code:	**EENG 352**	Course Title:	**Digital Systems II**
Course Description:	Finite State Machine: derivation of state graphs and tables, reduction of state tables, state assignment. Digital system design with: PALs, PLAs, SPLDs, registers, counters, memories, CPLDs, FPGAs. Digital System Architecture: Data path and control. Algorithmic state machines. Logic controllers for sequential arithmetic circuits. Introduction to Hardware Description Languages. VHDL Design Styles (data flow, behavioral, structural). VHDL Representation of Combinational and Sequential logic Circuits. Compile, simulate and synthesize sequential logic circuits. Use of CAD tools in Digital System Design.		

Course Code:	**EENG 353**	Course Title:	**Microprocessors**
Course Description:	Fundamentals of microprocessor: Basic architecture, bus transfer, Flags and microprocessor arithmetic: Emphasis is placed on 8-bit microprocessors systems later extended to larger microprocessor architectures; Instruction sets and assembly language programming; Software/Hardware trade-offs, Memory systems and hierarchy; Memory mapping & decoding; Interfacing I/O devices; I/O data transfer: handshaking, polling & interrupts, timing & sequencing, DMA; Introduction to more advanced microprocessor features: Cache, Pipelining, Super-scaling.		

Course Code:	**EENG 364**	Course Title:	**Digital Integrated Circuit**
Course Description:	A comprehensive view of digital integrated circuits. Digital logic family; Analysis of logic gates: TTL, ECL, MOS, CMOS. Design of static & dynamic MOS gates. Design and performance of simple gate functions. Sequential logic circuits: analysis & design Registers and clocking schemes. Memory design.		

Course Code:	**EENG 370**	Course Title:	**Communication Systems**
Course Description:	Overview of telecommunication systems, review of signals and systems, amplitude modulation systems, frequency modulation, sampling, Quantization and Pulse modulation techniques. Introduction to noise in communication systems, Signal-Space representation, Digital modulation techniques (ASK, PSK, FSK, QAM), Matched filter and optimum receivers, performance analysis and probability of error (BER), Power /data rate tradeoffs, channel capacity and bandwidth efficiency, Introduction to error correcting codes.		

Course Code:	**EENG 371**	Course Title:	**Electromagnetics**
Course Description:	Review of Vector Analysis; Electrostatic & Magnetostatic Fields: Coulomb's, Gauss's, Biot-Savart's, and Ampere's Laws; Electric and Magnetic Potential; Boundary Conditions; Electro-Magnetic Forces; Time Varying Fields and Faraday's Law; Static versus Time-varying Maxwell's equations; Introduction to Electromagnetic Wave Propagation and Antennas.		

Course Code:	**EENG 374**	Course Title:	**Computer Networks**
Course Description:	Computer network architecture, OSI seven-layer reference model, emphasis on the data link, network, and transport layers. Transmission media, switching methods, topologies, multiplexing, routing, and congestion control. Elementary queuing theory and network protocols. Emerging protocols. Error recovery and reliability. Applications including electronic mail, virtual terminals, and distributed operating systems.		

Course Code:	**EENG 382**	Course Title:	**Control Systems Design**
Course Description:	Representation of physical control system elements. Sensitivity, static accuracy, and transient response. Stability of control systems: Routh criterion, Root locus, Frequency response methods, Nyquist stability criterion. Compensation techniques and design. Discrete time systems, digital signal processing fundamentals. Z-Transform. A/D and D/A conversion, zero order hold, stability of digital control systems, state variable technique, time domain analysis, digital controller design, Microprocessor, and Microcontrollers control implementation.		

Course Code:	**EENG 396**	Course Title:	**Industrial Training**
Course Description:	All students in the program must participate in an approved training program in a relevant industry. At the completion of 300 hours of supervised training, each student must submit a formal report and conduct an oral presentation.		

Course Code:	**EENG 409**	Course Title:	**Professional Engineering Practice**
Course Description:	The course is intended to enhance student's capability to use available resources, like library and internet, to prepare seminars on selected topics in order to develop skills and apprise them of lifelong learning and contemporary issues. In addition, the course will teach the students the scope of engineering ethics. Moral reasoning and resolving ethical dilemmas. Codes of ethics. Environmental ethics.		

Course Code:	**EENG 458**	Course Title:	**Embedded System Design**
Course Description:	Introduction to embedded-system applications and platforms. Architecture of embedded processor/microcontroller. Embedded system memory architecture, High level programming and real time operating systems for embedded systems. Software and hardware tradeoffs. Input/output interfacing techniques for devices such as sensors, actuators, Serial communication, data acquisition systems, digital and analog I/O, timers. Wired and wireless and internet embedded networking. Case studies of real-world embedded systems using state-of-the art microcontrollers.		

Course Code:	**EENG 462**	Course Title:	**Advanced Electronics**
Course Description:	Feedback topologies and analysis, Feedback and stability, Analog integrated circuits, Filters, Sensitivity, Switched capacitor filters, Oscillators, Multivibrators, Integrated circuit timers, Wave shaping circuit.		

Course Code:	**EENG 471**	Course Title:	**Wireless Communications**
Course Description:	This course covers the design fundamentals of wireless and cellular communication systems, including issues of frequency reuse, channel assignments, hand-over techniques. Fading and multipath channels and radio propagation aspects. Speech coding, channel coding, spread spectrum, and multiple access and diversity techniques for wireless systems and standards. Analysis and design principles of antenna for wireless systems including antenna arrays, broadband antennas. Beamforming Techniques.		

Course Code:	**EENG 479**	Course Title:	**Digital Signal Processing**
Course Description:	Review of 1D discrete signals & systems; Z, Fourier, and Wavelet Transforms; 1D FIR and IIR filter design; Introduction to 2D and 3D Signal Processing: Image & Video Enhancement and Compression.		

Course Code:	**EENG 497**	Course Title:	**Senior Design Project I**
Course Description:	In this 1st phase of the project, a preliminary study is carried out in teams under the supervision of a faculty member on an approved proposal of a research project relevant to the field. The research project may be of experimental or theoretical nature, where the application of engineering knowledge towards the project development is demonstrated. This phase involves a thorough literature review, the development of a detailed implementation plan, as well as the conduction of any preliminary studies and preparation needed for the execution of the 2nd phase of the project in the subsequent course (Senior Project II). An end-of-term written report is required.		

Course Code:	**EENG 498**	Course Title:	**Senior Design Project II**
Course Description:	In this 2nd phase of the project, the development and implementation of the research project are continued by the same team under the supervision of the same faculty member. This phase involves accurate implementation and completion of the project tasks, deep analysis of the results, and logical and evident-based reasoning of the outcomes and drawn conclusions. End-of-term written formal report, poster, and oral presentation are required.		

Major Elective Courses Descriptions (ME):

Course Code:	**EENG 446**	Course Title:	**Solar and Wind Renewable Systems**
Course Description:	Estimation of solar radiation. Solar cells: types, characteristics. Modeling characteristics and sizing of Photovoltaic Systems (PV). Maximum Power Point Tracking. Interfacing between PV systems and power networks. Introduction to wind structure and statistics. Weibull and Raleigh distributions of wind speeds. Wind turbines: types, principles of operation, performance analysis. Economics of Solar and wind energy conversion systems.		

Course Code:	**EENG 450**	Course Title:	**Introduction to Artificial Intelligence**
Course Description:	Historical overview of AI; Data Science Basis; Fuzzy sets, and decisions-based Systems; Learning systems and Neural Network classes; Genetics, and evolutionary programming; Supervised learning; Deep learning paradigm and topologies; AI Driven Clustering techniques; Current trends in Artificial Intelligence applications.		

Course Code:	**EENG 454**	Course Title:	**Advance Logic Design**
Course Description:	Advanced topics in digital logic design, methodologies, and applications; design of complex high-speed digital circuits and systems; use of modern EDA tools in the design, simulation, synthesis and implementation; application of a hardware description language such as Verilog or VHDL to model digital systems at Behavior and RTL level; field programmable gate arrays (FPGA) as a vehicle to understand complete design-flow of an integrated circuit; advanced methods of logic minimization and state machine design; design and implementation of digital system building blocks such as arithmetic circuits, data paths, microprocessors, I/O modules, UARTs, frequency generators, memories etc.		

Course Code:	**EENG 456**	Course Title:	**Computer Interfacing**
Course Description:	Personal computer (PC) architecture; bus standards; Interrupts; direct memory access, and I/O capabilities; designing interface ports; serial and parallel I/O ports; UART; A/D and D/A converters; Design, implementation, and debugging of computer interfacing circuits; computer peripherals; device drivers and development tools; cases studies such as data acquisition systems; computer controlled motors, and interfacing to robots.		

Course Code:	**EENG 459**	Course Title:	**Programmable Logic Controllers (PLC)**
Course Description:	Introduction to relays, contactors, latches, switches, sensors, valves, and actuators; PLC components, installation, and wiring; Introduction to PLC programming; PLC input/output systems; PID and fuzzy controller implementation; PLC safety requirements, and emergency shutdown; Introduction to Industrial Networking; Introduction to Human Machine Interface (HMI) and SCADA systems.		

Course Code:	**EENG 463**	Course Title:	**Integrated Circuits and Applications**
Course Description:	Timer IC applications: Monostable, astable operation, Voltage-to-frequency conversion, Voltage-to-period conversion, Frequency-to-voltage conversion OTA's and CFB op amps, PLL: Analog multipliers, dividers, exponent and logarithmic amplifiers, Modulation and demodulation.		

Course Code:	**EENG 468**	Course Title:	**VLSI Circuits Design**
Course Description:	Historical perspective of VLSI design, MOS transistors: Theory of operation, device modeling, secondary effect models, Scaling properties and design trade-off, Analysis and design of MOS analog and Digital integrated Circuits, VLSI circuits using BJTs, new trends in VLSI circuit design.		

Course Code:	**EENG 470**	Course Title:	**Satellite Communications**
Course Description:	Introduction. Orbital aspects and spacecraft's. Antenna systems for satellites. Performance and design parameters. Down and up links design. Modulation and Multiplexing techniques for satellite links. Multiple access, encoding and error correction. Influence of earth path on satcom. Earth station technology. Satellite TV network distribution. (direct broadcasting frequencies, receivers) Typical examples (INMARSAT, INTELSAT, ARABSAT, GPS).		

Course Code:	**EENG 475**	Course Title:	**Introduction to Internet of Things (IoT)**
Course Description:	Introduction to Internet of Things: Concept and Applications to smart grid, city, home, and industrial automation; IoT Architecture; Sensors & Actuators; Edge / Fog / Cloud computing; IoT Networking and Connectivity Technologies; IoT Protocols; IoT data analytics; IoT Design and Prototyping project.		

Course Code:	**EENG 478**	Course Title:	**Microwave and Optical Systems**
Course Description:	Microwave impedance and matching; Microwave passive and active devices; Microwave filters and networks; Introduction to microwave integrated circuits; Ray theory; Optical fiber wave guides; Types of optical fibre and their transmission characteristics; Optical connectors, sources, and detectors; Optical fiber systems.		

Course Code:	**EENG 487**	Course Title:	**Nonlinear Control Design**
Course Description:	Analysis and design of nonlinear systems. Phase plane construction: the isocline Lienard's methods, classification of singularities. Variable structure control. Stability definitions. Lyapunov's second methods; Popov stability criterion. Analysis of stability for passive systems. The describing functions. Optimal control and state estimation. Conservative and Lagrangian systems. Kalman-Bucy algorithm and prediction. Sliding mode control synthesis.		

Course Code:	**EENG 488**	Course Title:	**Biomedical Engineering**
Course Description:	Introduction to Biomedical Engineering; Transducer Principles; Cardiovascular system measurement: Electrocardiogram, Phonocardiogram, blood flow, blood pressure; measurements in the respiratory and nervous systems: Pneumatography, Plethysmography, and Electroencephalograms; Biomedical signal processing techniques; patient-care equipment: pacemaker, defibrillator, and breathing assistive systems; practical diagnostic and therapeutic applications.		

Course Code:	**EENG 489**	Course Title:	**Robotics & Intelligent Systems**
Course Description:	Introduction to robotics; Spatial description and transformations; Forward and Inverse kinematics; The Jacobian, velocity, and spatial motion; Manipulators trajectories, dynamics, and control: linear and non-linear; Navigation and localisation of mobile Robots; Intelligent robotic systems, Computational intelligence (CI) techniques, neural networks, fuzzy logic systems, genetic programming and optimization, simulated annealing, and learning techniques; Optimization techniques and biometric methods; Foraging: prey model from behavioural ecology, autonomous robot applications, multi-agent system; Intelligent sensors, and machine vision; Examples of modern applications.		

Course Code:	**EENG 499**	Course Title:	**Special Topics in Electrical and Electronics Engineering**
Course Description:	The contents of this course cover selected advance topics in electrical and electronics engineering that will be offered from time to time based on the availability of the resources. The specific contents will be announced at least one semester prior to its offering. Contact the department for any enquiry about this course.		

Major Support Requirement Courses Descriptions (MSR):

Course Code:	**PHYCS 101**	Course Title:	**General Physics I**
Course Description:	Units and measurements; brief review of vectors; Newton's laws of motion; projectile motion; work and energy; impulse and momentum; rotational dynamics; equilibrium of a rigid body; periodic motion.		

Course Code:	**PHYCS 102**	Course Title:	**General Physics II**

Course Description:	Electric charges and fields; Coulomb's and Gauss's laws; electric potential; capacitors and dielectrics; direct current circuits; Kirchoff's rules; magnetic field and flux; ampere's law; induced emf; Lenz's law; mutual and self inductance; AC circuits; RLC circuit.

Course Code:	**MATHS 342**	Course Title:	**Linear Algebra and Complex Analysis Variables**
Course Description:	System of linear equations, Matrices, Determinants, Vector spaces, Subspaces, Linear independence, Linear transformations, Complex numbers, Analytical functions, Cauchy Integral theorem and formula, Residues, contour integration.		

Course Code:	**MENG 228**	Course Title:	**Thermal Sciences**
Course Description:	Basic concepts of thermodynamic, properties of pure substances, phase equilibrium, properties tables. The ideal gas equation of state. The First Law of thermodynamics: heat, work applications to closed and open systems. The Second Law of Thermodynamics: the concept of entropy. Power cycles. Introduction to heat transfer, modes of heat transfer: conduction, convection and radiation. Heat exchangers.		

Course Code:	**ITCS 110**	Course Title:	**Computer Programming for Scientists and Engineers**
Course Description:	Introduction to computers, their uses, development, components, hardware, and software. Internal representation and numbering systems. Algorithmic problem-solving principles. Introduction to a modern programming language (e.g. C++). Input/output, conditional statements, iteration, files, strings, functions and arrays. Lab assignments to practice programming.		

College Requirement Courses Descriptions (CR):

Course Code:	**MATHS 101**	Course Title:	**Calculus I**
Course Description:	Algebra. Functions and graphs. Trigonometry. Conic sections. Limits and continuity. Derivatives and integrals. Applications of derivatives which include mean value theorem, extreme of functions and optimization. Definite integrals and the Fundamental Theorem of Calculus.		

Course Code:	**CHEMY 101**	Course Title:	**General Chemistry I**

Course Description:	Significant figures, chemical formulas and equations; mass relations, limiting reactions and theoretical yield; Physical behavior of gases; electronic structure, periodic table, covalent bonding; Lewis structures, Molecular structures, hybridization; molecular orbital's, solutions; colligative properties. Related practical work.

Course Code:	**ENGL 101**	Course Title:	**Communication Skills I**
Course Description:	This course focuses on reading skills and strategies and language development. The reading section concentrates on high-interest contemporary topics and encourages students to increase speed and efficiency. The writing component, integrated to the reading materials, reviews grammatical structures, develops language accuracy and Introduces paragraph writing. Students are required to upgrade their grammar, reading, and listening skills on the internet.		

Course Code:	**MATHS 102**	Course Title:	**Calculus II**
Course Description:	Applications of definite integrals, including areas, volumes and surface areas of solids of revolution, arc length and centroids. Transcendental functions, indeterminate form and L'Hopital's Rule. Techniques of integration and improper integrals. Infinite series, power series. Maclaurin and Taylor Theorem.		

Course Code:	**ENGL 242**	Course Title:	**Report Writing and Presentation**
Course Description:	Technical Report Writing prepares students to design and compose effective technical documents, with particular emphasis on technical reports and oral presentations. The lecture hour is dedicated to theories, techniques and presentations. The tutorial hour is assigned to discuss the written reports feedbacks.		

Course Code:	**MATHS 203**	Course Title:	**Calculus III**
Course Description:	Parametric equations and polar coordinates. Vectors and surfaces. Limits, derivatives, and integrals of vector-valued functions. Partial differentiation. Multiple and line integrals and their applications. Green's and Stokes' Theorems.		

Course Code:	**MATHS 205**	Course Title:	**Differential Equations**
Course Description:	Differential equations of first order and their solution. Separable and exact equations. Equations convertible to separable type. Higher order linear equations with constant coefficients (homogeneous and non-homogeneous). Power series method for second order linear equations. Variation of parameters. Laplace transform technique. Applications of differential equations.		

Course Code:	**STAT 276**	Course Title:	**Statistical Data Analysis for Engineering**

Course Description:	Introduction to statistical methods for data analysis and interpretation. Statistical inference, probability distributions, descriptive statistics and data visualization, significance tests, Analysis of Variance (ANOVA), linear and nonlinear regression analysis. Principles of design of experiments, statistical quality control. Tools: spreadsheet software and programming environment.

Course Code:	**MENG 302**	Course Title:	**Engineering Economics**
Course Description:	Fundamentals of engineering economy. Time value of money. Present worth analysis. Annual worth analysis. Rate of return analysis. Replacement and retention analysis. Capital rationing. Breakeven analysis. ~~and~~ Payback period analysis. Cost estimation and indirect cost allocation. Depreciation methods.		

University Requirements Courses Descriptions (UR):

Course Code:	**HRLC 107**	Course Title:	**Human Rights**
Course Description:	This course deals with the principles of human rights in terms of the definition of human rights, scope, sources with a focus on the International Bill of Human Rights; The Charter of the United Nations; Universal Declaration of Human Rights; The International Covenant on Economics, Social and Culture rights; Convention against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment; Mechanics and the Constitutional Protection of Rights and Public Freedoms in Kingdom of Bahrain.		

Course Code:	**ISLM 101**	Course Title:	**Islamic Culture**
Course Description:	An introduction to the general outline and principles of Islamic culture, its general characteristics, its relationships with other cultures, general principles of Islam in beliefs, worship, legislation and ethics.		

Course Code:	**HIST 122**	Course Title:	**Modern History of Bahrain and Citizenship**
Course Description:	Spatial identity of Bahrain: Brief history of Bahrain until the 18th century; the historical roots of the formation of the national identity of Bahrain since the 18th century; the modern state and evolution of constitutional life in Bahrain; the Arabic and Islamic dimensions of the identity of Bahrain; the core values of Bahrain's society and citizenship rights (legal, political, civil and economic); duties; responsibilities and community participation; economic change and development in Bahrain; Bahrain's Gulf, Arab and international relations.		

Course Code:	**ARAB 110**	Course Title:	**Arabic Language Skills**
Course Description:	This course focuses on basic Arabic skills including form, function, and meaning. It also helps the student to appreciate and understand structures and approach them from a critical point of view, through various genres in literature.		