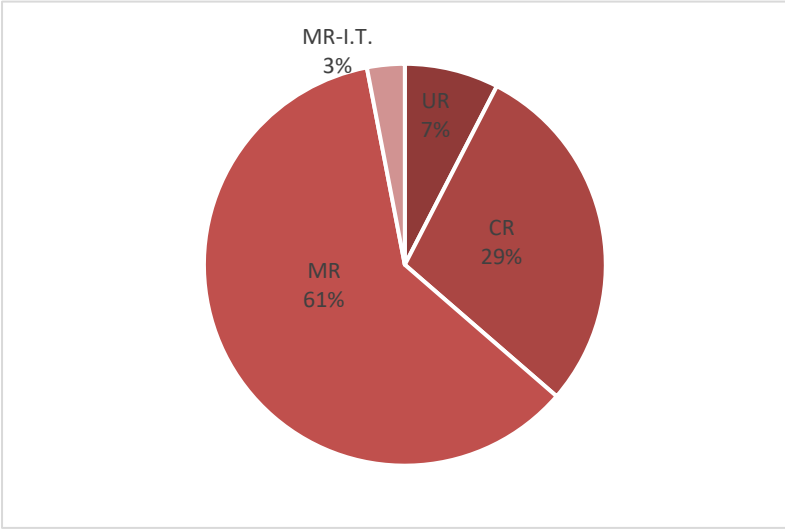
Associate Diploma of Science in Electronics Engineering

An Exit Qualification from the Electronics Engineering B.Sc. Program

for Students Admitted to B.SC Program (2014-2022)

Program Components

Course Type	CRD
University Requirement (UR)	5
College Requirement (CR)	19
Major Requirement (MR)	40
MR-Industrial Training	2
Total Credit (CRD)	66



List of Courses

University Requirements

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ARAB 110, or HIST 122, or ISLM 101	Arabic Language Skills Modern History of Bahrain and Citizenship Islamic Culture	3	0	3	UR	------	No
HRLC 107	Human Rights	2	0	2	UR	------	No

College Requirements

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
CHEMY 101	General Chemistry I	3	3	4	CR	------	No
CSC 103	Computer Programming for Scientists and Engineers	3	2	3	CR	------	No
ENGL 101	Communication Skills I	3	0	3	CR	------	No
ENGL 102	Composition and Reading II	3	0	3	CR	ENGL 101	No
MATHS 101	Calculus I	3	0	3	CR	------	No
MATHS 102	Calculus II	3	0	3	CR	MATHS 101	No

Major Requirements

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
EENG 100	Circuit Theory I	3	1	3	MR	MATHS101	YES
EENG 200	Circuit Theory II	3	1	3	MR	EENG100	YES
EENG 251	Digital Systems I	3	1	3	MR		YES
EENG 261	Electronic Devices and Circuits	3	1	3	MR	EENG100	YES
EENG 262	Analog Electronics	3	1	3	MR	EENG261	YES
EENG 302	Electronic Instrumentation	3	1	3	MR	EENG261, EENG200	YES
EENG 352	Digital Systems II	3	1	3	MR	EENG251 & EENG200	
EENG 353	Microprocessors	3	1	3	MR	EENG352 & CSC103	YES
EENG 271	Signals and Systems	3	1	3	MR	EENG200, MATHS102	YES
EENG 372	Communication Systems I	3	1	3	MR	EENG271	YES
EENG 343	Electrical Machines	3	1	3	MR	EENG200	YES
EENG 364	Digital Integrated Circuits	3	1	3	MR	EENG261	YES
EENG 381	Control Systems	3	1	3	MR	EENG271	YES
EENG 290	Junior Project	0	3	1	MR	Completion of 55 Credits	YES

Industrial Training

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
EENG 291	Industrial Training I	0	6	2	MR-Training	Completion of 45 credits	Yes

Courses Descriptions

University Requirements Courses Descriptions

Course Code: ARAB 110 **Course Title:** Arabic Language Skills
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.

Course Code: HIST 122 **Course Title:** Modern History of Bahrain and Citizenship
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: HRLC 107 **Course Title:** Human Rights
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
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.

College Requirement Courses Descriptions

Course Code: CHEMY 101 **Course Title:** General Chemistry I
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 orbitals, solutions; colligative properties. Related practical work.

Course Code: CSC 103 **Course Title:** Computer Programming for Scientists and Engineers
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.

Course Code: ENGL 101 **Course Title:** Communication Skills I
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: ENGL 102 **Course Title:** Composition and Reading II
A continuation of English 101, which further develops the students' skills in reading and writing. The course exposes students to a wider range of reading material aimed at developing their understanding of different styles of English.

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

Course Code: MATHS 102 **Course Title:** Calculus II
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.

Major Support Courses Descriptions

Course Code: EENG 100 **Course Title:** Circuit Theory I
Circuit elements, Lumped circuits Kirchhoff's laws. Network theorems. Sinusoidal steady-state analysis, single phase and 3-phase balanced and unbalanced networks. Coupled networks, series and parallel magnetic circuits.

Course Code: EENG 200 **Course Title:** Circuit Theory II
Natural and forced response of first and second order RLC networks. Laplace transform and application phase concept. Analysis of linear time-invariant circuits. Convolution network graphs. Tellegen's theorem. More on time domain solution of networks by Laplace transformation. Frequency response, bandwidth and quality factor. Transfer function. State equation and Two-port networks. Computer aided analysis of circuits.

Course Code: EENG 251 **Course Title:** Digital Systems I
Number systems; Basic logic gates; Boolean algebra; Simplification of logic functions: Karnaugh maps, Quine-McCluskey 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
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
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
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 290 **Course Title:** Junior Project
The course is meant to develop creative design skills in the students by exposing them to some ongoing important projects in the country and requiring them to submit report on a chosen project highlighting various design components. Field trips may be arranged in coordination with the industry. The project will emphasize independent learning and teamwork. The lectures will include introduction to electrical engineering profession, description of various areas of specialization, professional report writing techniques and the role of electrical engineers in the society.

Course Code: EENG 302 **Course Title:** Electronic Instrumentation

Introduction to measurements and instrumentation. AC/DC indicating instruments. Measurements of R,L, and C parameters. Digital measurements techniques. Recording instruments, and image understanding. Modern data acquisition systems. Modern process instrumentation.

Course Code: EENG 343 **Course Title:** Electrical Machines

Magnetic circuits, Transformers: Construction, principles of operation, equivalent circuit, efficiency, voltage regulation, 3-phase connections. 3-phase Induction Motors: equivalent circuit, energy balance, torque and slip, starting, speed control. Synchronous Generators: operating principles, phasor diagrams, voltage regulation, active and reactive powers. DC machines: construction, methods of excitation, starting and speed control.

Course Code: EENG 352 **Course Title:** Digital Systems II

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, behavioural, 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

Fundamentals of microprocessor: architecture, software development and interfacing. Emphasis is placed on 8-bit microprocessors systems extended to 16- and 32-bit microprocessor architecture; Assembly language programming; Memory systems; Memory mapping & decoding; Interfacing I/O devices; I/O data transfer: handshaking, interrupts, DMA; Programmable interface devices; Interfacing data converters.

Course Code: EENG 364 **Course Title:** Digital Integrated Circuits

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 372 **Course Title:** Communication Systems I

Overview of communication systems, random processes, mean, correlation, power spectral density, noise in amplitude modulations (DSB-SC, SSB,VSB) ,AM demodulation, frequency modulation, phase modulation, FM demodulation, noise in AM, and FM, pulse modulation (PAM, PCM) frequency division multiplexers (FDM), match filter, ISI, adaptive equalizers.

Course Code: EENG 381 **Course Title:** Control Systems

Introduction to control systems. Representation of physical control system elements. Analogies, Transfer functions, Signal flow graphs. State space analysis. Sensitivity, static accuracy and transient response. Stability of control systems: Routh criterion, Root locus, Frequency response methods, Nyquist stability criterion. Compensation techniques. Introduction to digital control and the Z transform. Discrete time control system.

Course Code: EENG 291 **Course Title:** Industrial Training I

In this industrial training course, all students must participate in an approved training program in the relevant industry, developing a multidisciplinary and teamwork experience. At the completion of 300 hours of supervised training each student must submit a formal report and oral presentation.