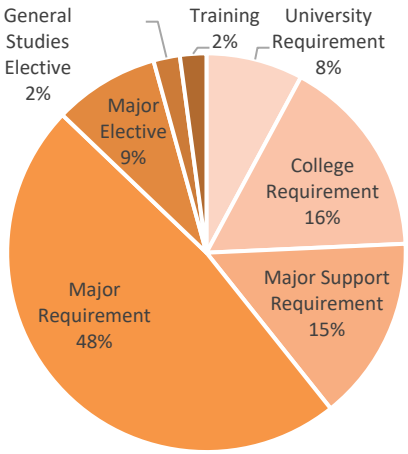
B.Sc. in Computer Engineering 2024

Program Components

Course Type	CRD
University Requirement (UR)	11
College Requirement (CR)	23
Major Support Requirement (MSR)	21
Major Requirement (MR)	67
Major Elective (ME)[1]	12
General Studies Elective (GSE)[2]	3
Training (Internship, Practicum) (TR)	3
Total Credit (CRD)	140



[1]Student must select four courses from Major Elective (ME) List.
[2]Student must select one from Humanities and Social Science Component. This includes any course from the following:

Humanities: Fine Arts, History, American Studies, Classics, Communications, English, (Foreign Language) French, Music, Philosophy, Theatre, Literature (Arabic), Religion (comparative).
Social Science: Anthropology, Economics, Education, Geography, History, Psychology, Sociology, Women's Studies, Political Science.

Teaching Language: English

Detailed Study Plan

Year 1 - Semester 1

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major GPA
		LEC	PRAC	CRD			
ITCE 101	Computer Technologies	3	0	3	MR	------	Yes
ITCS 106	Computer Programming I	3	2	4	CR	------	Yes
PHYCS 101	General Physics I	3	3	4	MSR	------	No
MATHS 101	Calculus I	3	0	3	CR	------	No
ENGL 157	English for Information Technology	3	0	3	CR	------	No

Year 1 - Semester 2

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major GPA
		LEC	PRAC	CRD			
ITCE 114	Digital Design I	3	2	4	MR	ITCE 101	Yes
ITCS 107	Computer Programming II	3	2	4	CR	ITCS 106	Yes
PHYCS 102	General Physics II	3	3	4	MSR	PHYCS 101	No
MATHS 102	Calculus II	3	0	3	MSR	MATHS 101	No
CHEMY 101	General Chemistry I	3	3	4	MSR	------	No

Year 2 - Semester 3

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major GPA
		LEC	PRAC	CRD			
ITCE 211	Digital Design II	3	0	3	MR	ITCE 114	Yes
ITCE 201	Electrical Circuit Analysis	3	2	4	MR	MATHS 101 & PHYCS 102	Yes
ITCS 214	Data Structures	3	0	3	CR	ITCS 107	Yes
ITCS 258	Discrete Structures	3	0	3	MR	ITCS 106 & MATHS 101	Yes
MATHS 205	Differential Equations	3	0	3	MSR	MATHS 102	No

Year 2 - Semester 4

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major GPA
		LEC	PRAC	CRD			
ITCE 222	Electronics	3	0	3	MR	ITCE 201	Yes
ITCE 232	Embedded Systems I	3	2	4	MR	ITCE 114	Yes
ITNE 233	Computer Networks	3	2	4	MR	ITCS 106 & ITCE 101	Yes
ITSE 201	Introduction to Software Engineering	3	0	3	MR	ITCS 107	Yes
STAT 273	Probability and Statistics	3	0	3	CR	MATHS 101	No

Year 3 - Semester 5

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major GPA
		LEC	PRAC	CRD			
ITCE 381	Applied Machine Learning	3	0	3	MR	ITCS 214 & STAT 273	Yes
ITNE 351	Routing and Switching	3	0	3	MR	ITNE 233	Yes
ITCS 325	Operating Systems	3	0	3	MR	ITCS 214 & ITCE 232	Yes
ITCS 330	Database Driven Websites	3	0	3	MR	ITCS 214	Yes
ENGL 219	Technical Report Writing	3	0	3	CR	ENGL 157	No
HIST 122	Modern History of Bahrain and Citizenship	3	0	3	UR	------	No

Year 3 - Semester 6

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major GPA
		LEC	PRAC	CRD			
ITCE 340	Signals and Systems	3	0	3	MR	ITCE 201 & MATHS 205	Yes
ITCE 364	Computer Architecture	3	0	3	MR	ITCE 211 & ITCE 232	Yes
ITCE 370	Professional Issues and Ethics	3	0	3	MR	ENGL 219	Yes
ITNE 481	Cloud Computing	3	0	3	MR	ITNE 351	Yes
ITCS 340	Analysis and Design of Algorithms for Engineers	3	0	3	MR	ITCS 214 & ITCS 258	Yes
ARAB 110	Arabic Language Skills	3	0	3	UR	------	No

Training Requirement

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major GPA
		LEC	PRAC	CRD			
ITCE 491	Industrial Training	0	6	3	CR-Training	Passing 85 CrHr	Yes

Year 4 - Semester 7

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major GPA
		LEC	PRAC	CRD			
ITCE 476	Computer Systems Security	3	0	3	MR	ITNE 351	Yes
ITCE 497	Senior Project	0	9	3	MR	ENGL 219 & Passing 85 CrHr	Yes
ITXX 4XX	Major Elective 1 (List 1)	3	0	3	ME	See Elective List	Yes
MATHS 342	Linear Algebra and Complex Analysis Variables	3	0	3	MSR	MATHS 102	No
ISLM 101	Islamic Culture	3	0	3	UR	------	No
GSE XXX	Humanities/Social Sciences (List 2)	3	0	3	GSE	------	No

Year 4 - Semester 8

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major GPA
		LEC	PRAC	CRD			
ITXX 4XX	Major Elective 2 (List 1)	3	0	3	ME	See List 1	Yes
ITXX 4XX	Major Elective 3 (List 1)	3	0	3	ME	See List 1	Yes
ITXX 4XX	Major Elective 4 (List 1)	3	0	3	ME	See List 1	Yes
ITIS 404	Project Management for Engineers	3	0	3	GSE	------	No
HRLC	Human Rights	3	0	3	UR	------	No

List 1: Major Elective Courses List

Course Code	Course Title	Course Hours			Course Type	Pre-requisite	Major GPA
		LEC	PRAC	CRD			
ITCE 402	Selected Topics in Computer Engineering 1	3	0	3	ME	Department Approval	Yes
ITCE 403	Selected Topics in Computer Engineering 2	3	0	3	ME	Department Approval	Yes
ITTE 401	IT Technical Selected Topics 1	3	0	3	ME	Department Approval	Yes
ITTE 402	IT Technical Selected Topics 2	3	0	3	ME	Department Approval	Yes
ITTE 403	Cooperative Learning	0	12	6	ME - Training	Department approval Co-requisite: ITCE 497	Yes
ITCE 410	Digital System Design	3	0	3	ME	ITCE 211	Yes
ITCE 430	Internet of Things	3	0	3	ME	ITCE 232 & ITNE 233	Yes
ITCE 434	Embedded Systems II	3	0	3	ME	ITCE 232	Yes
ITCE 442	Digital Signal Processing	3	0	3	ME	ITCE 340	Yes
ITCE 445	Image Processing	3	0	3	ME	ITCE 340	Yes
ITNE 450	Wireless Networks	3	0	3	ME	ITNE 351	Yes
ITCE 456	Multimedia Communication	3	0	3	ME	ITNE 233 & ITCE 340	Yes
ITCE 475	Hardware Security Design	3	0	3	ME	ITCE 211	Yes
ITCE 480	Computer Vision	3	0	3	ME	ITCE 340	Yes
ITNE 482	Wireless Sensor Networks	3	0	3	ME	ITNE 351	Yes
ITCE 484	Robotics	3	0	3	ME	ITCE 232 & MATHS 342	Yes
ITCE 485	Accelerated Computing	3	0	3	MR	ITCE 381	Yes

List 2: General Studies Elective Courses List

Course Code	Course Title	Course Hours			Course Type	Pre-requisite
		Lec	Prac	CRD		
ARAB 141	Modern Arabic Lit.	3	0	3	GSE	------
ARAB 242	Arabic Poetry In The Renaissance Period	3	0	3	GSE	------
ART 133	Fundamentals of Music and Its Appreciation	3	0	3	GSE	------
ART 141	Drawing and Painting	2	1	3	GSE	------
ART 221	Traditional Music of Bahrain and Its Application	3	0	3	GSE	------
CHL 101	Introduction to Chinese Language	3	0	3	GSE	------
EDAR 126	Playing on Piano and Org 1	3	0	3	GSE	------

EDPS 144	Psychology of Learning and Memory	3	0	3	GSE	------
EDTC 100	Teaching and Learning Technology	3	0	3	GSE	------
ENGL 130	Introduction to Literature	3	0	3	GSE	------
FREN 141	French I	3	0	3	GSE	------
GERM 101	Introduction to German	3	0	3	GSE	------
HISTO 212	Contemporary History of The Arab World	3	0	3	GSE	------
HISTO 281	Landmarks of Islamic Civilisation	3	0	3	GSE	------
ISLM 114	Quranic Sciences	3	0	3	GSE	------
ISLM 136	Biography of The Prophet	3	0	3	GSE	------
ISLM 141	Introduction to Shari'a	3	0	3	GSE	------
ISLM 252	Islamic Doctrine	3	0	3	GSE	------
JAPN 101	Japanese Level I	3	0	3	GSE	------
KL 101	Korean Language	3	0	3	GSE	------
LAW 101	Introduction to Legal Studies	3	0	3	GSE	------
LAW 102	History of Law	3	0	3	GSE	------
LAW 106	Constitutional Law I	3	0	3	GSE	------
PSYC 103	Introduction to Psychology	3	0	3	GSE	------
PSYC 120	Psychology of Marriage	3	0	3	GSE	------
PSYC 211	Educational Psychology	3	0	3	GSE	------
SOCIO 161	Introduction to Sociology	3	0	3	GSE	------
SOCIO 181	Introduction to Anthropology	3	0	3	GSE	------
SOCIO 191	Citizenship, Identity and Globalization	3	0	3	GSE	------
SOCIO 224	Sociology of Health	3	0	3	GSE	------
SOCIO 226	Sociology of Arabian Gulf	3	0	3	GSE	------
GSE XXX	Other electives	X	X	3	GSE	Department Approval

Course Description

Course Code: ITCE 101 **Course Title:** Computer Technologies
This course introduces the basics of computer information systems and IT terminology. Topics include hardware components, system software, and application software. Software and hardware installation, upgrade, and troubleshooting. Representation of textual and numerical data. Problem solving principles. Programming languages fundamentals, language translation and interpretation. Communication, Networking, and Internet basics, Network services, Network layers and protocols.

Course Code: ITCE 114 **Course Title:** Digital Design I
This course covers the fundamentals of digital logic and design. Topics include number systems; Binary codes, logic gates, Boolean algebra, simplification of logic functions: Karnaugh maps, combinational logic circuits (adders, decoders, encoders, multiplexer, etc.). Analysis and design of sequential circuits: latches, Flip-Flops, counters, registers. Design of state machines (Mealy, Moore). The laboratory experiments will provide students with hands-on experience of designing, implementing, testing, and simulating digital logic circuits.

Course Code: ITCE 211 **Course Title:** Digital Design II
This course covers the fundamental aspects of digital design hierarchy and the role of methodology, focusing on using hardware description languages and ECAD tools on the design implementation. Topics include hardware description languages (Example: VHDL), structural and behavioral modeling, rapid prototyping, design synthesis, Programmable Logic Devices (PLDs), Complex Programmable Logic Devices (CPLDs), and Field Programmable Gate Arrays (FPGAs).

Course Code: ITCE 201 **Course Title:** Electrical Circuit Analysis
This course covers the fundamental concepts, laws, and theorems of electrical circuits. Topics include units, charge, current, voltage, power, and energy. Ohm's and Kirchhoff's laws. Analysis techniques and theorems for both DC and AC circuits. (Examples: nodal analysis, mesh analysis, source transformation, superposition, and Thevenin's and Norton's theorems). Transient analysis of RC and RL circuits, sinusoids and phasors, impedance and admittance, AC power analysis, power factor correction, and series and parallel resonance.

Course Code: ITCS 258 **Course Title:** Discrete Structures
This course covers basic discrete structures that are the backbones of computer science. Topics include logic, predicate calculus, proofs, sets, relations, recurrence relations, graphs, and trees.

Course Code: ITCE 222 **Course Title:** Electronics
This course introduces basic semiconductor concepts and popular discrete semiconductor devices. The course covers the design and analysis of circuits based on Operational Amplifiers (OP-AMPs), diodes, Bipolar Junction Transistors (BJTs) and Metal Oxide Semiconductor Field Effect Transistors (MOSFETs).

Course Code: ITCE 232 **Course Title:** Embedded Systems I
This course covers the microprocessor and microcontroller architectures and peripherals. Topics covered include: µP and µC Architectures, Instruction Set, Assembly language programming, high-level language programming, Timers, ADC, USART, Interrupt, Interfacing with sensors and actuators.

Course Code: ITNE 233 **Course Title:** Computer Networks
The course provides a comprehensive understanding of network architectures, protocols, and communication models. It covers topics such as network applications, topologies, IP addressing, subnetting, and routing protocols. Learners will explore popular network technologies such as Ethernet, TCP/IP, Wi-Fi, VLANs and DNS, and gain hands-on experience in configuring and managing network devices such as routers and switches.

Course Code: ITSE 201 **Course Title:** Introduction to Software Engineering
This course covers the fundamentals of software engineering. Topics include software evolution, software development processes, analysis and design methods, software engineering standards and metrics, emerging software engineering in the cloud computing services, and case tools.

Course Code: ITCE 381 **Course Title:** Applied Machine learning
This course covers the basics of machine learning with a focus on applications and programming. Topics include linear regression, logistic regression, multiclass classification, Neural Networks, Support Vector Machines (SVMs), K-Nearest Neighbor (KNN), k-means clustering.

Course Code: ITNE 351 **Course Title:** Routing and Switching
This course focuses on the routing and switching architectures, algorithms, and protocols for packet switched networks with an emphasis on the Internet Protocol (IP) based networks. Routing techniques for both traditional wired networks and the emerging wireless and mobile networks will be examined. The course teaches the fundamental routing concepts using open standards. Topics covered in this course are: Advanced IPv4 addressing, NAT, IPv6, internal and external routing protocols, Multicasting, MPLS, MANET (Mobile Ad Hoc Network) Routing, Geographic Routing, Geocasting, DTN (delay tolerant network) Routing.

Course Code: ITCS 325 **Course Title:** Operating Systems
This course presents fundamental concepts and practices to design and implement modern computer operating systems. Topics include functions and types of operating systems, operating system structure, process and thread management, process coordination, memory management and virtual memory, file system and I/O device management, protection, and security.

Course Code: ITCS 330 **Course Title:** Database Driven Websites
This course exposes the fundamental concepts of database management systems and the key technologies underlying the WWW that are used to develop dynamic web applications. Topics include database concepts, relational data models, query mechanisms, web design (HTML, CSS), current server-side programming, database access and event-driven programming.

Course Code: ITCE 340 **Course Title:** Signals and Systems
This course covers the fundamental concept used in analogue and digital signals and systems. Topics include: elementary continuous and discrete-time signals, sampling theory and Nyquist theorem, signal decomposition, Linear Time-Invariant (LTI) systems: properties, impulse responses, convolution, Fourier series and integral with applications, frequency responses, pole-zero description, difference and differential equations, Laplace and Z transforms, transient and steady-state time responses to elementary signals, FIR and IIR filter design.

Course Code: ITCE 364 **Course Title:** Computer Architecture
This course covers the fundamentals of computer architecture. Topics include instruction set principles and examples, addressing modes, Complex Instruction Set Computers (CISC) vs. Reduced Instruction Set Computer (RISC), performance evaluation, low-level program coding, arithmetic operation (multiplication and division in hardware), floating point, Parallelism: pipelining. Processor design, data path design, control unit design, microprogramming, single cycle design vs Parallel design, pipeline hazard. superscalar architectures. Memory hierarchy, cache memory, virtual memory, multi/many-core architectures.

Course Code: ITCE 370 **Course Title:** Professional Issues and Ethics
This course covers professional and legal issues in computer engineering and research methodology. Topics include: research methodology, technical report writing and effective communication, teamwork, ethical theories, privacy, intellectual property, copyrights, legal computing issues and regulations, professional societies and code of conduct, philosophical frameworks and cultural issues.

Course Code: ITNE 481 **Course Title:** Cloud Computing
This course covers concepts required to build cloud infrastructure. Topics include cloud infrastructure reference model, resource management, programming models, application models, system characterizations, implementations, deployment of cloud computing systems.

Course Code: ITCS 340 **Course Title:** Analysis and Design of Algorithms for Engineers
This course covers techniques used to design and analyze algorithms. Topics include time and space complexity analysis of algorithms, brute force, divide-and–conquer, recursive and sorting algorithms, greedy, dynamic programming, parallel algorithms, scheduling algorithms, and heuristics. A special focus is dedicated to real life applications such as mobile or location-aware, line balancing, hardware/software systems, design decisions etc.

Course Code: ITCE 472 **Course Title:** Computer Systems Security
This course covers the design and implementation of secure computer systems. Lectures cover threat models, attacks that compromise security and techniques for achieving security. Topics include buffer overflow, network security, security services, network security protocols, and cryptography.

Course Code: ITCE 497 **Course Title:** Senior Project
Senior students are required to undertake a design project in the department or within an industrial workplace, using knowledge and skills obtained in prior courses wherein they incorporate engineering standards and multiple realistic constraints such as economic, ethical, social, political, environmental, health and safety, manufacturability, and sustainability. The students are expected to work in teams and are required to submit a written report and conduct an oral presentation.

Course Code: ITIS 404 **Course Title:** Project Management for Engineers
This course covers the essential components of engineering and IT Project Management (PM). Topics covered include defining and planning an engineering and IT project using different planning techniques; defining scope, time, cost, quality, and risk management in the context of computer engineering; monitoring and controlling projects; project management software; using different testing techniques for the validation and verification of a project.

Major Elective Course Descriptions

Course Code: ITCE 402 **Course Title:** Selected Topic in Computer Engineering 1
This course is to give room for offering newly emerging topics in Computer Engineering. Topics proposed for this purpose shall be submitted to the department at least one semester ahead and will be offered only upon department approval.

Course Code: ITCE 403 **Course Title:** Selected Topic in Computer Engineering 2
This course is to give room for offering newly emerging topics in Computer Engineering. Topics proposed for this purpose shall be submitted to the department at least one semester ahead and will be offered only upon department approval.

Course Code: ITCE 410 **Course Title:** Digital System Design
This course covers Field Programmable Gate Array (FPGA) design flows and techniques. Topics covered include writing synthesizable HDL code for FPGAs, functional verification, using FPGA reconfigurable resources such as embedded memory blocks, Digital Signal Processing (DSP) blocks and reconfigurable IOs. This course also covers basic hardware/software system design: implementing soft processors, embedded software development, Intellectual Property (IP) integration, creating and interfacing custom IPs, etc.

Course Code: ITCE 430 **Course Title:** Internet of Things
This course provides an overview of key concepts and challenges related to IoT. Topics include: IoT architecture, sensors, communication standard, networks for IoT (wireless communication, routers, and gateways), web services, CoAP protocol, MQTT protocol, IoT enabled Technology, IoT levels, Domain Specific IoT, cloud protocols, IoT security.

Course Code: ITCE 433 **Course Title:** Embedded Systems II
This course covers the basics of embedded programming and software development for small microcontroller devices. The course introduces C programming concepts relevant to embedded systems such as data types, structure, unions, bitfields, enumeration and techniques for writing optimized code. It also covers concepts in Real Time Operating Systems (RTOS) and RTOS application development such as multitasking, task scheduling, task synchronization, task communication, mutual exclusion, etc.

Course Code: ITCE 442 **Course Title:** Digital Signal Processing
This course covers the concepts and techniques of modern digital signal processing which are fundamental to computer engineering applications. Topics include sampling and reconstruction of signals, Fast Fourier Transform FFT, frequency analysis of discrete-time systems, design of analog and digital filters (IIR, FIR) using time and frequency domain techniques, window functions, DSP chips, hardware DSP Implementation, applications such as speech and image processing.

Course Code: ITCE 445 **Course Title:** Image processing

This course covers the fundamental techniques and concepts of image analysis and processing. Topics include: Image sampling and quantization, grey scale and color images, point operations, segmentation, morphological image processing, linear image filtering and correlation, image transforms, multiresolution image processing, noise reduction and restoration, feature extraction and recognition tasks, image registration.

Course Code: ITNE 450 **Course Title:** Wireless Networks

This course covers the fundamental concepts of mobile and wireless communication networks. Topics include radio channel characteristics and propagation, multiple access techniques, frequency reuse, interference, link budget, hand-off procedures, mobile communication standards.

Course Code: ITCE 456 **Course Title:** Multimedia Communication

Introduction to multimedia, Multimedia information presentation, transmission of continuous media such as digital audio and video, text compression, image compression, audio and video compression, Multimedia services, broadband networks, network technologies for real-time, low-latency delivery of multimedia, QoS, Multimedia protocols, Multimedia services, audio and video streaming.

Course Code: ITCE 475 **Course Title:** Hardware Security Design

The course covers major topics in secure hardware design. Topics include implementations for finite-field arithmetic, building blocks for symmetric-key and public-key cryptography, and random number generation, topics related to platform implementation issues such as optimizations for high-performance and lightweight cryptography, FPGA security, side-channel analysis, fault analysis, physical unclonable functions and secure design flows.

Course Code: ITCE 480 **Course Title:** Computer Vision

This course provides an overview to computer vision, including fundamentals of image formation, camera imaging geometry, feature detection and matching, motion estimation and tracking, image classification, scene understanding, and deep learning with neural networks.

Course Code: ITNE 482 **Course Title:** Wireless Sensor Networks

This course covers an introduction to wireless sensor networks. Topics include the architecture of wireless sensor nodes and networks, applications and implementations, Media Access Control protocols, routing protocols (flat, hierarchal, geographical, and data-centric), data aggregation and fusion, topology control, localization, and time synchronization.

Course Code: ITCE 484 **Course Title:** Robotics

This course explores and apply different concepts of robotics, Topics include Sensors, controllers, actuators, concepts of energy, power and kinematics, static, dynamic, gearing, necessary software concepts for design and implementation of various robotic algorithms, data logging and microcontrollers.

Course Code: ITCE 485 **Course Title:** Accelerated Computing

This course introduces the fundamentals of accelerated computing and General-Purpose Graphical Processing Units (GPGPU) programming. Topics include parallelism, GPU architecture, memory management, concurrency, streams, profiling, deployment and practical applications of accelerated computing.

Course Code: ITTE 403 **Course Title:** Cooperative learning

This course provides the students an opportunity to work full-time in a relevant industrial establishment for one academic semester. Gaining the experience of a structured job experience and working on a realistic capstone project using knowledge and skills obtained in prior courses wherein they incorporate IT standards and multiple realistic constraints such as economic, ethical, social, political, environmental, health and safety, manufacturability and sustainability. The students are expected to submit a written report of the work experience together with a written report detailing the project design efforts, and often a working prototype.

Major Support Course Requirements

Course Code: PHYCS 101 **Course Title:** General Physics I
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
"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: CHEMY 101 **Course Title:** General Chemistry I
Significant figures, chemical formulas and equations; mass relations, limiting reactants 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: 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.

Course Code: MATHS 205 **Course Title:** Differential Equations
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: MATHS 342 **Course Title:** Linear Algebra and Complex Analysis Variables
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.

College Requirement Courses Descriptions

Course Code: ENGL 157 **Course Title:** English for Information Technology
The is first in a two-part series of language courses for IT students. It focuses on developing students' grammar and writing skills, specifically essay and summary writing. The level of this course is upper-intermediate (B2).

Course Code: ENGL 219 **Course Title:** Technical Report Writing
This course deals with professional and technical writing. It looks at the theoretical and practical aspects of technical report writing. It also teaches the vocabulary and language structures typically found in report writing with a view to producing a full-length formal research report.

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: STAT 273 **Course Title:** Probability and Statistics
Descriptive Statistics, Introduction to probability and probability distributions. Some of probability Densities, Sampling distributions. Central limit theorem. t and F distributions. Estimation. Tests of hypotheses. Goodness of fit tests. Regression and correlation.

Course Code: ITCS 106 **Course Title:** Computer Programming I
This course introduces problem solving and fundamental programming concepts and techniques implemented by a high-level programming language. Topics include primitive and compound data types, syntax, semantics, expressions, assignment, input, output, conditional and iterative control structures, functions.

Course Code: ITCS 107 **Course Title:** Computer Programming II
This course covers key concepts of object-oriented programming. Topics include object oriented design, encapsulation, event handlers, memory management, arrays, exception handlers, searching algorithms, programming applications.

Course Code: ITCS 214 **Course Title:** Data Structures
This course covers data structures and their implementations in an object-oriented programming language. Topics include subtyping, abstract base class, lists, stacks, queues, trees, graphs, hash tables, strategies for choosing appropriate data structure.

Cr - Training:

Course Code: ITCE 491 **Course Title:** Industrial Training
This course provides the students an opportunity to get hands-on experience of working in Engineering and IT industry for two continuous months during summer. The students are expected to work in teams and are required to submit a written report describing the working experience and any project involved during the training period.

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.