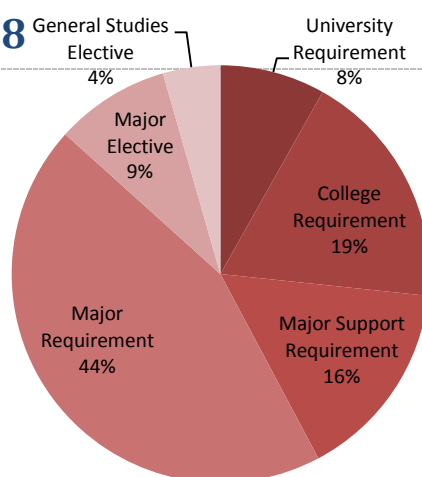


B.Sc. in Computer Engineering 2018

Program Components

Course Type	CRD
University Requirement (UR)	11
College Requirement (CR)	24
Major Support Requirement (MSR)	21
Major Requirement (MR)	60
Major Elective (ME) ¹	12
General Studies Elective (GSE) ²	6
CR- Training (Internship) Yes	1
Total Credit (CRD)	135



¹Student must select four courses from Major Elective (ME) List.

²Student must select one course from the Free Electives for Computer Engineering list, and one course from Humanities and Social Science Component. This include 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.

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	2	3	MR	-----	Yes
ITCS 113	Computer Programming I	3	2	3	CR	-----	Yes
PHYCS 101	General Physics I	3	3	4	MSR	-----	No
MATHS 101	Calculus I	3	0	3	CR	-----	No
ENGL 154	Language Development I	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 112	Digital Design I	3	2	3	MR	ITCE 101	Yes
ITCS 114	Computer Programming II	3	2	3	CR	ITCS 113	Yes
PHYCS 102	General Physics II	3	3	4	MSR	PHYCS 101	No
MATHS 102	Calculus II	3	0	3	MSR	MATHS 101	No
ENGL 155	Language Development II	3	0	3	CR	ENGL 154	No
HRLC 107	Human Rights	2	0	2	UR	none	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	2	3	MR	ITCE 112	Yes
ITCE 221	Electrical Circuit Analysis	3	2	3	MR	MATHS 101 & PHYCS 102	Yes
ITCS 214	Data Structures	3	2	3	CR	ITCS 114	Yes
ITCS 254	Discrete Structures I	3	2	3	MR	ITCS 113 & MATHS 101	Yes
CHEMY 101	General Chemistry I	3	3	4	MSR	-----	No
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	2	3	MR	ITCE 221	Yes
ITCE 230	Microprocessors	3	2	3	MR	ITCE 112	Yes
ITCE 252	Data Communication Networks	3	2	3	MR	ITCS 114	Yes
ITSE 201	Introduction to Software Engineering	3	2	3	MR	ITCS 114	Yes
STAT 273	Probability and Statistics	3	0	3	CR	MATHS 101	No
ARAB 110	Arabic Language Skills	3	0	3	UR	-----	No

Year 3 - Semester 5

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCE 331	Embedded Systems	3	2	3	MR	ITCE 230 & ITCE 222	Yes
ITCE 353	Computer Networks	3	2	3	MR	ITCE 252	Yes
ITCS 325	Operating Systems	3	2	3	MR	ITCS 214 & ITCE 230	Yes
ITCS 330	Database Driven Websites	3	2	3	MR	ITCS 214	Yes
ENGL 219	Technical Report Writing	3	0	3	CR	ENGL 155	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	2	3	MR	ITCE 221 & MATHS 205	Yes
ITCE 364	Computer Architecture	3	2	3	MR	ITCE 230	Yes
ITCE 370	Professional Issues and Ethics	3	2	3	MR	ENGL 219	Yes
ITCE 453	Cloud Technology and Architecture	3	2	3	MR	ITCE 353	Yes
ITCS 340	Analysis and Design of Algorithms for Engineers	3	2	3	MR	ITCS 214 & ITCS 254	Yes

Training Requirement

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCE 490	Industrial Training	0	3	1	CR-Training	85 CrHr	Yes

Year 4 - Semester 7

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCE 473	Cybersecurity	3	2	3	MR	ITCE 353	Yes
ITCE 497	Senior Project	0	6	3	MR	ENGL 219 & Passing 85 CRD	Yes
ITCE 4XX	ITCE Elective 1 from List 1	3	2	3	ME	See List 1	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

Year 4 - Semester 8

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCE 4XX	ITCE Elective 2 from List 1	3	2	3	ME	See List 1	Yes
ITCE 4XX	ITCE Elective 3 from List 1	3	2	3	ME	See List 1	Yes
ITCE 4XX	ITCE Elective 4 from List 1	3	2	3	ME	See List 1	Yes
GSE XXX	Free Elective for Computer Engineering (from List 2)	3	x	3	GSE	-----	No
GSE XXX	Humanities/Social Sciences (from List 3)	3	0	3	GSE	-----	No

List 1: Major Elective Courses

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCE 400	Selected Topics in Computer Engineering 1	3	2	3	ME	Department Approval	Yes
ITCE 401	Selected Topics in Computer Engineering 2	3	2	3	ME	Department Approval	Yes
ITCE 410	Digital System Design	3	2	3	ME	ITCE 211	Yes
ITCE 430	Internet of Things	3	2	3	ME	ITCE 331	Yes
ITCE 432	Industrial Automation	3	2	3	ME	ITCE 331 & ITCE353	Yes
ITCE 442	Digital Signal Processing	3	2	3	ME	ITCE 340	Yes
ITCE 445	Image Processing	3	2	3	ME	ITCE 340	Yes
ITCE 450	Mobile and Wireless Networking	3	2	3	ME	ITCE 353	Yes
ITCE 454	Wireless Sensor Networks	3	2	3	ME	ITCE 353	Yes
ITCE 456	Multimedia Communications	3	2	3	ME	ITCE 252	Yes
ITCE 460	Distributed Computing	3	2	3	ME	ITCE 364	Yes
ITCE 475	Hardware Security Design	3	2	3	ME	ITCE 211	Yes
ITCE 480	Computer Vision	3	2	3	ME	ITCE 340	Yes
ITCE 481	Data Mining and Machine Learning	3	2	3	ME	STAT 273& MATHS 342	Yes
ITCE 483	Artificial Intelligence	3	2	3	ME	MATHS 342	Yes
ITCE 484	Robotics	3	2	3	ME	ITCE 331 & MATH342	Yes

List 2: Free Elective Courses for Computer Engineering

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITIS 404	Project Management for Engineers	3	2	3	GSE	-----	No
ITIS 321	Entrepreneurship and Digital Innovation	3	2	3	GSE	-----	No
MKT 261	Marketing Management	3	0	3	GSE	-----	No
MGT 131	Introduction to Business Administration	3	0	3	GSE	-----	No
MGT 230	Organization and Management	3	0	3	GSE	-----	No
ACC 112	Financial Accounting I	3	0	3	GSE	-----	No

List 3: 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	-----
TL 101	Turkish 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	-----

Course Code	Course Title	Course Hours			Course Type	Pre requisite
		Lec	Prac	CRD		
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 provides working knowledge of the terminologies, processes and components associated with the computer system. Topics include: data representation, computer hardware (input, output and storage devices), software (system utilities, processes), motherboard, CPU (fetch-execute cycles), memory (RAM, ROM, BIOS), operating systems (FAT, NTFS, Registry, Drivers), troubleshooting skills, basic principles of networking, and mobile fundamentals and OS.

Course Code: ITCE 112 **Course Title:** Digital Design I

This course covers the fundamental of digital logic and design. Topics include: number systems; logic gates, Boolean algebra, simplification of logic functions: Karnaugh maps, combinational logic circuits (adders, comparators, decoders, encoders, multiplexer, etc.). Analysis and design of sequential circuits: latches, Flip-Flops, counters, registers, memory and storage. 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 VHDL, structural and behavioral modeling, rapid prototyping, design synthesis, programmable logic devices, complex programmable logic devices, and field programmable gate array.

Course Code: ITCE 221 **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 254 **Course Title:** Discrete Structures I

This course covers basic discrete structures that are backbones of computer science. Topics include logic, predicate calculus, proofs, sets, relations, functions.

Course Code: ITCE 222 **Course Title:** Electronics

This course covers operational amplifiers OP AMP circuits analysis and design. Topics include: diodes and applications; FET and BJT transistors biasing techniques, small-signal modeling, design and analysis of single-stage and multistage transistor amplifiers.

Course Code: ITCE 230 **Course Title:** Microprocessors

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: ITCE 252 **Course Title:** Data Communication Networks

This course covers the concepts and techniques of host to host computer networks and data communications. Topics include: the basics of network models, standards, and protocols, data communications systems and schemes implemented at physical and data link layers.

Course Code: ITSE 201 **Course Title:** Introduction to Software Engineering

The course covers software evolution; introduction to software engineering, software development processes, and analysis and design methods, software engineering standards and metrics. Software and system applications including Cloud computing. Software development tools requirements and CASE tools.

Course Code: ITCE 331 **Course Title:** Embedded Systems

This course covers the following areas: development environments for embedded software, resource aware programming, hardware programming, developing multi-threaded software, inter-process communication with shared memory and message passing, programming using real time operating systems, fault detection and testing, and fault tolerance and fault recovery. Applications such as WSN, IoT, cloud servers, mobile interfacing, smart home.

Course Code: ITCE 353 **Course Title:** Computer Networks

This course covers the functionalities of network, transport, and applications layers. Topics includes: logical addressing and routing; process-to-process delivery; connection management and flow control; major network application layer services; network management and security.

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 devicemanagement, 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 fundamental of computer architecture. Topics include: instruction set principles and examples, Complex Instruction Set Computers (CISC) vs. Reduced Instruction Set Computer (RISC), performance evaluation, processor design, data path design, control unit design, microprogramming. Parallelism: pipelining, 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: ITCE 453 **Course Title:** Cloud Technology and Architecture

This course covers the fundamental engineering concepts behind cloud computing as well as technological issues in developing, deploying, and utilizing cloud computing. Topics include: resource virtualization and its applications to computing, networking, storage and architectural layers of cloud computing. Other topics include management and scheduling of cloud resources and an overview of various industrial solutions.

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 473 **Course Title:** Cybersecurity

This course covers the fundamentals of cyber security, cybercrime investigation, cyber-privacy, cyber operations, and cyber security applications. Topics include: cyber security components, cyber security industries, cryptographic Algorithms, cyber security architecture, security threat and risk assessment, e-services security, system cyber Security such as embedded systems, cloud computing security, and Internet of Things security.

Course Code: ITCE 497 **Course Title:** Senior Project

Senior students are required to undertake a design project, 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.

Major Elective Course Descriptions

Course Code: ITCE 400 **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 401 **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 various methods and techniques for designing digital systems using different design flows. Advanced VHDL techniques are used to model and simulate the functionality of complex digital circuits with the aid of modern EDA tools, in addition to rapid prototyping and implementation of such circuits using Programmable Logic Devices (PLDs). The design and function of common digital building blocks is discussed (Examples: Adders, Multipliers, Floating Point Arithmetic circuits, Memories and FIFOs). Hardware testing for combinational and sequential circuits using scan testing techniques and Built-in-Self-Tests (BISTs).

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), cloud protocols, IoT security.

Course Code: ITCE 432 **Course Title:** Industrial Automation

This course covers data acquisition systems and supervisory control in industrial sites. Topics include: review of the systems used such as DCS and PLCs, SCADA system hardware and firmware, sensors and actuators, software and protocols, cables, interferences, central computer.

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: 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 450 **Course Title:** Mobile and Wireless Networking

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 454 **Course Title:** Wireless Sensor Networks

The course gives an overview of various topics related to wireless sensor networks. Topics include distributed signal processing in large scale sensor networks, energy conservation approaches, node deployment and topology, communication in sensor networks, time synchronization, localization, data fusion and geographical energy aware routing.

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

This course covers the transmission of digital audio and video across computer networks. Topics include: multimedia representation, media compression, network technologies for real-time, low-latency delivery of multimedia, media retrieval, multimedia broadband network, and applications.

Course Code: ITCE 460 **Course Title:** Distributed Computing

This course covers abstractions and implementation techniques for the design of distributed systems. Topics include: Distributed OS (DOS), coupled systems, distributed communications, memory hierarchies, high performance I/O, memory coherence and file coherence, logical time, distributed mutual exclusion algorithms, distributed files and services.

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: ITCE 481 **Course Title:** Data Mining and Machine Learning

This course covers data mining and machine learning with a focus on applications and programming. A wide range of popular algorithms are discussed and evaluated for solving classification, regression, clustering and association rules learning problems such as decision Trees, KNN, K Means, SVMs and Apriori.

Course Code: ITCE 483 **Course Title:** Artificial Intelligence

This course covers intelligent systems and their applications. Topics include: introduction to AI, knowledge representation, modeling of AI system, search strategies, rule-based system, fuzzy logic and artificial neural network and their use in realizing intelligent system such as a robotic system. Design and implementation of fuzzy logic controller for target applications. Genetic algorithm and its use in AI applications. The use of software tools in the simulation and design of target intelligent systems.

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

This course topics include: automation, automotive systems, robot manipulators, mobile robots, kinematics, localization, navigation, mapping, robot vision, AI for robotics, UAV, humanoid.

Major Support Course Requirements

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.

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)."

Free Electives for Computer Engineering:

Course Code: ITIS 404 **Course Title:** Project Management for Engineers

This course covers the essential components of engineering project management. Topics covered: defining and planning an engineering 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 an engineering project.

Course Code: ITIS 321 **Course Title:** Entrepreneurship and Digital Innovation

This course covers areas related to developing and managing technology-based new ventures. Topics covered include: role and personality of the entrepreneur, business planning, building and managing teams, digital innovative products, market evaluation and developing a business and marketing plan, legal issues including intellectual property, preparation of venture budgets, and raising finance.

Course Code: MKT 261 **Course Title:** Marketing Management

Elements of marketing management: the marketing system and the marketing environment; analysis of consumer and industrial markets; marketing research and marketing information systems; market segmentation. The marketing mix: product decisions, pricing decisions, distribution decisions and promotion decisions, international marketing in non-profit organizations.

Course Code: MGT 131 **Course Title:** Introduction to Business Administration

Overview of business administration as a field of study and practice, survey of major functional specialties within business management, accounting, finance, marketing and production, interrelationships among various specialties and foundation-level, understanding of the management profession.

Course Code: MGT 230 **Course Title:** Organization and Management

Overview of management theories and practices; introduction to the study of organizational structures; management functions and processes within an action frame of reference; organization design, planning and control systems; leadership and employee motivation; decision-making models, the management of change.

Course Code: ACC 112 **Course Title:** Financial Accounting I

A survey of the accounting cycle; recording changes in financial position; ledger; journal; trial balance; income measurement; adjusting and closing entries; accounting for merchandising operations; special journals and subsidiary ledgers; accounting for cash; receivables; inventories; plant and equipment.

College Requirement Courses Descriptions

Course Code: ENGL 154

Course Title: Language Development I

ENGL 155 is the second of three integrated language courses designed for IT students. The level is upper-intermediate.

Course Code: ENGL 155

Course Title: Language Development II

The first of a series of three integrated language courses designed specifically for IT/CS and CE majors. Special attention is given to IT related vocabulary, reading texts and writing.

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 113

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 114

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.

Course Code: ITCE 490

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.