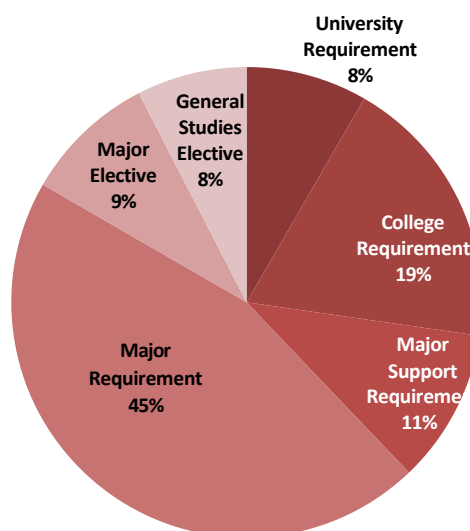


B.Sc. in Computer Science 2016

Program Components

Course Type	CRD
University Requirement (UR)	11
College Requirement (CR)	24
Major Support Requirement (MSR)	14
Major Requirement (MR)	60
Major Elective (ME) ¹	12
General Studies Elective (GSE) ²	10
CR- Training (Internship) Yes	1
Total Credit (CRD)	132



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

² Student must select three General Studies Electives according to the following:

- One course must be selected from any field of science:
the following courses are suggested:
 1. CHEMY101 (GENERAL CHEMISTRY I)
 2. BIOLS102 (GENERAL BIOLOGY I)
 3. EEG100 (CIRCUIT THEORY I) -> Pre-requisite: PHYCS101 (This is an Engineering course).
 4. Or any other science course approved by the department chair.
- One course must be selected from Business College:
the following courses are suggested:
 1. ACC112 (FINANCIAL ACCOUNTING)
 2. MGT131 (INTRO. TO BUSINESS ADMINISTRATION)
 3. MGT341 (SMALL BUSINESS MANAGEMENT)
 4. MKT261 (MARKETING MGT.)
 5. Or any other business course approved by the department chair.
- One course must be selected 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.

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			
ARAB 110	Arabic Language Skills	3	0	3	UR	-----	No
ITCS 113	Computer Programming I	3	2	3	CR	-----	Yes
ENGL 154	Language Development I	3	0	3	CR	-----	No
MATHS 101	Calculus I	3	0	3	CR	-----	No
PHYCS 101	General Physics I	3	3	4	MSR	-----	No

Year 1 - Semester 2

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 114	Computer Programming II	3	2	3	CR	ITCS 113	Yes
ENGL 155	Language Development II	3	0	3	CR	ENGL 154	No
PHYCS 102	General Physics II	3	3	4	MSR	PHYCS 101	No
ITIS 103	Fundamentals of Information Systems	3	0	3	MR	-----	Yes
MATHS 102	Calculus II	3	0	3	MSR	MATHS 101	No

Year 2 - Semester 3

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
HIST 122	Modern History of Bahrain and Citizenship	3	0	3	UR	-----	No
ISLM 101	Islamic Culture	3	0	3	UR	-----	No
ITCS 214	Data Structures	3	0	3	CR	ITCS 114	Yes
STAT 273	Probability and Statistics	3	0	3	CR	MATHS 101	No
ITCE 250	Digital Logic	3	2	3	MR	ITCS 113	Yes
ITCS 254	Discrete Structures I	3	0	3	CR	ITCS 113 & MATHS 101	Yes

Year 2 - Semester 4

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 255	Discrete Structures II	3	0	3	MR	ITCS 254	Yes
GSE XXX	Science Elective	X	X	4	GSE	-----	No
ITCS 285	Database Management Systems	3	0	3	MR	ITCS 214	Yes
ENGL 219	Technical Report Writing	3	0	3	CR	ENGL 155	No
ITCS 316	Human-Computer Interaction	3	0	3	MR	ITCS 214	Yes

Year 3 - Semester 5

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 347	Analysis and Design of Algorithms	3	0	3	MR	ITCS 214 & ITCS 255	Yes
ITCS 321	Computer Organization and Assembly Language	3	0	3	MR	ITCS 114 & ITCE 250	Yes
ITCS 333	Internet Software Development	3	0	3	MR	ITCS 285	Yes
ITCS 389	Software Engineering I	3	0	3	MR	ITCS 285	Yes
ITCS 396	Professional Issues and Ethics	3	0	3	MR	ENGL 219	Yes
MATHS 211	Linear Algebra	3	0	3	MSR	MATHS 101	No

Year 3 - Semester 6

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 317	Formal Languages and Automata	3	0	3	MR	ITCS 214 & ITCS 255	Yes
ITCS 325	Operating Systems	3	0	3	MR	ITCS 214 & ITCS 321	Yes
HRLC 107	Human Rights	2	0	2	UR	-----	No
ITCS 4XX	ITCS Elective 1	3	0	3	ME	As per ME list	Yes
ITCE 314	Computer Networks I	3	2	3	MR	ITCS 114 & STAT 273	Yes
ITCS 489	Software Engineering II	3	0	3	MR	ITCS 389	Yes

STAT 271* for college of Science students only

Training Requirement

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 481	Industrial Training	0	3	1	CR-Training	Pass 85 Credits	Yes

Year 4 - Semester 7

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 440	Intelligent Systems	3	0	3	MR	ITCS 347	Yes
GSE XXX	Business Free Elective	3	0	3	GSE	-----	No
ITCE 416	Computer Networks II	3	2	3	MR	ITCE 314	Yes
ITCS 4XX	ITCS Elective 2	3	0	3	ME	As per ME list	Yes
ITCS 498	Senior Project	0	9	3	MR	ENGL 219 & pass 85 credits	Yes

Year 4 - Semester 8

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 411	Cryptography and Computer Security	3	0	3	MR	ITCS 347	Yes
ITCS 4XX	ITCS Elective 3	3	0	3	ME	As per ME list	Yes
ITCS 4XX	ITCS Elective 4	3	0	3	ME	As per ME list	Yes
GSE XXX	Humanities / Social Sciences	3	0	3	GSE	-----	No
ITCS 441	Parallel and Distributed Computing	3	0	3	MR	ITCS 325	Yes

Major Elective Courses

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 400	IT-Based Entrepreneurship	3	0	3	ME	ITCS 396 & MGT 131	Yes
ITCS 416	Advanced Operating Systems	3	0	3	ME	ITCS 325	Yes
ITCS 421	Geographical Information Systems	3	0	3	ME	ITCS 214	Yes
ITCS 433	Design of Programming Languages	3	0	3	ME	ITCS 317	Yes
ITCS 437	Computer Graphics	3	0	3	ME	ITCS 214 & MATHS 211	Yes
ITCS 443	Optimization Techniques	3	0	3	ME	ITCS 214 & MATHS 211	Yes
ITCS 444	Mobile Application Development	3	0	3	ME	ITCS 333	Yes
ITCS 448	Cloud Computing	3	0	3	ME	ITCE 314	Yes
ITCS 449	Computer Vision	3	0	3	ME	ITCS 347 & STAT 273	Yes
ITCS 453	Multimedia and Hypermedia Systems	3	0	3	ME	ITCS 214	Yes
ITCS 455	Semantic Web	3	0	3	ME	ITCS 333	Yes
ITCS 457	Data Mining	3	0	3	ME	ITCS 285 & ITCS 347	Yes
ITCS 458	Big Data Analytics	3	0	3	ME	ITCS 255	Yes
ITCS 461	Advanced Database Management Systems	3	0	3	ME	ITCS 285	Yes
ITCS 464	Information Retrieval	3	0	3	ME	ITCS 333	Yes
ITCS 465	Numerical Computations	3	0	3	ME	ITCS 255 & MATHS 211	Yes
ITCS 494	Selected Topics in Computer Science	3	0	3	ME	Department Approval	Yes
ITCS 496	Physical Implementation of DBMS	3	0	3	ME	ITCS 285	Yes
ITTS 401	IT Technical Selected Topics I	3	0	3	ME	Department Approval	Yes
ITTS 402	IT Technical Selected Topics II	3	0	3	ME	Department Approval	Yes
ITTS 403	Cooperative Learning	0	12	6	ME - Training	Department Approval & Co-requisite ITCS 498	Yes

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	-----

Course Code	Course Title	Course Hours			Course Type	Pre requisite
		Lec	Prac	CRD		
SOCIO 226	Sociology of Arabian Gulf	3	0	3	GSE	-----
TL 101	Turkish Language	3	0	3	GSE	-----
GSE XXX	Other electives	X	X	3	GSE	Department Approval

Course Description

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: ITCS 255 **Course Title:** Discrete Structures II

This course is a continuation of discrete structures I. Topics include elementary number theory, asymptotic notations of growth of functions, recurrence relations and their solutions, graphs and trees, Combinatorics.

Course Code: ITCS 285 **Course Title:** Database Management Systems

This course exposes the fundamental concepts of database management systems. Topics include information management concepts, database architecture and data independence, conceptual models, relational and object oriented data models, query mechanisms, database recovery, security, integrity, backup, transaction processing, indexing.

Course Code: ITCS 316 **Course Title:** Human-Computer Interaction

This course covers techniques used to analyze and design Human-Computer Interaction (HCI) systems. Topics include user interface design methods, social interactions, interface evaluation, human capabilities, interface technology, GUI programming concepts.

Course Code: ITCS 317 **Course Title:** Formal Languages and Automata

This course introduces formal languages and their relationship with automata and grammars including their relationship to programming languages. Topics include finite-state machines, regular expressions, context-free grammars, Turing machines, the classes P and NP, NP-complete and NP-hard problems, the halting problem, abstract syntax trees.

Course Code: ITCS 321 **Course Title:** Computer Organization and Assembly Language

This course introduces computer architecture and assembly language programming. Topics include RISC and CISC architectures, assembly language programming, Interrupts, call/return mechanism, addressing modes, instructions set architecture, integer and floating-point arithmetic, performance evaluation, data path and control unit, non-pipelined and pipelined processor design, memory hierarchy.

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 333 **Course Title:** Internet Software Development

This course exposes the key technologies underlying the World-Wide Web and the principles and tools that are used to develop dynamic web applications. Topics include web design technologies (HTML, CSS style sheets), current server-side programming, web server processing, database access, event-driven programming.

Course Code: ITCS 347 **Course Title:** Analysis and Design of Algorithms

This course covers techniques used to design and analyze algorithms. Topics include time and space complexity analysis of recursive and non-recursive algorithms, brute force, divide- and – conquer, greedy, heaps, and dynamic programming design methods and their applications to real world problems.

Course Code: ITCS 389 **Course Title:** Software Engineering I

This course introduces the software engineering concepts and techniques. Topics include software process models, project management, software requirements elicitation, data, process, and behaviour modelling using conventional and object-oriented techniques.

Course Code: ITCS 396 **Course Title:** Professional Issues and Ethics

This course introduces research methodology, professional and legal issues related to IT. Topics include research types and methodology, technical report writing and presentation, ethical theories, privacy, intellectual property rights, legal IT issues and regulations, professional societies and code of conduct, global impact of IT and globalization.

Course Code: ITCS 400 **Course Title:** IT-Based Entrepreneurship

This unit will give students insight into how to identify, create, and pursue opportunities for new products and services. These opportunities have been growing rapidly due to the steady increase in digital work flows and digital customers. Google, Facebook, YouTube, Twitter, and Flickr are well-known examples of digital entrepreneurship; there are many thousands of additional examples. Specifically, this unit includes the study of entrepreneurship, opportunity analysis, feasibility analysis, intellectual property, market research, accounting, financial management, sources of funding, business models, teamwork, and business planning. Understanding these topics will allow students to more readily identify, analyze, and develop opportunities for the creation of new products and services.

Course Code: ITCS 411 **Course Title:** Cryptography and Computer Security

This course introduces fundamentals of computer security and cryptography. Topics include network security, cryptography, symmetric encryption methods, authentication and authorization mechanisms, public key infrastructure, electronic mail security, web security and cryptographic protocols, defence mechanisms and countermeasures, malware.

Course Code: ITCS 416 **Course Title:** Advanced Operating Systems

This course discusses advanced topics in design and implementation of modern operating systems. Topics include virtual machines, real-time and embedded systems, distributed operating, file systems, fault tolerance, performance evaluation.

Course Code: ITCS 421 **Course Title:** Geographical Information Systems

This course introduces foundation in the science and technology of geographical information systems (GIS). Topics include interpreting geophysical, geological and related data, accessing database, data translators, spatial data handling, storage capabilities of a GIS system, GIS programming, integrated GIS solutions.

Course Code: ITCS 433 **Course Title:** Design of Programming Languages

This course introduces major concepts of programming languages design. Topics include programming paradigms, features and specifications of programming languages, language syntax and semantics, bindings, design and implementation of language data structures and control structures.

Course Code: ITCS 437 **Course Title:** Computer Graphics

This course covers theories and applications of the computer graphics. Topics include 2-D and 3-D modelling and transformations, viewing transformations, projections, clipping, vectors lines and planes, rendering techniques, graphical software packages and graphics systems.

Course Code: ITCS 440 **Course Title:** Intelligent Systems

This course covers analysis and design concepts of intelligent systems. Topics include problem solving methods, searching techniques, heuristic search, game playing, knowledge representations, expert systems, fuzzy logic, machine learning.

Course Code: ITCS 441 **Course Title:** Parallel and Distributed Computing
This course covers theory of parallelism and distributed computing. Topics include parallelism, communication, coordination, sequential and parallel processing, parallel and scalable architecture, parallel decomposition, multiple simultaneous computations, parallel computer models, parallel and concurrent programming.

Course Code: ITCS 443 **Course Title:** Optimization Techniques
This course introduces optimization techniques and their applications to real life problems. Topics include linear programming, network flow optimization, genetic algorithms, dynamic programming, branch and bound.

Course Code: ITCS 444 **Course Title:** Mobile Application Development
This course covers key technologies underlying mobile application development. Topics include mobile platforms, GUI design, mobile programming, web services processing, database access and event-driven programming.

Course Code: ITCS 448 **Course Title:** Cloud Computing
This course covers concepts required to build a cloud infrastructure. Topics include cloud infrastructure reference model, resource management, programming models, application models, system characterizations, and implementations, deployment of cloud computing systems.

Course Code: ITCS 449 **Course Title:** Computer Vision
This course introduces concepts and applications of computer vision. Topics include image processing, boundary detection, segmentation and clustering, feature detection, motion estimation and tracking, probabilistic and statistical methods for detection and classification, multiple view geometry, object and scene recognition.

Course Code: ITCS 453 **Course Title:** Multimedia and Hypermedia Systems
This course covers techniques used to design multimedia systems using conceptual frameworks and multimedia authoring tools. Topics include multimedia system elements, ethical and legal issues in using and creating multimedia contents, create and manipulate information using multimedia presentation concepts.

Course Code: ITCS 455 **Course Title:** Semantic Web
This course covers core concepts of semantic Web. Topics include semantic Web technology, XML, XML document models, RDF models, schema, metadata processing, web ontology, web services.

Course Code: ITCS 457 **Course Title:** Data Mining
This course introduces concepts and techniques of data mining and knowledge discovery. Topics include analysis of large data sets, algorithms and techniques for association rule mining, clustering, classification and prediction, and outlier detection.

Course Code: ITCS 458 **Course Title:** Big Data Analytics
This course covers concepts, techniques and tools needed to deal with various aspects of data science practice, including data collection, cleansing, mangling, and integration, exploratory data analysis, predictive modelling, descriptive modelling, data product creation, machine learning algorithms, evaluation, and effective communication. Topics include: Data mining, Map-reduce and the new stack software, mining data streams, link analysis, clustering, classification, recommendation, and visualization of large data sets. Applications and projects using major big data tools (e.g. Spark, Hadoop, Python, or R).

Course Code: ITCS 461 **Course Title:** Advanced Database Management Systems
This course covers advanced topics of database management systems. Topics Include query processing and query optimization, concurrency control, active, temporal, and multimedia databases, distributed databases and client-server architecture, data warehouse, data mining, emerging database technologies.

Course Code: ITCS 464 **Course Title:** Information Retrieval
This course is an introduction to information retrieval systems. Topics include standard concepts in information retrieval (such as documents, queries, collections, and relevance), theoretical and practical aspects of information retrieval systems, recent advances in information retrieval, web retrieval systems.

Course Code: ITCS 465 **Course Title:** Numerical Computations

This course covers principles of numerical computation and its application to engineering and scientific problems. Topics include floating-point, round-off analysis, solution of linear and nonlinear equations, least squares curve fitting, interpolation and extrapolation, finite differences and polynomial approximations, finite integration.

Course Code: ITCS 489 **Course Title:** Software Engineering II

This course is a continuation of software engineering I. Topics include design patterns, software architecture design, verification and validation, software testing, software evolution and maintenance, system reengineering.

Course Code: ITCS 494 **Course Title:** Selected Topics in Computer Science

This course covers advanced topics from various areas of computer science not covered in CS curriculum.

Course Code: ITCS 496 **Course Title:** Physical Implementation of DBMS

This course covers practical aspects of implementation of computerized database systems. Topics include SQL programming, writing programs to interrogate databases, designing and programming, triggers, GUI forms and reports, module development and integration, testing, deployment.

Course Code: ITCS 498 **Course Title:** Senior Project

This course allows the student to use computer science related knowledge, techniques and skills to design and develop a complete application or solve IT related problems.

Course Code: ITIS 103 **Course Title:** Fundamentals of Information Systems

This is a foundation course that introduces students to the definitions, concepts and tools used in the IS field. It focuses on discussing the business implications of information systems, social and ethical issues it creates, their relationship with organization activities and how they support e-Commerce, knowledge management and decisions making. Topics covered include: information systems in global business today, ethical and social issues in information system, achieving operational excellence and customer intimacy, e-commerce, building and managing systems, managing knowledge and collaboration, enhancing decision making.

Course Code: ITCE 250 **Course Title:** Digital Logic

Number systems (number system conversion; modulo-N arithmetic; coding techniques). Combinational logic circuits (Boolean algebra; logic minimization; standard forms of Boolean expressions; Karnaugh maps). Combinational Network Design (NAND and NOR implementation; Multiple output networks). MSI Integrated circuits in Combinational networks design (Adders; decoders; encoders; multiplexers; comparators; ROMs; PALs; PLAs). Sequential circuits analysis and design (latches; flip flops; analysis and design of synchronous sequential networks; counters; registers).

Course Code: ITCE 314 **Course Title:** Computer Networks I

Computer Networks and the Internet. Physical Media. Internet Backbones. Packet-Switched Networks. Protocol Layers. Application Layer. HTTP, FTP, Electronic Mail, DNS. Socket Programming. Web Servers. Transport Layer: Multiplexing and Demultiplexing, Reliable Data Transfer and Congestion Control. Network Layer and Routing: The Internet Protocol (IP), IPv6, Multicast Routing and Mobility.

Course Code: ITCE 416 **Course Title:** Computer Networks II

Link Layer and Local Area Networks. Error control and correction techniques. Multiple Access Protocols. Ethernet. Wireless Links. PPP. Frame Relay. ATM. Multimedia Networking and Applications. Real-Time Interactive Applications. Scheduling and Policing Mechanisms. Integrated Services. RSVP. Differentiated Services. Security in Computer Networks. Access Control; Firewalls. SSL and TLS. Network Management.

Course Code: ITTS 401 **Course Title:** IT Technical Selected Topics I

This course covers advanced technical topics from various areas of information technology not covered in the curriculum.

Course Code: ITTS 402 **Course Title:** IT Technical Selected Topics II

This course covers advanced technical topics from various areas of information technology not covered in the curriculum.

Course Code: ITTS 403 **Course Title:** Cooperative Learning

This course provides the students an opportunity to working 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.

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; amperes law; induced emf; Lenz's law; mutual and self inductance; AC circuits; RLC circuit.(

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 211 **Course Title:** Linear Algebra

Fields. Vector spaces. Linear dependence and independence. Bases. Dimensions. Subspaces. Quotient spaces. Linear transformations. Connection with matrices. Change of bases (PAQ and PAP). Eigen-values. Characteristic polynomial. Minimal polynomial. Canonical forms in simple cases. Real and complex inner-product spaces. Orthonormal bases. Orthogonal and complex unitary matrices and their eigen-values. Orthogonal and unitary reduction of real symmetric and complex Hermitian matrices.

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.

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: ITCS 481

Course Title: Industrial Training

This course provides the students an opportunity to get hands on experience of working in IT industry.

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.