Associate Diploma in Information Technology

Program Components

Course Type	CRD
University Requirement (UR)	**11**
College Requirement (CR)	**21**
General Studies Compulsory (GSCC)	**-**
Major Requirement (MR)	**15**
Major Elective (ME)[1]	**24**
General Studies Elective (GSE)[2]	**-**
Training (Internship) **Yes**	**1**
Total Credit (CRD)	**72**

[1] Student must select two (1XX & 2XX) courses from Major Elective(ME) List-1. Additional to this, six (3XX & 4XX) courses must be selected from Major Elective(ME) List-2.

Detailed Study Plan

Year 1 - Semester 1

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 113	Computer Programming I	3	2	3	CR	------	Yes
MATHS 101	Calculus I	3	0	3	CR	------	No
ENGL 154	Language Development I	3	0	3	CR	------	No
HIST 122	Modern History of Bahrain and Citizenship	3	0	3	UR	------	No
ARAB 110	Arabic Language Skills	3	0	3	UR	------	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
ITNE 110	Introduction to Computer and Network Technology	3	2	3	MR	------	Yes
ENGL 155	Language Development II	3	0	3	CR	ENGL 154	No
ISLM 101	Islamic Culture	3	0	3	UR	------	No
HRLC 107	Human Rights	2	0	2	UR	------	No

Year 2 - Semester 3

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 214	Data Structures	3	2	3	CR	ITCS 114	Yes
ITSE 201	Introduction to Software Engineering	3	2	3	MR	ITCS114	Yes
ENGL 219	Technical Report Writing	3	0	3	CR	ENGL 155	No
ITCC 240	Fundamental of Cloud Computing	3	2	3	MR	ITNE 110 & ITCS 114	Yes
ITXX 1XX/2XX	ITXX 1XX/2XX Major Elective 1 – List 1	3	2	3	ME	AS per ME list 1	Yes

Year 2 - Semester 4

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 285	Database Management Systems	3	2	3	MR	ITCS 214	Yes
ITXX 1XX/2XX	ITXX 1XX/2XX Major Elective 2 – List 1	3	2	3	ME	AS per ME list 1	Yes
ITXX 3XX/4XX	ITXX 3XX/4XX Major Elective 1	X	X	3	ME	AS per ME list 2	Yes
ITXX 3XX/4XX	ITXX 3XX/4XX Major Elective 2	X	X	3	ME	AS per ME list 2	Yes
ITXX 3XX/4XX	ITXX 3XX/4XX Major Elective 3	X	X	3	ME	AS per ME list 2	Yes

Training Requirement

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITAD 299	Internship	0	3	1	CR-Training	Pass 48 Credits	Yes

Year 3 - Semester 5

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 333	Internet Software Development	3	2	3	MR	ITCS 285	Yes
ITXX 3XX/4XX	ITXX 3XX/4XX Major Elective 4	X	X	3	ME	AS per ME list 2	Yes
ITXX 3XX/4XX	ITXX 3XX/4XX Major Elective 5	X	X	3	ME	AS per ME list 2	Yes
ITXX 3XX/4XX	ITXX 3XX/4XX Major Elective 6	X	X	3	ME	AS per ME list 2	Yes

Major Electives Courses

List 1: ITXX 1XX/2XX (two courses from the following list)

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 222	Computer Organization	3	2	3	ME	ITCS 214	Yes
ITNE 231	Computer Networks I	3	2	3	ME	ITCS 113 & ITNE 110	Yes
ITNE 241	Computer Networks II	3	2	3	ME	ITNE 231	Yes
ITNE 240	Network Operating Systems	3	2	3	ME	ITCS 214 & ITNE 231	Yes
ITIS 241	Software Development	3	2	3	ME	ITCS 114	Yes
ITCS 254	Discrete Structures I	3	2	3	ME	MATHS 101 & ITCS 113	Yes
ITCS 255	Discrete Structures II	3	2	3	ME	ITCS 254	Yes
ITSE 220	Software Requirements Engineering	3	2	3	ME	ITSE 201	Yes
ITCY 201	Fundamentals of Cybersecurity	3	2	3	ME	ITCS 113 & ITNE 110	Yes
ITCE 112	Digital Design I	3	2	3	ME	ITNE 110	Yes

*Or any other course approved by the College

List 2: ITXX 3XX/4XX (6 courses from the following list)

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 396	Professional Issues and Ethics	3	2	3	ME	ENGL 219	Yes
ITCS 316	Human-Computer Interaction	3	2	3	ME	ITCS 214	Yes
ITCS 317	Formal Languages and Automata	3	2	3	ME	ITCS 214 & ITCS 255	Yes
ITCS 325	Operating Systems	3	2	3	ME	ITCS 222 & ITCS 214	Yes
ITCC 341	Cloud Computing Architecture	3	2	3	ME	ITCC 240 & ITNE 231	Yes
ITCC 345	Cloud Development	3	2	3	ME	ITCC 240 & ITCS 285	Yes
ITCC 343	Cloud Operations	3	2	3	ME	ITCC 240 & ITCS325 & ITNE 231	Yes
ITSE 301	Software Project Management	3	2	3	ME	ITSE 201	Yes
ITSE 302	Software Design and Architecture	3	2	3	ME	ITSE 220	Yes
ITSE 305	Software Engineering Project	3	2	3	ME	ITSE 301 & ITSE 302	Yes

ITCS 342	Design of Algorithms	3	2	3	ME	ITCS 214 & ITCS 254	Yes
ITNE 341	Network Security I	3	2	3	ME	ITNE 241	Yes
ITNE 352	Network Programming	2	3	3	ME	ITCS 214 & ITNE 231	Yes
ITNE 350	Network Management and Administration	3	2	3	ME	ITNE 241	Yes
ITNE 351	Routing and Switching	3	2	3	ME	ITNE 231	Yes
ITNE 360	Wireless Networks	3	2	3	ME	ITNE 241	Yes
ITNE 361	Network Security II	3	2	3	ME	ITNE 341	Yes
ITCY 354	Secure Software Engineering	3	2	3	ME	ITSE 201 & ITNE 352	Yes
ITIS 322	Entrepreneurship and Digital Innovation	3	2	3	ME	ITSE 201	Yes
ITIS 362	Governance and Management of Enterprise IT	3	2	3	ME	ITSE 201	Yes
ITIS 460	Strategic IT Planning	3	2	3	ME	ITIS 362	Yes
ITCY 470	IT Auditing and Business Continuity	3	2	3	ME	ITCY 201	Yes
ITCY 410	Digital Forensics	3	2	3	ME	ITCY 201 & ITIS 362	Yes
ITCY 460	Security Risk Assessment and Countermeasures	3	2	3	ME	ITCY 201 & ITIS 362	Yes
ITCE 418	Network Engineering and Design	3	2	3	ME	ITNE 231	Yes
ITNE 480	Ethical Hacking	3	2	3	ME	ITNE 361	Yes
ITCS 411	Cryptography and Computer Security	3	2	3	ME	ITCS 342	Yes
ITCS 440	Intelligent Systems	3	2	3	ME	ITCS 342	Yes
ITCC 445	Advanced Cloud Development	3	2	3	ME	ITCC 345	Yes
ITCC 442	Cloud Security	3	2	3	ME	ITCC 341	Yes
ITCS 441	Parallel and Distributed Computing	3	2	3	ME	ITCS 325	Yes
ITCS 444	Mobile Application Development	3	2	3	ME	ITCS 333	Yes
ITCS 453	Multimedia and Hypermedia Systems	3	2	3	ME	ITCS 214	Yes
ITCS 455	Semantic Web	3	2	3	ME	ITCS 333	Yes
ITCS 458	Big Data Analytics	3	2	3	ME	ITCS 255	Yes
ITCS 461	Advanced Database Management Systems	3	2	3	ME	ITCS 285	Yes
ITCS 464	Information Retrieval	3	2	3	ME	ITCS 333	Yes
ITCS 496	Physical Implementation of DBMS	3	2	3	ME	ITCS 285	Yes
ITSE 403	Software Testing and Quality Assurance	3	2	3	ME	ITSE 305	Yes

ITSE 450	Object Oriented Design Patterns	3	2	3	ME	ITSE 302	Yes
ITSE 453	Advanced Software Architectures	3	2	3	ME	ITSE 302	Yes
ITSE 476	Free and Open Source Software Development	3	2	3	ME	ITSE 305	Yes
ITSE 469	Software Engineering Economics	3	2	3	ME	ITSE 220	Yes
ITAD 393	Selected Topics in IT	3	2	3	ME	Department Approval	Yes

*Or any other course approved by the College

Course Description

Course Code: ITNE 110 **Course Title:** Introduction to Computer and Network Technology

This foundational course teaches basic computer and network theory, and component identification and function. Hardware Basics: Case, Motherboard, CPU, Cards (PCI, ISA, etc..), HDD, FDD, CD, Power supply, memory, etc. BIOS, CMOS, POST, Basic connections and troubleshooting, Operating systems (Windows versions, DOS prompts), Important files (Win.ini, System.ini, config.sys, autoexec.bat, etc.), Registry, Upgrading; Networks glossary, OSI Model, Physical Media, Internet Backbones, Basic network troubleshooting.

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: ITCY 201 **Course Title:** Fundamentals of Cyber Security

This course provides a general overview of cybersecurity. Students will be introduced to the concept of cybersecurity governance and the organization's approach to protecting the organization's critical infrastructure from attack, damage, and misuse. Topics include an overview of cybersecurity frameworks; cybersecurity infrastructure; defense techniques, defense tactics and practices; cybersecurity safeguards, and defense in depth.

Course Code: ITSE 220 **Course Title:** Software Requirements Engineering

This course covers fundamentals of requirements engineering including definition, process, characteristics, and management; eliciting requirements sources and techniques; requirements specification and documentation techniques; requirements validation techniques, and requirements analysis and system modeling.

CourseCode: ITCC240 **CourseTitle:** Fundamental of Cloud Computing

This course introduces cloud-computing concepts. Topics include cloud fundamentals, infrastructure, architecture, deployment models, security, compute services, storage services, network services, finance.

CourseCode: ITNE 231 **CourseTitle:** Computer Networks I

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: ITSE 201 **Course Title:** Introduction of 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, emerging software engineering for cloud services. Software development and CASE tools.

Course Code: ITCS 222 **Course Title:** Computer Organization

This course introduces basics of computer organization. Topics include data representation, basics of digital logic, basics of Assembly language, instruction formats, addressing modes, instruction set architecture, performance evaluation, single-cycle data path, and processor control. Assembly language programming is used as a means of exploring instruction set architectures.

Course Code: ITNE 240 **Course Title:** Network Operating Systems

This course provides fundamentals of network operating systems and applications. Topics covered are Standards & Protocols, Addressing, Address Resolution, Network OS, File Systems, Intro to Linux, File Sharing in Windows & Linux, Samba, ftp, sftp, System Administration, Software installation, Network Services, DHCP, DNS, Apache, Security.

Course Code: ITNE 241 **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.

Course Code: ITIS 241 **Course Title:** Software Development

This course introduces students to the design and development of desktop applications that meet commercial programming standards using visual object-oriented programming language (such as C# or Visual Basic). Topics covered include: the language's core syntax and object-oriented fundamentals, basic and complex user interface elements (e.g. rich text editors, selectors, dialog and special controls, data controls), implementation and manipulation of data structures (e.g. arrays, collections), and debugging and unit testing. The course focuses on connecting and manipulating databases within the software, and performing CRUD (create, read, update, and delete) operations.

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: ITCS285 **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: ITSE 301 **Course Title:** Software Project Management

This course covers the fundamental concepts, techniques, and tools for project planning and tracking including: requirements management; work breakdown and task scheduling, resource allocation, time, effort, and cost estimation, and associated tools and techniques, risk management and metrics, project tracking metrics and techniques and software configuration management.

Course Code: ITSE 302 **Course Title:** Software Design and Architecture

This course covers the design concepts including principles, tools, interactions, and quality attributes. Design strategies including conventional, object oriented, and cloud computing. Architecture, database and interface design styles, patterns, and frameworks.

Course Code: ITSE 305 **Course Title:** Software Engineering project

This course emphasizes on a real problem project to practice software requirements engineering, project management, software design and construction. Team work including management, planning and load distribution, meetings, oral and written presentations.

Course Code: ITCS316 **Course Title:** Human-ComputerInteraction

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 programmingconcepts.

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: ITCS325 **Course Title:** OperatingSystems

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: ITCS333 **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: ITNE 341 **Course Title**: Network Security I

The course will cover the security topics in the following areas: Access control, simple authentication protocols, password-based security, ACLs and capabilities, multilevel and multilateral security, covert channels and inference control, firewalls and intrusion detection systems. Software: flows and malware, buffer overflows, viruses and worms, software reverse engineering, digitals rights management, secure software development and operating systems security.

CourseCode: ITCC341 **CourseTitle:** Cloud Computing Architecture

This course provides technical and management skills to effectively design, operate, and maintain cloud computing systems. Topics include: transform an organization's current infrastructure to an efficient infrastructure on the cloud, Load balancing, High performance computing, Secure architecture, well designed infrastructures, designing a high available, scalable, reliable, fault tolerant cloud infrastructure.

CourseCode: ITCC343 **CourseTitle:** Cloud Operations

This course covers in-depth knowledge in the field of cloud operations. Topics include cloud administrations, system and network troubleshooting, system deployment in the cloud, cloud infrastructure deployment, monitoring and configuration.

CourseCode: ITCC345 **CourseTitle:** Cloud Development

This course provides technical knowledge in development of applications using cloud technologies. Topics include: Development in a cloud environment; Cloud Programming SDKs and IDEs; Programmatic configuration security and identification; Programmatic creation and utilization of object storage; Design and development of scalable applications using Caching and Content Delivery Networks; containers; Development and integration of non-relational databases; Message queues and notifications.

Course Code: ITCS 342 **Course Title:** Design of Algorithms

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 in cybersecurity such as cryptography, digital forensics, data Integrity and authentication etc.

Course Code: ITNE 350 **Course Title**: Network Management and Administration

The network management course is concerned with providing the principle background theory and practical skills that are vital to understand the tools that are necessary to manage and maintain the operation of computer networks. Network management protocols such as SNMP1,2,3, RMON1 , RMON2. The course also features some of the topics related to network management including network programming, network security and network monitoring.

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, such as BGP and OSPF. Topics covered in this course are: Advanced IPv4 addressing, NAT, IPv6, RIP, BGP, OSPF, Multicasting, MPLS, MANET (Mobile Ad Hoc Network) Routing, Geographic Routing, Geocasting, DTN (delay tolerant network) Routing.

Course Code: ITNE 352 **Course Title:** Network Programing

This course introduces the basics of computer network programming. Topics include: designing and implementation of software for distributed systems (client/server and peer-to-peer), creating and managing sockets and interfaces, addressing, TCP and UDP programming, programming for web services (RESTful AP), message passing, securing connections, multithreading, remote procedure call, and remote object access.

Course Code: ITCY 354 **Course Title:** Secure Software Engineering

This course introduces students to the discipline of designing, developing, and testing secure and dependable software-based systems. It focuses on how to incorporate security in each phase and what are the techniques /approaches/tools to use to get software that is secure by default. Topics to be covered include Secure software development lifecycle, Low level and application related vulnerability analysis, Security requirement and secure design, Secure coding practices and software inspection, and Security testing.

Course Code: ITNE 360 **Course Title**: Wireless Networks

WLAN technologies, Infrared, UHF narrowband, spread spectrum, RF, microwave, design, Bluetooth, RF survey, Wireless LAN design, Wireless LAN protocol standards, Media Access Protocol, WMAN, Wireless Network Security.

Course Code: ITNE 361 **Course Title:** Network Security II

Basic of cryptographic systems, symmetric block ciphers (DES, AES, other contemporary symmetric ciphers), linear and differential cryptanalysis, perfect secrecy, public-key cryptography (RSA, discrete logarithms), algorithms for factoring and discrete logarithms, cryptographic protocols, hash functions, authentication, key management, key exchange, and signature schemes.

Course Code: ITIS 362 **Course Title:** Governance and Management of Enterprise IT

This course provides students with the knowledge to become skilled in directing, planning, running, building and monitoring of Enterprise IT. Topics covered include: Introduction to Enterprise IT Management; strategic alignment of IT strategy to enterprise strategy, types of IT organizations and functions; organizational structures, Enterprise IT governance concepts and frameworks; concepts of measuring, governance enablers, reporting and controlling; outsourcing approaches.

Course Code: ITAD 393 **Course Title:** Selected Topics in IT

This This course covers advanced topics from various areas of IT not covered in the curriculum.

Course Code: ITSE 403 **Course Title:** Software Testing and Quality Assurance

This course covers software quality concepts, review techniques and software quality assurance and quality metrics and measurements, software testing types and strategies for conventional, object-oriented and web Apps, testing tools and standards. Software security and statistical analysis.

Course Code: ITCY 410 **Course Title:** Digital Forensics

This course introduces the fundamental concepts of digital forensics, topics include the principles and techniques for digital forensics investigation and the spectrum of available computer forensics tools. Students will learn about core forensics procedures to ensure the admissibility of evidence, as well as the legal and ethical implications. Lab work will cover forensic investigation on different file systems, and guide students through forensic procedures and review and analyze forensics reports.

Course Code: ITCS411 **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: ITCE 418 **Course Title**: Network Engineering and Design

The objective of this course is to teach a practical methodology for designing enterprise networks that are reliable, secure, and manageable. The course content includes: logical network design, customer to technology mapping, physical network design, and testing network designs. Additionally, the students will be exposed to various security and network management strategies. Various hardware and software building blocks of the networks will be studied and compared to facilitate effective network design.

CourseCode: ITCC442 **CourseTitle:** Cloud Security

This course covers in-depth knowledge in the field of cloud security. Topics include cloud security basics, Security of the cloud, Security in the cloud, security services, Securing the services, Authentication, Access control, Compliance, Incident Management & Troubleshooting.

Course Code: ITCS440 **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: ITCS441 **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: ITCS444 **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.

CourseCode: ITCC445 **CourseTitle:** **Advanced** Cloud Development

This course provides students with advanced technical expertise in development using cloud technologies. Topics include: Serverless development and workflows; Step functions; Application Programming Interfaces; Development and Operations; Continuous integration and continuous delivery (CI/CD); Development and deployment of secure applications in a cloud environment.

Course Code: ITCS453 **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: ITSE 450 **Course Title:** Object Oriented Design patterns

This course covers study of object-oriented design patterns. Topics include detailed study of patterns such as creational, structural, and behavioral. The use and selecting of appropriate design patterns for problem solving. The practical analysis and design of software patterns.

Course Code: ITSE 453 **Course Title:** Advanced Software Architectures

This course covers detailed study of software architectures for various applications including safety critical systems, embedded systems, intelligent decision support systems, mobile applications, web-based applications, big data applications, and cloud computing.

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: ITCS455 **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: ITCS461 **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: ITCS464 **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: ITCY 460 **Course Title:** Security Risk Assessment and Countermeasures

This course examines information security as a risk management problem where the organization identifies information security risks, evaluates those risks, and makes risk mitigation and acceptance decisions given its resource constraints. The students will learn the foundational concepts in risk management and will be introduced to standard risk management approaches for identifying, analyzing, and responding to risk, as well as the tools and methodologies for metrics to monitor risk management activities.

Course Code: ITIS 466 **Course Title:** IS Auditing and Business Continuity

This course covers Information Systems audit and control concepts and practices. Topics covered include: risk assessments concepts in compliance with IS audit standards and guidelines, types of audits to ensure that systems are protected and controlled, strategies to minimize risks, control objectives and controls related to Information Systems and audit planning, audit project management techniques and standards and procedures for the development and maintenance of the Business Continuity Plan (BCP) and testing methods.

Course Code: ITCY 470 **Course Title:** IT Auditing and Business Continuity

This course covers system audit and control concepts and practices. Topics covered include: risk assessments concepts in compliance with information systems audit standards and guidelines, types of audits to ensure that systems are protected and controlled, strategies to minimize risks, control objectives and controls related to audit planning, audit project management techniques and standards and procedures for the development and maintenance of the Business Continuity Plan (BCP) and testing methods.

Course Code: ITNE 480 **Course Title**: Ethical Hacking

Students in this course will study software and network vulnerabilities and how they are exploited. It will examine well-known cases and ask the students to share others via presentations and the course project. Topics of this course include an introduction to types of hackers, ethics of hacking and responsible disclosure, incentives/root causes of hacking, exploiting humans phishing, passwords, exploiting networks cross-site scripting, WiFi/WEB/WPA vulnerabilities i.e., cracking pre-shared keys, man-in-middle attacks and finally routing vulnerabilities, i.e., ARP and DNS poisoning.

Course Code: ITSE 469 **Course Title:** Software Engineering Economics

This course involves introduction to engineering economics and analysis fundamentals. Topics include economic planning of a software Engineering project, cost analysis and estimation, economic analysis of projects, risk analysis, budget development and for-profit and not-for-profit decision making.

Course Code: ITSE 476 **Course Title:** Free and Open Source Software Development

This course covers the development of free and open-source software, or similar software whose source code is publicly available. The main topics are introduction to open Source software development, and its differences with proprietary software; technical infrastructure, developers' demographics and motivations; participation etiquette; best practices; Git distributed revision control system and GitHub; its societal and intellectual property licenses; its economic models; hands-on experience with free and open source software projects.

CourseCode: ITCS496 **CourseTitle:** 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.

College Requirement Courses Descriptions

Course Code: ENGL154 **Course Title:** Language Development I
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: ENGL155 **Course Title:** Language Development II
ENGL 155 is the second of three integrated language courses designed for IT students. The level is upper-intermediate.

Course Code: ENGL219 **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: MATHS101 **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: ITCS113 **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: ITCS114 **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: ITCS214 **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: ITAD 299 **Course Title:** Internship
This course provides the students an opportunity to get hands on experience of working in IT industry.

University Requirement 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.