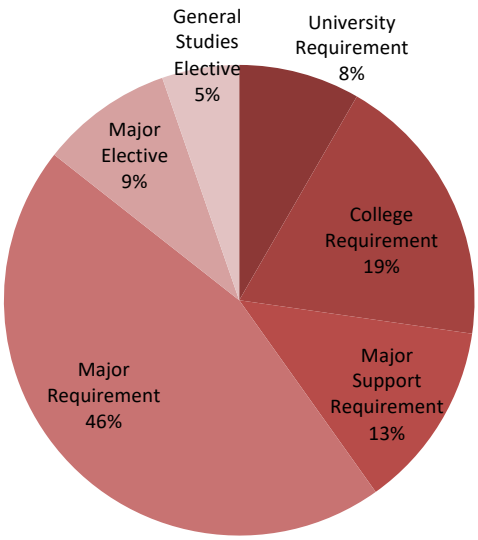
B.Sc. in Software Engineering 2024

Program Components

Course Type	CRD
University Requirement (UR)	**11**
College Requirement (CR)	**23**
Major Support Requirement (MSR)	**17**
Major Requirement (MR)	**61**
Major Elective (ME)[1]	**12**
General Studies Elective (GSE)[2]	**7**
CR- Training (Internship) **Yes**	**3**
Total Credit (CRD)	**134**



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

[2] Student must select two 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)

  Or any other science 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.

Detailed Study Plan

Year 1 - Semester 1

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 106	Computer Programming I	3	2	4	CR	------	Yes
ARAB 110	Arabic Language Skills	3	0	3	UR	------	No
ENGL 157	English for Information Technology	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 107	Computer Programming II	3	2	4	CR	ITCS 106	Yes
ITCE 101	Computer Technologies	3	0	3	MR	------	Yes
PHYCS 102	General Physics II	3	3	4	MSR	PHYCS 101	No
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			
ITCS 214	Data Structures	3	0	3	CR	ITCS 107	Yes
ENGL 219	Technical Report Writing	3	0	3	CR	ENGL 157	No
STAT 273	Probability and Statistics	3	0	3	CR	MATHS 101	No
GSE XXX	Science Elective	X	X	4	GSE	------	No
ITSE 201	Introduction to Software Engineering	3	0	3	MR	ITCS 107	Yes

Year 2 - Semester 4

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 258	Discrete Structures	3	0	3	MR	ITCS 106 & MATHS 101	Yes
ITCS 285	Database Management Systems	3	0	3	MR	ITCS 214	Yes
ITCC 240	Fundamental of Cloud Computing	3	0	3	MR	ITCE 101 & ITCS 107	Yes
ITNE 233	Computer Networks	3	2	4	MR	ITCE 101 & ITCS 106	Yes
ITSE 220	Software Requirements Engineering	3	0	3	MR	ITSE 201	Yes
ITCS 223	Computer Architecture	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			
MATHS 205	Differential Equations	3	0	3	MSR	MATHS 102	No
ITCS 325	Operating Systems	3	0	3	MR	ITCS 223	Yes
ITCS 333	Internet Software Development	3	0	3	MR	ITCS 285	Yes
HIST 122	Modern History of Bahrain and Citizenship	3	0	3	UR	------	No
ITSE 301	Software Project Management	3	0	3	MR	ITSE 201	Yes
ITSE 302	Software Design and Architecture	3	0	3	MR	ITSE 220	Yes

Year 3 - Semester 6

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCS 303	Cryptography and Computer Security	3	0	3	MR	ITCS 258 & ITNE 233	Yes
ITCS 316	Human-Computer Interaction	3	0	3	MR	ITCS 214	Yes
ITCS 347	Analysis and Design of Algorithms	3	0	3	MR	ITCS 214 & ITCS 258	Yes
ITCS 396	Professional Issues and Ethics	3	0	3	MR	ENGL 219	Yes
ITCS 355	Machine Learning	3	0	3	MR	STAT 273 & ITCS 214	Yes
ITSE 306	Current Practices in Software Deployment	3	0	3	MR	ITSE 301 & ITSE 302	Yes

Training Requirement

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITSE 483	Industrial Training	0	6	3	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			
HRLC 107	Human Rights	2	0	2	UR	------	No
ITSE 403	Software Testing and Quality Assurance	3	0	3	MR	ITSE 306	Yes
ITXX 4XX	ITXX 4XX Major Elective I	3	0	3	ME	As per ME list	Yes
ITXX 4XX	ITXX 4XX Major Elective II	3	0	3	ME	As per ME list	Yes
ITSE 498	Software Engineering Senior Project	0	9	3	MR	ENG 219 & ITSE 306 & pass 85 credits	Yes

Year 4 - Semester 8

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ISLM 101	Islamic Culture	3	0	3	UR	------	No
MATHS 211	Linear Algebra	3	0	3	MSR	MATHS 101	No
GSE XXX	Humanities / Social Sciences	3	0	3	GSE	------	No
ITXX 4XX	ITXX 4XX Major Elective III	3	0	3	ME	As per ME list	Yes
ITXX 4XX	ITXX 4XX Major Elective IV	3	0	3	ME	As per ME list	Yes

Major Elective Courses

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITSE 450	Object Oriented Design Patterns	3	0	3	ME	ITSE 302	Yes
ITSE 453	Advanced Software Architecture	3	0	3	ME	ITSE 302	Yes
ITSE 460	Systems Engineering	3	0	3	ME	ITSE 306	Yes
ITSE 466	Formal Methods in Software Development	3	0	3	ME	ITSE 306	Yes
ITSE 469	Software Engineering Economics	3	0	3	ME	ITSE 220	Yes
ITSE 476	Free and Open Source Software Development	3	0	3	ME	ITSE 306	Yes
ITSE 484	Selected Topics in Software Engineering I	3	0	3	ME	Department Approval	Yes
ITSE 485	Selected Topics in Software Engineering II	3	0	3	ME	Department Approval	Yes
ITCS 400	IT-Based Entrepreneurship	3	0	3	ME	ITCS 396	Yes
ITCS 428	Artificial Intelligence	3	0	3	ME	ITCS 347	Yes
ITCS 441	Parallel and Distributed Computing	3	0	3	ME	ITCS 325	Yes
ITCS 444	Mobile Application Development	3	0	3	ME	ITCS 333	Yes
ITCS 453	Multimedia and Hypermedia Systems	3	0	3	ME	ITCS 214	Yes
ITCS 458	Big Data Analytics	3	0	3	ME	ITCS 258	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 496	Physical Implementation of DBMS	3	0	3	ME	ITCS 285	Yes
ITCC 434	Cloud Operations	3	0	3	ME	ITCC 240 & ITNE 233 & ITCS 325	Yes
ITCC 441	Cloud Computing Architecture	3	0	3	ME	ITCC 240 & ITNE 233	Yes
ITCC 442	Cloud Security	3	0	3	ME	ITCS 303	Yes
ITCC 446	Cloud Development	3	0	3	ME	ITCC 240 & ITCS 285	Yes
ITCY 410	Digital Forensics	3	0	3	ME	ITCS 303	Yes
ITCY 420	Secure Coding	3	0	3	ME	ITCS 303 & ITSE 306	Yes
ITCY 481	Ethical Hacking	3	0	3	ME	ITCS 303 & ITCS 333	Yes

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
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 ITSE 498	Yes

General Studies Elective Courses (Humanities / Social Sciences)

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	------
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	------
SPAN101	Spanish I	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: ITCE 101 **Course Title:** Computer Technologies
This course introduces the basics of computer information systems and IT terminology. Topics include hardware components, system software, and application software. Software and hardware installation, upgrade, and troubleshooting. Representation of textual and numerical data. Problem solving principles. Programming languages fundamentals, language translation and interpretation. Communication, Networking, and Internet basics, Network services, Network layers and protocols.

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

Course Code: ITSE 220 **Course Title:** Software Requirements Engineering
This course covers fundamentals of requirements engineering. Topics include requirement engineering's definition, process, characteristics, and management; eliciting requirements sources and techniques; requirements specification and documentation techniques; requirements validation techniques, and requirements analysis and system modeling.

Course Code: ITCS 223 **Course Title:** Computer Architecture
This course introduces the basics of computer architecture. Topics include data representation, basics of digital logic, basics of assembly language, computer performance evaluation, data path and control unit, non-pipelined and pipelined processor design, main memory hierarchy. assembly language programming is used as a means of exploring instruction set architectures.

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

Course Code: ITCC 240 **Course Title:** Fundamentals 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.

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

Course Code: 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: ITSE 301 **Course Title:** Software Project Management
This course covers the fundamental concepts, techniques, and tools for project planning and tracking. Topics include 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 architectural design in software development. Topics include determining architectural drivers, attribute-driven design methodology used with UML, architectural design evaluation practices, architecture of big data, cloud applications.

Course Code: ITCS 303 **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, web security and cryptographic protocols, threats, malicious software, defense mechanisms and countermeasures.

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: ITSE 306 **Course Title:** Current Practices in Software Deployment
This course covers current practices in software deployment. Topics include latest software deployment's methodologies, technologies, and tools, monolithic, microservices architecture design and implementation, version control systems, continuous integration, continues deployment, automated testing, software containers.

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 355 **Course Title:** Machine Learning
This course covers concepts and methods of machine learning. Topics include basics of supervised, unsupervised, generative, and reinforcement learning, model representation, cost functions, gradient descent, linear regression, logistic regression, multiclass classification, overfitting/underfitting, regularization, neural Networks, ML algorithm evaluation, Deep Learning, SVMs and ML real world applications.

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 course covers IT-based entrepreneurship concepts, innovation and best practices. Topics include study of entrepreneurship, opportunity analysis, feasibility analysis, intellectual property, market research, accounting, financial management, sources of funding, business models, teamwork, and business planning.

Course Code: ITSE 403 **Course Title:** Software Testing and Quality Assurance
This course covers software testing and quality assurance techniques and current practices. Topics include software quality concepts, review techniques, software quality assurance and quality metrics and measurements, software testing types and strategies for conventional, object-oriented and web Apps, testing tools and standards.

Course Code: ITCS 428 **Course Title:** Artificial Intelligence

This course covers analysis and design concepts of artificial intelligence. topics include problem solving methods, searching techniques, heuristic search, game playing, knowledge representations, expert systems, fuzzy logic, bayesian belief networks, hidden markov model, natural languages processing, intelligent agents.

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, and distributed applications using map reduce.

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 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: 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: 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: ITSE 453 **Course Title:** Advanced Software Architectures
This course covers detailed study of software architectures for various applications. Topics include 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. Topics include data collection, cleansing, mangling, and integration, exploratory data analysis, predictive modelling, descriptive modelling, data product creation, machine learning algorithms, evaluation, clustering, classification, recommendation, and visualization of large data sets and effective communication, real-life applications and projects using current data science tools.

Course Code: ITSE 460 **Course Title:** Systems Engineering
This course covers concepts of systems engineering and complex systems. Topics include systems engineering life-cycle and processes, conceptual system design, technical performance measures, trade-off analyses, and system specification, preliminary and detailed system design, design review, integration of systems engineering and software engineering activities.

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: ITSE 466 **Course Title:** Formal Methods in Software Development
This course covers formal methods in software development. topics include concepts of formal specifications, validation, and verification of software systems, formal mathematical specification for software via algebraic specifications and abstract model specifications, application of formal methods to analysis, design, implementation, software verification and model-driven software architectures.

Course Code: ITSE 469 **Course Title:** Software Engineering Economics
This course covers 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
The course covers all aspects related to free and open-source systems. Topics include technical infrastructure of open-source systems and environments, social and political infrastructure, economics of open-source systems, communication in open-source systems, packaging, releasing, daily development, legal aspects related to open source.

Course Code: ITSE 484 **Course Title:** Selected Topics in Software Engineering I
This course covers advanced topics from various areas of software engineering not covered in SE curriculum.

Course Code: ITSE 485 **Course Title:** Selected Topics in Software Engineering II
This course covers advanced topics from various areas of software engineering not covered in SE curriculum.

Course Code: ITSE 498 **Course Title:** Senior Project
This course allows the student to use software engineering related knowledge, techniques and skills to design and develop a complete application or solve IT related problems.

Course Code: ITCC 434 **Course Title:** 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.

Course Code: ITCC 441 **Course Title:** 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.

Course Code: ITCC 442 **Course Title:** 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: ITCC 446 **Course Title:** 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: 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: ITCY 420 **Course Title:** Secure Coding
This course explains the principles and practices for secure computing and writing secure software. Topics include code vulnerabilities, static code analysis, error handling, secure coding practices, secure I/O, race conditions and mediation, handling buffer overflow, and handling vulnerabilities in web and database programming.

Course Code: ITCY 481 **Course Title:** Ethical Hacking
Practice and methodology of ethical hackers are identified to provide the learners with an understanding of networks threats and possible attacks, ability to plan and apply penetration test, distinguish recommended countermeasures, and compose a penetration test report.

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; ampere's 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 205 **Course Title:** Differential Equation
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: 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.

University Requirements Courses Descriptions

Course Code: ARAB 110 **Course Title:** Arabic Language Skills
This course focuses on basic Arabic skills including form, function, and meaning. It also helps the student to appreciate and understand structures and approach them from a critical point of view, through various genres in literature.

Course Code: HIST 122 **Course Title:** Modern History of Bahrain and Citizenship
Spatial identity of Bahrain: Brief history of Bahrain until the 18th century; the historical roots of the formation of the national identity of Bahrain since the 18th century; the modern state and evolution of constitutional life in Bahrain; the Arabic and Islamic dimensions of the identity of Bahrain; the core values of Bahrain's society and citizenship rights (legal, political, civil and economic); duties; responsibilities and community participation; economic change and development in Bahrain; Bahrain's Gulf, Arab and international relations.

Course Code: HRLC 107 **Course Title:** Human Rights
This course deals with the principles of human rights in terms of the definition of human rights, scope, sources with a focus on the International Bill of Human Rights; The Charter of the United Nations; Universal Declaration of Human Rights; The International Covenant on Economics, Social and Culture rights; Convention against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment; Mechanics and the Constitutional Protection of Rights and Public Freedoms in Kingdom of Bahrain.

Course Code: ISLM 101 **Course Title:** Islamic Culture
An introduction to the general outline and principles of Islamic culture, its general characteristics, its relationships with other cultures, general principles of Islam in beliefs, worship, legislation and ethics.

College Requirement Courses Descriptions

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

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

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

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

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

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

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

Course Code: ITSE 483 **Course Title:** Industrial Training
This course provides the students an opportunity to get hands on experience of working in IT industry.
PIAC