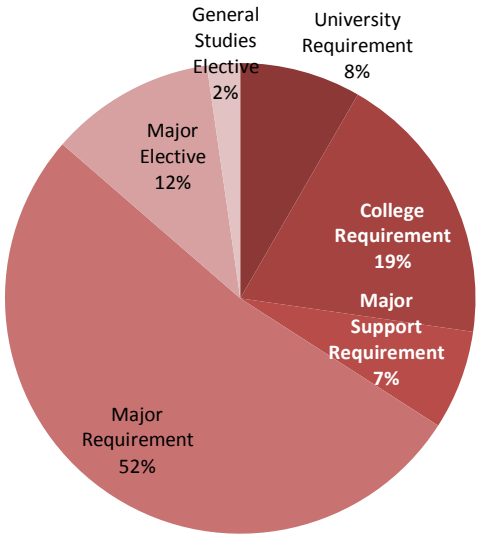
B.Sc. in Network Engineering 2017

Program Components

Course Type	CRD
University Requirement (UR)	**11**
College Requirement (CR)	**24**
Major Support Requirement (MSR)	**17**
Major Requirement (MR)	**63**
Major Elective (ME)[1]	**15**
General Studies Elective (GSE)[2]	**3**
CR- Training (Internship) **Yes**	**1**
Total Credit (CRD)	**134**



[1] All students must select two courses from Major Elective(ME) List. Also, he/she must choose another 9 credit hours that is either the cooperative learning track, or the traditional track (senior project plus two ME courses).

[2] Student must select one General Studies Elective from Humanities and Social Science.
Note:

- Humanities and Social Science Component: 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			
ITNE 110	Introduction to Computer and Network Technology	3	2	3	MR	------	Yes
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
STAT 273	Probability and Statistics	3	0	3	CR	MATH 101	No
ENGL 155	Language Development II	3	0	3	CR	ENGL 154	No
PHYCS 102	General Physics II	3	3	4	MSR	PHYSC 101	No
MATHS 102	Calculus II	3	0	3	MSR	MATHS 101	No
GSE XXX	Humanities/Social Sciences	3	0	3	GSE	------	No

Year 2 - Semester 3

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCE 260	Circuit Analysis	3	2	3	MR	PHYCS 102 & MATH 102	Yes
ITCE 250	Digital Logic	3	2	3	MR	ITCS 113	Yes
ITCS 214	Data Structures	3	2	3	CR	ITCS 114	Yes
MATHS 205	Differential Equations	3	0	3	MSR	MATHS 102	No
ITNE 231	Computer Networks I	3	2	3	MR	ITCS 114 & STAT 273 & ITNE 110	Yes
PHYCS 241	Introductory Electronics	3	2	3	MSR	PHYCS 102	No

Year 2 - Semester 4

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITCE 272	Signals and Systems	3	2	3	MR	ITCE 260 & MATH 205	Yes
ENGL 219	Technical Report Writing	3	0	3	CR	ENG 155	No
ITCS 254	Discrete Structures I	3	2	3	MR	ITCS 113 & MATH 101	Yes
ITNE 241	Computer Networks II	3	2	3	MR	ITNE 231	Yes
ITNE 240	Network Operating Systems	3	2	3	MR	ITCS 214 & ITNE 231	Yes
ITCS 285	Database Management Systems	3	2	3	MR	ITCS 214	Yes

Year 3 - Semester 5

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
HIST 122	Modern Bahrain History and Citizenship	3	0	3	UR	------	No
ITCE 300	Digital Communications	3	2	3	MR	STAT 273 & ITCE 272	Yes
ITNE 341	Network Security I	3	2	3	MR	ITNE 241	Yes
ITCE 320	Network Programming	2	3	3	MR	ITCS 214 & ITNE 231	Yes
ITNE 350	Network Management and Administration	3	2	3	MR	ITNE 241	Yes
ITNE 351	Routing and Switching	3	2	3	MR	ITNE 231	Yes

Year 3 - Semester 6

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITIS 265	IT Project Management	3	2	3	MR	------	Yes
ARAB 110	Arabic Language Skills I	3	0	3	UR	------	No
ITNE 360	Wireless Networks	3	2	3	MR	ITNE 241	Yes
ITNE 361	Network Security II	3	2	3	MR	ITNE 341	Yes
ITCE 418	Network Engineering and Design	3	2	3	MR	ITNE 231	Yes
ITCS 333	Internet Software Development	3	2	3	MR	ITCS 285	Yes

Training Requirement

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITNE 400	Internship	0	3	1	CR-Training	Completion of 85 credit-hours	Yes

Year 4 - Semester 7

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITNE 401	Cooperative Learning	0	27	9	ME	ITNE 400 & MGPA>= 2.0	Yes
or							
ITNE 402	Senior Project	0	6	3	ME	Completion of 85 credit hours & ENG 219	Yes
and ITNE XXX	ITNE Major Elective From List 1	X	X	3	ME	As per ME list 1	Yes
and ITNE XXX	ITNE Major Elective From List 1	X	X	3	ME	As per ME list 1	Yes

Year 4 - Semester 8

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ITNE 480	Ethical Hacking	3	2	3	MR	ITNE 361	Yes
HRLC 107	Human Rights	2	0	2	UR	------	No
ISLM 101	Islamic Culture	3	0	3	UR	------	No
ITNE 481	Cloud Computing	3	2	3	MR	ITNE 231	Yes
ITNE XXX	ITNE Elective From List 1	3	2	3	ME	As per ME list 1	Yes
ITNE XXX	ITNE Elective From List 1	3	2	3	ME	As per ME list 1	Yes

Major Elective Courses

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
List 1							
ITNE 483	Advanced Network Troubleshooting	3	2	3	ME	ITNE 350	Yes
ITNE 484	Data Center Management	3	2	3	ME	ITNE 350 & ITNE 341	Yes
ITNE 485	WLAN Architecture and Design	3	2	3	ME	ITNE 360	Yes
ITCE 419	Wireless Sensor Networks	3	2	3	ME	ITNE 231	Yes
ITNE 486	Protocol Analysis and Design	3	2	3	ME	ITCE 320	Yes
ITNE 487	Mobile Computing	3	2	3	ME	ITNE 360	Yes
ITNE 488	Internet Of Things	3	2	3	ME	ITNE 360	Yes
ITNE 489	Cyber Security Risk Management and Policies	3	2	3	ME	ITNE 361	Yes
ITNE 490	Multimedia Communication	3	2	3	ME	ITNE 360 & ITNE 351	Yes
ITIS 321	Entrepreneurship & Digital Innovation	3	2	3	ME	As per department Approval	Yes
ITNE 492	Selected Topics in Network Engineering 1	3	2	3	ME	As per department Approval	Yes
ITNE 493	Selected Topics in Network Engineering 2	3	2	3	ME	As per department Approval	Yes
ITNE 494	Selected Topics in Network Engineering 3	3	2	3	ME	As per department Approval	Yes

General Studies Elective Courses (Humanities / Social Sciences)

Course Code	Course Title	Course Hours			Course Type	Pre requisite
		Lec	Prac	CRD		
FREN 141	French I	3	0	3	GSE	------
FREN 142	French II	3	0	3	GSE	FREN 141
CHL 101	Introduction to Chinese Language	3	0	3	GSE	------
PHEDE 214	Principles of Educational Statistics	3	0	3	GSE	------
EDTC 100	Teaching and Learning Technology	3	0	3	GSE	------
EDPS 144	Psychology of Learning and Memory	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	------

Course Code	Course Title	Course Hours			Course Type	Pre requisite
		Lec	Prac	CRD		
ART 221	Traditional Music of Bahrain and Its Application	3	0	3	GSE	------
EDAR 126	Playing on Piano and Org 1	3	0	3	GSE	------
JAPN 101	Japanese Level I	3	0	3	GSE	------
JAPN 102	Japanese Level II	3	0	3	GSE	JAPN 101
GERM 101	Introduction to German	3	0	3	GSE	------
KL 101	Korean Language	3	0	3	GSE	------
TL 101	Turkish Language	3	0	3	GSE	------
ENGL 130	Introduction to Literature	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	------
PSYC 281	Thinking Skills	3	0	3	GSE	PSYC 103 or EDPS 241
SOCIO 161	Introduction to Sociology	3	0	3	GSE	------
SOCIO 181	Introduction to Anthropology	3	0	3	GSE	------
SOCIO 191	Citizenship, Identity and Globalization	3	0	3	GSE	------
SOCIO 224	Sociology of Health	3	0	3	GSE	------
SOCIO 226	Sociology of Arabian Gulf	3	0	3	GSE	------
HISTO 212	Contemporary History of The Arab World	3	0	3	GSE	------
HISTO 281	Landmarks of Islamic Civilisation	3	0	3	GSE	------
ARAB 141	Modern Arabic Lit.	3	0	3	GSE	------
ARAB 242	Arabic Poetry In The Renaissance Period	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	------
LAW 101	Introduction to Legal Studies	3	0	3	GSE	------
LAW 102	History of Law	3	0	3	GSE	------
ECON 140	Microeconomics	3	0	3	GSE	------
LAW 106	Constitutional Law I	3	0	3	GSE	------
GSE XXX	Other electives	X	X	3	GSE	Department Approval

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 260 Course Title: Circuit Analysis
Systems of units, charge, current, voltage, power and energy, Ohm's & Kirchoff's laws. Series, parallel and Wye-Delta transformation Independent and dependent sources, mesh & nodal analysis Superposition, Thevenin's & Norton's theorems, Transient analysis of RC & RL circuits, Sinusoids & phasors, impedance & admittance, AC mesh & nodal analysis, AC power analysis. Power Factor correction, Series and Parallel Resonance.

Course Code: ITCE 250 Course Title: Digital Logic
Number system; Basic logic gates; Boolean algebra; Simplification of logic functions: Karnaugh maps; NAND and NOR gates networks; multiple output networks; MSI combinational logic circuits: Multiplexers, Decoders, Adders, Comparators; combinational logic circuits design with programmable logic devices. ROM; Flip-Flops; Design and analysis of sequential networks, counters and registers. The laboratory experiments will provide students with hands-on experience of designing, implementing and testing digital logic circuits using small and medium scale integrated circuits.

Course Code: ITNE 231 Course Title: 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: PHYCS 241 Course Title: Introductory Electronics
Properties of semiconductors; diode characterization; Zener diodes; tunnel diodes; photodiodes; construction and operation of bipolar junction and field effect transistors; dc biasing; stabilization; small signal analysis of BJT; JFET and MOSFET amplifiers; multistage systems; operational amplifiers.

Course Code: ITCE 272 Course Title: Signals and Systems
Elementary continuous and discrete-time signals, signal decomposition and convolution, sampling theory and Nyquist theorem, Laplace and Z transforms, Fourier series and integral with applications, Linear Time-Invariant (LTI) systems: Properties, impulse and frequency responses, Pole-zero description, input-output difference and differential equations, transient and steady-state time responses to elementary signals.

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: 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: 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: 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: ITCE 300 Course Title: Digital Communications .
This course deals with the fundamental aspects of the communications functions, focusing on the transmission of signals in a reliable and efficient manner. Topics covered include signal transmission, transmission media and systems, signal encoding, interfacing, data link control, and error detection and correction methods.

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.

Course Code: ITCE 320 Course Title: Network Programming
This course covers the fundamental topics in designing and implementation of software for distributed systems. Furthermore, the course covers the design patterns, concepts and implementation issues and techniques of distributed systems. The course also covers the following in context of distributed systems: concurrency, massage passing, remote procedure call and remote object access, object oriented network communication, mobile codes and peer-to-peer systems.

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: ITIS 265 Course Title: IT Project Management
This course provides students with the basic principles of project management, including concepts of project initiating, planning, executing, monitoring and controlling, and closing process groups. The course introduces the fundamentals of five project management areas: integration, scope, time, cost and quality.

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: 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.

Course Code: ITCS 333 Course Title: Internet Software Development
Key technology underlying the World-Wide Web. Web architecture, including server design, Internet protocols standards (e.g. HTTP, TCP/IP, SMTP, POP3, MIME, FTP), Client-Server data processing; Web design using HTML/XHTML/CSS that include techniques for text, images, links and forms; XML based Applications, DTD, XSL/XSLT, and RSS; Client and Server-side programming languages, JavaScript and PHP; Web-based Programming Project.

Course Code: ITNE 401 Course Title: Cooperative Learning
Cooperative training consists of students working full time in a relevant industrial establishment while getting academic credit for the structured job experience. The students are expected to submit a written portfolio of their work experience and conduct an oral presentation.

Course Code: ITNE 402 Course Title: Senior Project
Senior students are required to carry out a design project, using knowledge and skills obtained in prior courses wherein they incorporate engineering standards and multiple realistic constraints such as economic, ethical, social, political, environmental, health and safety, manufacturability and sustainability. The students are expected to work in teams and are required to submit a written report and conduct an oral presentation.

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: ITNE 481 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: ITNE 483 Course Title: Advanced Network Troubleshooting
This course provides the student with the knowledge to troubleshoot computer networks. The course discusses network troubleshooting strategies, troubleshooting tools, host troubleshooting, connectivity testing, traffic capturing, traffic analyzing, and performance measurements. By taking this course the learner will be able to identify network problems, analyses them, use couple tools such as Wireshark, and manage to troubleshoot the problem.

Course Code: ITNE 484 Course Title: Data Centre Management
The primary objective of this course is to deliver broad awareness of datacenter requirements, design and management technologies and methodologies. This includes: reliability, security, network systems, storage systems, industrial design, systems management, operating environments, application environments/management, operations, logistics and energy efficiencies.

Course Code: ITNE 485 Course Title: WLAN Architecture and Design
This course introduces the architecture, design and implementation of wireless LANs. The course provide a detailed discussion of the 802.11 WLAN standard which is necessary to construct and manage reliable WLANs. The course focuses on designing efficient WLANs to provide optimal coverage, capacity and mobility to users. The essential components necessary for building WLANs are also covered as well as the deployment of these elements.

Course Code: ITCE 419 Course Title: Wireless Sensor Networks
This course covers an introduction to wireless sensor networks, distributed signal progressing in large scale sensor networks, energy conservation approaches, node deployment and topology, communication in sensor networks, time synchronization, and localization in sensor networks. Moreover, the students will study target localization, data fusion and geographical energy aware routing.

Course Code: ITNE 486 Course Title: Protocol Analysis and Design
This course will cover the key topics in protocol analysis and design. Topics include Communication Protocol Definition/Representation, Formal and Informal Protocol Development Methods, Protocol Engineering Phases, Protocol specification, Components of specification, Service specification, Interface specifications, Interactions, Multimedia specifications, RSVP specification, Protocol Specification Language, Protocol Verification/ Validation, and Protocol Conformance and Performance Testing.

Course Code: ITNE 487 Course Title: Mobile Computing
This course provides an overview of modern mobile communication systems. Introductory concepts will be discussed including the evolution of mobile communication and the fundamentals of cellular systems. The course also covers several topics such as the radio wave propagation, air interface technologies, multiple access techniques, radio resource management and computer simulation of communication systems.

Course Code: ITNE 488 Course Title: Internet Of Things
This course provides an overview of key concepts and challenges related to digital transformation. The course will cover: the potential of the IoT for our society; the underlying technology that powers the IoT, as well as the challenges that comes with such technologies; various network protocols and the key wireless technologies used in IoT; the role of big data, cloud computing and data analytics in a typical IoT system; design, implementation and testing of a complete working IoT system.

Course Code: ITNE 489 Course Title: Cyber Security Risk Management and Policies
This course covers the principles of applied information security management and is suitable for those who are looking for an in-depth understanding of security management in medium to large organizations. The course comprises the following topics: governance and security policy, threats and vulnerability management, incident management, risk management, information leakage, crisis management and business continuity, legal and compliance, security awareness and security implantation considerations, dealing with classified sensitive data, and the practical consideration when implementing the frameworks to address current and future threats.

Course Code: ITNE 490 Course Title: Multimedia Communications
This course is intended to provide the students with a comprehensive understanding that underlie the transmission of continuous media such as digital audio and video across many well used computer networks. In this course, an emphasis will be on network technologies for real-time, low-latency delivery of multimedia. The concepts on media compression, retrieval, and applications will be covered. Reasonable class time will be devoted to multimedia networking techniques and lab experiments. Students are asked to do a term project and present the projects at the end of the course. The project should be conducted in group of at least two students. A project should be within the topics multimedia such as implementing one of the well known compression algorithms. Students should present their project and share their experience with other students and express it openly. Tool such as Matlab is used in lab and in implementing the project.

Course Code: ITIS 321 Course Title: Entrepreneurship & Digital Innovation
This course covers areas related to developing and managing technology-based new ventures. Topics covered include: role and personality of the entrepreneur, business planning, building and managing teams, digital innovative products, market evaluation and developing a business and marketing plan, legal issues including intellectual property, preparation of venture budgets, and raising finance.

Course Code: 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 Equations
Differential equations of first order and their solution. Separable and exact equations. Equations convertible to separable type. Higher order linear equations with constant coefficients (homogeneous and non-homogeneous). Power series method for second order linear equations. Variation of parameters. Laplace transform technique. Applications of differential equations.

Course Code: PHYCS 241 **Course Title:** Introductory Electronics
Properties of semiconductors; diode characterization; Zener diodes; tunnel diodes; photodiodes; construction and operation of bipolar junction and field effect transistors; dc biasing; stabilization; small signal analysis of BJT; JFET and MOSFET amplifiers; multistage systems; operational amplifiers.

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: ITNE 400 Course Title: Internship (0-3-1))
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.