

<i>Computer Science Department</i>
<i>King Abdullah II School for Information Technology</i>
<i>University of Jordan</i>

*Curriculum for B.Sc.
in
Computer Science*

The Academic Degree: B.Sc. in Computer Science

A. Contents:

The curriculum for the department of Computer Science consists of (132) credit hours as follows: -

Sequence	Requirement type	Credit Hours
1	University Requirements	27
2	Faculty Requirements	24
3	Specialization Requirements	81
Total		132

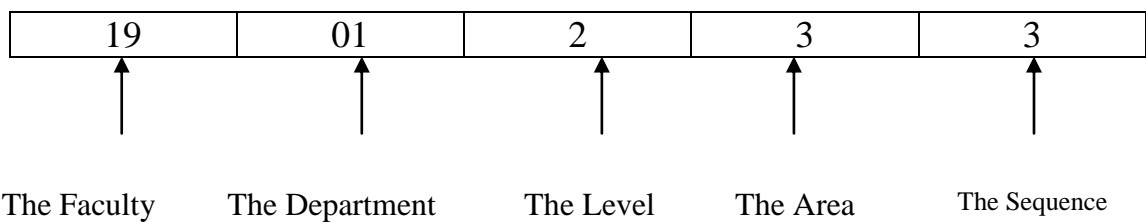
B. Department Codes:

Code	Department
1	Computer Science (CS)
2	Computer Information Systems (CIS)
3	Business Information Systems (BIS)

C. Area Codes:-

Area Code	Specialization	Area Code	Specialization
0	General	5	Applications
1	Languages	6	Distributed Systems And Communications
2	Information Systems And Management	7	Systems Development
3	Hardware Components And Based Erect	8	Specialized Topics
4	Theoretical Erect	9	Special Topics And Project

- Meaning of Course Code:



Example: 1901233 Data Structures 1

First: University Requirements (27): Credit Hours as follows:

A. Obligatory Courses: (12) Credit Hours as follows:

Course Code	Course Name	Credit Hours
1501100	Arabic Communication Skills	3
1502100	English Communication Skills	3
2200100	Military Sciences	3
2300100	National Education	3

B. Elective Courses: (15) Credit Hours as follows:

Course Code	Course Name	Credit Hours
3001000	Research Methodology	3
0305100	Environment	3
0342100	Science and Society	3
0352100	Principles of Energy and Economies	3
0401100	Islamic Culture	3
0402100	Islamic System	3
0505100	Principles of Public Health	3
0603100	Human Nutrition	3
0641100	Home Garden	3
0710100	First Aid	3
0807100	Introduction to library and Information Science	3
0905100	Principles of General Safety	3
0905101	Jordanian Industries	3
1032100	Human Rights	3
1041100	Legal Culture	3
1132100	Sport and Health	3
1601105	Management Skills	3
1607100	Public Political Economy	3
2001100	Art Appreciation	3
2200103	Foreign Language	3
2301100	Creative Writing	3
2302102	History of Human Civilization	3
2302104	History of Jordan and Palestine	3
2303100	Logic and Critical Thinking	3
2304100	Geography of Jordan	3
2305100	Introduction to Sociology	3

2307100	Principles of Psychology	3
2308100	Principles of Political Science	3
2601100	Jordan Monuments	3
2701100	Principles of Social Work	3

Second: Faculty Requirements (24): Credit Hours

A. Obligatory Courses: (24) Credit Hours as follows:

Course No.	Course Name	Theoretical	Practical	Credit Hours	Pre Required
0301101	Calculus-1	3	-	3	-
1901101	Discrete Mathematics	3	-	3	-
1931102	Computer Skills for Scientific Faculties	2	1	3	Pass Qualifications Exam or 1902099
1901233	Data Structures-1	2	1	3	1931102
1902202	Documentation and Ethics	3	-	3	1903101
1902223	Introduction to Database Systems	3	-	3	1901233
1903101	Fundamentals of Information Technology	3	-	3	-
1903121	Web Applications Development-1	3	-	3	1903101

B. Elective courses: None

Third: Specialization Requirements (81): Credit Hours as follows:

A. Obligatory Courses: (69) Credit Hours as follows:

Course No.	Course Name	Week Hours		Credit Hours	Pre Required
		Theoretical	Practical		
1901204	Digital Logic	3	-	3	1901101
1901234	Data Structures -2	3	-	3	1901233
1901237	Programming Methodologies	3	-	3	1901233
1901238	Programming In Special Languages	3	-	3	1901237
1901241	Theory Of Computation	3	-	3	1901101
1901322	Computer Organization	3	-	3	1901204
1901341	Theory Of Algorithms	3	-	3	1901233
1901351	Numerical Analysis	3	-	3	0301101 1931102 +
1901353	Modeling And Simulation	3	-	3	1901234
1901359	Computer Graphics	3	-	3	1901233
1901362	Computer Networks-1	3	-	3	1901233
1901376	Systems Programming And Management	3	-	3	1901322
1901442	Network Programming	3	-	3	1901362 1901238+
1901463	Computer Security	3	-	3	1901362
1901464	Parallel Processing	3	-	3	1901322
1901466	Distributed Systems	3	-	3	1901341 1901442+
1901471	Design And Implementation Of Programming Languages	3	-	3	1901241
1901472	Compiler Construction	3	-	3	1901241
1901473	Operating Systems	3	-	3	1901233
1901496	Project-1	-	-	1	90 hours
1901497	Project-2	-	-	2	1901496
1901498	Training	6 Weeks		0	90 hours
0301131	Statistics	3	-	3	-
1902342	Artificial Intelligence	3	-	3	1901233
1902371	Introduction Software Engineering	3	-	3	1902223

B - Elective Courses: (12) Credit Hours selected from the following list:

Course No.	Course Name	Week Hours		Credit Hours	Pre Required
		Theoretical	Practical		
1901443	Graph Theory	3	-	3	1901341
1901446	Computer Systems Performance	3	-	3	1901322 +0303113
1901452	Pattern Recognition	3	-	3	1901234
1901457	Information Visualization	3	-	3	1901359
1901459	Certified Software	3	-	3	1901233
1901461	Computer Networks-2	3	-	3	1901362
1901467	Multimedia Networking	3	-	3	1901362
1901469	Mobile Wireless Networks	3	-	3	1901362
1901475	Operating Systems Programming	3	-	3	1901473 1901237
1901494	Special Topics	3	-	3	1901233
1902353	Human-Computer Interaction	3	-	3	1901359
1902454	Digital Image Processing	3	-	3	1901359
1902474	Systems Analysis and design	3	-	3	1902223
1903341	Operational Research	3	-	3	1903255 Or 0301131
1903353	Web Application Development -2	3	-	3	1903121 +1902223

Courses Offered By CS Department:

Course No.	Course Name	Week Hours		Credit Hours	Pre Required
		Theoretical	Practical		
1901101	Discrete Mathematics	3	-	3	-
1931102	Computer Skills-2 (C++)	3	-	3	1902100
1901204	Digital Logic	3	-	3	1901101
1901238	Programming In Special Languages	3	-	3	1901237
1901233	Data Structures-1	3	-	3	1901102
1901234	Data Structures-2	3	-	3	1901233
1901237	Programming Methodologies	3	-	3	1901233
1901241	Theory of Computation	3	-	3	1901101
1901322	Computer Organization	3	-	3	
1901341	Theory of Algorithms	3	-	3	1901233
1901351	Numerical Analysis	3	-	3	0301101 1931102 +
1901353	Modeling And Simulation	3	-	3	1901234
1901376	Systems Programming And Management	3	-	3	1901322
1901359	Computer Graphics	3	-	3	1901233
1901362	Computer Networks-1	3	-	3	1901233
1901443	Graph Theory	3	-	3	1901341
1901442	Network Programming	3	-	3	1901362 1901238+
1901446	Computer Systems Performance	3	-	3	0301131 1901322+
1901452	Pattern Recognition	3	-	3	1901234
1901457	Information Visualization	3	-	3	1901359
1901459	Certified Software	3	-	3	1901233
1901461	Computer Networks-2	3	-	3	1901362
1901463	Computer Security	3	-	3	1901362
1901464	Parallel Processing	3	-	3	1901322
1901466	Distributed Systems	3	-	3	1901341 1901442+
1901467	Multimedia Networking	3	-	3	1901362
1901469	Mobile Wireless Networks	3	-	3	1901362
1901471	Design And Implementation Of Programming Languages	3	-	3	1901241
1901472	Compiler Construction	3	-	3	1901371
1901473	Operating Systems	3	-	3	1901233
1901475	Operating Systems Programming	3	-	3	1901473 +1901237
1901494	Special Topics	3	-	3	1901233
1901496	Project-1	1	-	1	90 hours
1901497	Project-2	2	-	2	1901496
1901498	Training	6 Weeks		0	90 hours

Supervisory Plan

First Year

First Semester			Second Semester		
Course No.	Course Name	Credit Hours	Course No.	Course Name	Credit Hours
0301101	Calculus-1	3	0301131	Statistics	3
1901101	Discrete Mathematics	3	1931353	Modeling and Simulation	3
1931102	Computer Skills-2 (C++)	3	1901233	Data Structures-1	3
1903101	Fundamentals Of Information Technology	3	1903121	Web Application Development -1	3
	Univ. Req.	3		Uni. Req.	3
				Uni. Req.	3
		15			18

Second Year

First Semester			Second Semester		
Course No.	Course Name	Credit Hours	Course No.	Course Name	Credit Hours
1901204	Digital Logic	3	1901238	Programming In Special Languages	3
1901234	Data Structures-2	3	1902202	Documentation and Ethics	3
1901241	Theory of Computation	3	1901351	Numerical Analysis	3
1901237	Programming Methodologies	3		Elective Course.	3
	Univ. Req.	3		Univ. Req.	3
	Univ. Req.	3			
		18			15

Third Year

First Semester			Second Semester		
Course No.	Course Name	Credit Hours	Course No.	Course Name	Credit Hours
1901322	Computer Organization	3	1901341	Theory of Algorithms	3
1902223	Introduction to Database Systems	3	1902371	Introduction Software Engineering	3
1901362	Computer Networks-1	3	1901376	Systems Programming	3
1901359	Computer Graphics	3	1902342	Artificial Intelligence	3
	Univ. Req.	3		Elective Course	3
				Elective Course	3
		15			18

Fourth Year

First Semester			Second Semester		
Course No.	Course Name	Credit Hours	Course No.	Course Name	Credit Hours
1901442	Network Programming	3	1901466	Distributed Systems	3
1901471	Programming Languages	3	1901472	Compiler Construction	3
1901463	Computer Security	3	1901464	Parallel Processing	3
1901473	Operating Systems	3	1901497	Project-2	2
1901496	Project-1	1		Elective Course	3
	Univ. Req.	3		Elective Course	3
		16			17

Computer Science Dept. Courses Description

1901101 Discrete Mathematics: (Prerequisite none)

This course studies the mathematical elements of computer science. Topics include propositional logic; predicate logic; mathematical reasoning; techniques of proof; mathematical induction; set theory; number theory; matrices; sequences and summations; functions, relations and their properties, elementary graph theory, and tree.

1931102 Computer Skills-2 (C++): (Prerequisite 1902100)

Fundamental concepts of programming using C++; Basic structures of programming tools: variable names; Data types; Control structures; Arrays; Functions; Pointers; Introduction to classes and objects; Inheritance; Applications using C++. Weekly practice in the lab.

(1901204) Logic Design : (Prerequisite 1901101)

Main concepts of Logic Design; Boolean Algebra; Basic Definitions; Basic Theorems and Properties; Boolean Functions; Canonical and Standard Forms; Digital Logic Gates; Minimization Methods; Combinational Logic; Sequential Logic. Numbering Systems; Binary Codes; Boolean Algebra; Gate-Level Minimization; Algebraic Simplifications; Karnaugh Maps; Don't-Care conditions; NAND and NOR Implementation; Combinational Logic; Adders and subtractors; Decoders and Encoders; Multiplexers and Demultiplexors; ROMS and PLAs; Sequential Logic; Flip Flops; Registers, Counters, and Serial adder.

1901238 Programming In Special Languages: (Prerequisite 1901237)

Object-oriented Programming (OOP) Environment; Input/Output; Loops; Decision; Function; Array and Strings; Data structures; Encapsulation; Advanced variables; Object Oriented Programming; Useful OO features; Class and object; Polymorphism; Exceptions handling; Applet; I/O streams; Threads, Files; Weekly exercises in lab.

1901233 Data Structures – 1: (Prerequisite 1931102)

Records. Classes and data abstraction. Inheritance and composition. Templates. Contiguous list. Stacks, Stack operations and Implementation of Stacks as arrays. Queues, Queue operations and Implementation of Queues as arrays.

1901234 Data Structures – 2:**(Prerequisite 1901233)**

Pointers. Classes. Virtual functions and abstract classes. Overloading. Recursion. Linked list: singly, doubly, circular. Stacks, Stack operations and Implementation of Stacks as linked-list. Queues, Queue operations and Implementation of Queues as linked-list. Trees, Binary Trees.

1901241 Theory of Computation:**(Prerequisite 1901101)**

Sets; Relations; Closure and Languages; Finite automata: deterministic and nondeterministic; Closure and pumping lemma; Regular languages and expressions; Context-free grammar: regular languages and context-free languages, pushdown automata, closure, determinism and parsing, LL(1) grammar; Turing machines, combining Turing machines and machine schemas, examples; Introduction to P and NP classes.

1901322 Computer Organization:**(Prerequisite 1901204)**

Main concepts of computer architecture; Hardware components of a computer; Instruction set: instruction formats, encoding of instructions, types; Execution unit: registers design, combinational shifters, ALU, division and multiplication algorithms; Control unit: register transfer language, hardwired and micro programmed control unit; Memory unit: RAM, cache memory, associative memory, virtual memory; Input/output processors; Introduction to multiprocessor systems and parallel processing.

1901341 Theory of Algorithms:**(Prerequisite 1901233)**

Definition of an algorithm; Algorithm design and techniques, such as sequential versus divide-and-conquer; Algorithm analysis; Concept of basic operations; Concept of worst, best, and average case analysis; Complexity analysis: big O, Omega and Theta notations; Recurrence equations and recursive algorithms; Searching and sorting algorithms; Concept of graphs; Graph algorithms.

1901237 Programming Methodologies:**(Prerequisite: 1901233)**

The course would basically cover the following areas: Multi-threading and synchronization, Storage and I/O (i.e.Memory and Garbage Collection, File Structure, I/O Streams, Serialization), defensive programming techniques (error handling, exceptions, assertions, debugging aids), current programming trends (functional and/or scripting), code testing, and tuning strategies and techniques.

1901351 Numerical Analysis: (Prerequisite: 1901102 + 0301101)

An introductory course to numerical analysis, introduces students to: computer arithmetic representation, error analysis; finding roots of a function, iterative methods; solution of linear systems of equations; solution of nonlinear systems; interpolation techniques; numerical integration, curve fitting, and differentiation; and optimization techniques. Weekly practice in the lab.

1901353 Modelling and Simulation: (Prerequisite: 1901233)

Fundamentals concepts of computer simulation; models for computer simulation; random numbers: Pseudorandom number generation and testing, Monte Carlo methods. Introduction to distribution functions. Simulation modeling: discrete-event simulation, continuous simulation; verification and validation of simulation models: input analysis, output analysis. Queuing theory models; design codes, test and debug simulation programs. Sample applications. Weekly practice in the lab.

1901452 Pattern Recognition: (Prerequisite 1901233)

Introduction to the foundation of pattern recognition algorithms. Covering theoretical foundations of classification and pattern recognition and discuss applications in character, speech and face recognition, and some applications in automation and robotics. A list topics include: Bayesian decision theory, discriminate functions for normal class distribution, pattern estimation and supervised learning, nonparametric techniques linear discriminant functions and learning, unsupervised learning and clustering, neural networks including multilayer perceptrons, stochastic algorithms (such as genetic algorithms), and cellular automata. Weekly practice in the lab.

1901359 Computer Graphics: (Prerequisite 1901233)

Introduction to Graphics systems, an overview of Computer Graphics applications; Graphics Output Primitives and its attributes; Geometric Transformations; Three-Dimensional Object Representations; Graphical User Interface and its attributes; Introduction to OpenGL programming in C++ and its applications; Overview of well-known Computer Graphics software through a course project that covers 3D Computer Graphics.

1901362 Computer Networks-1:**(Prerequisite 1901233)**

This course explores key concepts and essential technologies of computer networks and broad range of topics in networking, including: General overview: Networks applications, Network classifications and topologies, Network layers, Channel performance measures, transmission media, Communication Network Protocols and architecture; Data link layer: framing, error detection and correction, CSMA/CD, LAN IEEE standards; Network layer: IP service model, IP Addressing, subnetting, Host configuration DHCP, ARP Protocol, ICMP protocol; Transport layer: UDP protocol, TCP protocol, TCP reliable transfer and sliding window, TCP flow and congestion control; Application layer: DNS protocol, NAT protocol, HTTP protocol, persistent and non-persistent HTTP connection. Weekly practice in the lab.

1901376 Systems Programming:**(Prerequisite 0907335)**

Introduction; assemblers: basic function. Machine-dependent and machine-independent features, design options; loaders and linkers: basic functions, types of loaders, Macro processor : basic functions, features, design options, basics of administration of operating systems and data design options, basics of administration of operating systems and databases. Advanced concepts including: virtual machines, runtime Environments, memory garbage collection. Weekly practice in the lab.

1901457 Information Visualization :**(Prerequisite 1901359)**

Information visualization is the science that unveils the underlying structure of data sets using visual representations that utilize the powerful processing capabilities of the human visual perceptual system. In this Course, we will study algorithms and systems for visually exploring, understanding, and analyzing large, complex data sets. Information visualization focuses on abstract data such as symbolic, tabular, networked, hierarchical, or textual information sources. The student will learn the principals involved in information visualization and a variety of existing techniques and systems. The students will also gain backgrounds and skills that will aid the design of new, innovative visualizations in realistic applications.

1901443 Graph Theory:**(Prerequisite 1901341)**

Concepts of a graph. Undirected graphs vs. directed graphs. Computer representation of graphs; Euler graph and De Bruijn sequences. Shortest path algorithm. Trees; minimum Spanning trees algorithms: Kruscal and Prime algorithms. Depth first search for directed and undirected graphs. Applications of a depth first search: non-separable components and strongly connected graphs. Maximum flow in a network: Ford-Fulkerson Algorithm. NP-complete

graph problems: graph coloring, maximum independent set, minimum vertex cover, traveling salesman problem.

1901442 Networks Programming: (Prerequisite 1901362 +1901238)

This course discusses the practical aspects of network programming using a programming language such as java or C#, including: Internet Addressing ; Data Streams, Serialization, Exception handling; User Datagram protocol: Datagram Packet, Datagram Socket , Sending and receiving UDP packets, Building an UDP Client/Server; Transmission Control Protocol: TCP sockets, Server Sockets; Building a TCP Client/Server ;Multi-Threaded Applications, Synchronization; Implementing Application protocols. Practice in the lab for each class meeting.

1901446 Computer Systems Performance: (Prerequisite 1901322 + 0301131)

Concepts of performance. Concepts of performance Metric and Benchmark programs. Characteristics of good performance metric, summarizing data: averaging performance and variability. Quantifying errors in experiments. Comparing alternatives. Measurement tools and techniques. Introduction to simulation. Analytical models: introduction to queuing theory. Practice in the lab: experimenting with benchmarks and code profiling.

1901459 Certified Software: (Prerequisite 1901233)

This course is designed to help students to gain rapid software application skills such as: Solaris System Software, Sun, Unix, Cisco, MSE and others. in this course the student will be able to develop and design a web applications and services, mobile applications and others using certified software's from Microsoft company or certified software's to achieve the final goal of the course which is getting an intentional certificate from international companies. Weekly practice in the lab.

1901471 Computer Networks-2: (Prerequisite 1901362)

This course explains and discusses advanced concepts of computer networks, including: VLANs, Routing protocol; Advanced TCP, silly window syndrome, Adaptive timeout; Network Analysis, Arditector and design. Network Performance metrics Measurements, polices and monolerng Network management, SNMP protocol, SIM protocol, MIB protocol; Asynchronous Transfer Mode (ATM).

1901463 Computer Security:**(Prerequisite 1901362)**

This course explains Security protocols, authentication protocols, data integrity, digital signatures, intrusion detection, key management and distribution, viruses and other malicious codes, information flow, mobile code and agent security. Cryptographic algorithms: Secret Key Encryption (DES), Public Key Encryption (RSA), Message Digest Algorithm (MD5); Attacks and countermeasures: Packet sniffing, Spoofing and denial of service; Application layer security: HTTPS, secure email; Transport layer security: TLS, SSL; Network layer security: IP security (IPSec), AH protocol, ESP protocol; access control and Firewalls: Filter-based firewalls, Proxy-based firewalls; wireless networks security, security in IEEE 802.11, WEP protocol, EAP protocol.

1901464 Parallel Processing:**(Prerequisite 1901322)**

Introduction to high-performance computing; Models of parallel architectures and PRAM models; Parallel languages and tools; Multiprocessors; Multi-computers; Interconnection and routing topologies; Shared and message-passing memories; Recent parallel applications.

1901466 Distributed Systems:**(Prerequisite. 1901341 + 1901442)**

Concepts of distributed system: advantages; hardware; software; design issues; communication in distributed systems: inter-process communication, synchronization: clocks; concurrency; consistency, scheduling; fault tolerance; distributed file systems; emphasis on recent and emerging distributed systems technologies; lab assignments to experiment with suitably-scaled distributed systems issues, case studies.

1901467 Multimedia Networking:**(Prerequisite 1901362)**

This course explains and discusses key concepts of Multimedia networking, including: Introduction: Digital Audio, Graphics and Video, voice over IP (VOIP); Characteristics of multimedia; Multimedia Perceptual Quality: Frame rate, Delay, Jitter, Loss; Compression standards; Real Time Multimedia Applications, Desk Top Conferencing, Video Conferencing, Video Mail, Distance Learning, Non-Real Time Multimedia Applications: World Wide Web, Multimedia Mail; Design of Networked Multimedia Applications; Transport layer multimedia: RTP protocol, RTCP protocol, SIP protocol; Quality of Service: Network layer support for multimedia, IntServ, DiffServ; Multimedia Multicasting; Multimedia programming, Future trends.

1901469 Mobile Wireless Networks:**(Prerequisite 1901362)**

Wireless networks and their basic operation, different types of wireless technologies and systems, the basics of how they operate, key commercial systems. Wi-Fi wireless networks, Bluetooth wireless technology, cellular Mobile IP and Mobile routing, Transport layer over wireless networks, Mobile wireless network applications. Introduction to Mobile location Base services.

1901471 Design and Implementation of Programming Languages:**(Prerequisite 1901241)**

Programming languages: design and basic approaches to language implementation; Informal semantics and implementation of various constructs from typical higher level languages; Languages (data, operations, control structures, storage management and operating environment); Case studies covering different paradigms; Imperative, Logic, Functional and object-oriented programming languages. Weekly practice in the lab.

1901472 Compiler Construction:**(Prerequisite 1901471)**

Introduction to Compiling; Lexical analysis: specification and recognition of tokens, finite automata; Syntax analysis: grammars, top-down and bottom-up parsing; Syntax-directed translation; Semantic routines; Storage-allocation strategies; Code generation; Error recovery. Weekly practice in the lab.

1901473 Operating Systems:**(Prerequisite 1901233)**

Definition and role of the operating systems; History of operating systems and development; Functionality and structuring methods of a typical operating system; Concepts of process versus thread; Scheduling, dispatching and context switching; Concurrent execution: the "mutual exclusion" problem and some solutions; Deadlocks: causes, conditions, and methods for resolution; Memory management; Virtual memory management; Mass-storage structure.

1901474 Operating Systems programming**(Prerequisite 1901473+1901237)**

This course focuses on Unix Operating System, including Linux, Solaris, AIX, HP-UX, etc. A comprehensive study is given, including its evolution, structure, programming environment, and user interface. Topics include the shell (Korn, Bourne, C, etc), file system commands, data manipulation commands, editors (vi and ed), software tools, networking tools, and system administration tools. The course is supplemented with many hands-on exercises that reinforce the lectures.

1901494 Special Topics:**(Prerequisite 1901233)**

Selected Topics in advance areas of Computer Science; Report and Documentation required. Weekly practice in the lab.

1901496 Project-1:**(90 hours)**

Project includes theoretical and practical aspects in Computer Science; the first stage of the graduation project, includes project proposal, analysis and preparation, and project design stages. A report at the end of each stage should be delivered to the department and the supervisor.

1901497 Project- 2:**(Prerequisite 1901496)**

It includes the second stage of the graduation project, which covers the implementation, testing and evaluation stages, and completing the project in its final version. A documentation of the whole project should be delivered to the department and the supervisor. Finally, the project should be submitted for final examination.

1901498 Training:**(90 hours)**

The student must be trained in an institution, for at least 6 weeks. The student must provide a report from the institution that shows the efficiency of this training, According to the regulations of the Dean's Council of the Faculty's Departments, or get a certificate in one of the information technology fields from a recognized institute.

1902202 Documentation and Ethics :**(Prerequisite: 1903101)**

This course has two parts first it introduces students to the technical writing process and the requirements to develop a good writing style; it explains the definition, types and structure of formal reports, proposals, research papers, feasibility reports, user manuals, memorandums and resumes. The second part of this course addresses the definition of ethics, provides a framework for making ethical decisions, and analyzes in detail several areas of ethical issues that computer professionals are likely to encounter in business. Topics include philosophical, business, and professional ethics, privacy, criminal conduct, property rights, reliability in addition to Plagiarism.

1902223 Introduction to Database Systems:**(Prerequisite 1901233)**

This course introduces the basics of database systems , as well as the modeling , design and manipulation of relational data . The students will gain the required knowledge to describe databases, their characteristics , functions , pros and cons.

Topics include record storage and primary file organization , data modeling , database design theory , data definition and manipulation languages , storage and indexing techniques , relational database design : normalization , Entity – Relationship(ER) and Enhanced E-R(EER) models , SQL . The course will enable the students to create and manipulate databases on Oracle database management system by producing small group project.

1902342 Artificial Intelligence:

(Prerequisite 1901233)

Introduction to AI and application; Exhaustive Search methods; Heuristic search Methods; First Order Logic for knowledge representation; Programming in PROLOG; Production rule systems; Principles of expert systems; Expert systems Programming in PROLOG; Knowledge Acquisition. Weekly practice in the lab.

1902454 Digital Image Processing:

(Prerequisite 1902359)

Introduction, Data structure for image analysis; Shape representation; Image pre-processing; Image formats; Recognition; Feature extraction; Processing primitives; Modeling (e.g. quad applications); Local and global operations; Clustering: hierarchical and non-hierarchical methods, clustering using neural networks and genetic algorithms; Classifications; Nearest neighbours; Neural nets; Image enhancement; Segmentation application and measurement; Image storage and retrieval; Applications. Weekly practice in the lab.

1902353 Human-Computer Interaction :

(Prerequisite 1901359)

Designing, building, and programming graphical user interfaces, Human-centered software evaluation, Human-centered software development, HCI aspects of multimedia systems and Web-based systems, these topics are intended as an introduction to human-computer interaction. Emphasis will be placed on understanding human behaviour with interactive objects, knowing how to develop and evaluate interactive software using a human-centered approach, and general knowledge of HCI design issues with multiple types of interactive software. Weekly practice in the lab.

1902371 Introduction Software Engineering:

(Prerequisite 1902223)

This course introduces students to the concept of software engineering and presents the notions of software engineering processes and management. The course covers the processes, techniques and deliverables that are associated with requirements engineering: software requirements, system modelling, formal specification and techniques for specifying dependability. In addition, this course presents software design and design processes.

1902474 System Analysis and design: (Prerequisite 1902323)

Introduction to systems development; Development life cycle; System Development feasibility; Development of fact finding methods; Context diagram; Data flow diagram; Decision tables and trees; Data dictionary; Installation; Training; Development Tools: Documentation, Maintenance, Conceptual design, DB design, Reverse engineering, Graphical user interface, Systems life cycle, System conversion, System charts and flow of control; Case study. Weekly practice in the lab.

1903101 IT Fundamentals 1903101 (Prerequisite none)

This course introduces the students to the Information Technology components available in all computer areas including computer hardware, software, telecommunications and networks multimedia, Internet applications, Operating systems including Microsoft Windows and open source software's (e.g. Linux), E-business, system software and applications, information system analysis and development, problem solving including algorithms, flowchart, and pseudo code. It also gives an insight to the principles of numbering systems including decimal, binary, octal, hexadecimal numbers, how to convert numbers from one base to another, and to be able to do arithmetic's using these numbering systems.

1903121 Web Application development-1 (Prerequisite 1903101)

This course aims to improve students' ability in developing web applications. Students will have strong knowledge about the methods and tools used in developing web applications. Students will know how the World Wide Web works to be able to design, implement and configure its services and applications effectively. Also students should work on emerging web technologies available in the market. topics include XHTML, CSS and JavaScript.

1903341 Operational Research (Prerequisite 1903255 or 0301131)

This course emphasizes the use of quantitative methods and techniques for effective decision-making. Model formulations and applications are used in solving business decision problems. Topics include: Linear Programming, Transportation, Assignment, CPM/PERT techniques, and Game Theory. The course is application oriented, it emphasizes learning by doing. Analytic techniques and computer packages will be used to solve problems facing business managers in decision environments.

1903353 Web Application Development-2 (Prerequisite 1903121&1902223)

The course introduces the concepts of PHP web server programming. The course aims to provide students with the basic constructs of the **PHP language** so that they are able to implement anything from basic feedback forms to more advanced database driven shopping cart solutions.