Faculty of Information Technology

Department of

Computer Science\Computer Science

Study Plan for the Bachelor Degree in Computer Science\Computer Science

2023 / 2024

Vision:

Leadership and excellence in computer science to reach for global according to the approved standards.

Mission:

Prepare distinguished and effective elite in the fields of computer science capable of developing software and computer-related industries to meet the needs of the labor market and serve the local community.

Program Objectives:

1. Delivering high-quality and effective education using a variety of contemporary teaching methods including blended online education as a means of increasing efficiency and student learning opportunities.
2. Provide Scholarships for outstanding students.
3. Attracting distinguished faculty members.
4. Build mutual partnership with the local community.
5. Prepare qualified competencies in the field of computer science to fulfill the local and regional labor market requirements.
6. Preparing cadres committed to the ethics of the profession

1. Intended Learning Outcomes (ILOs):

a- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
b- Design, implement and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
c- Communicate effectively in a variety of professional contexts.
d- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
e- Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
f- Apply computer science theory and software development fundamentals to produce computing-based solutions. [CS].

2. **Framework for Computer Science\Computer Science Bachelor Degree (135 Cr. Hrs.)**

Classification	Credit Hours			Percentage
	Compulsory	Elective	Total	
University Requirements	12	12	24	18%
Faculty Requirements	21	-	21	15.5%
Program Requirements	66	9	75	55.5%
Support Courses	12	-	12	9%
Free Electives	3	-	3	2%
Total			135	100%

Course Numbering:

0	6	0	5	year	semester	0-9		0-9
Faculty Code		Dept. Code		Course Level		Knowledge Field		Sequence

Knowledge Areas

Number	Knowledge Field
0	**Computer Sciences and Algorithms** - Discrete Mathematics, Data Structure, Algorithms
1	**Programming** Visual Programming, Object Oriented Programming, Web Design (1), Web Design (2), Programming Methodology, Programming Fundamentals
2	**Computer Main Components** - Digital Logic Circuits, Computer Architecture, Operating Systems, Computer Organization and Design
3	**Information Sciences and Applications** - Information Systems Analysis and Design, Databases, Database Systems Management.
4	**Networks:** - Computer Networks, Wireless Computer Networks
5	**Computer Science Specialization:** - Computation Theory, Smart Phone Programming, Information Security, Compiler Design, Computer Graphics, Information Systems Retrieval and File Management, Software Engineering Fundamental, Image Processing, Software Projects Management, Numerical Analysis
6	**Computer Science Programming:** - Networks & Severs Programming
7	**Elective Requirement Courses:**

	- Advanced Programming, Simulation and modeling, Artificial Intelligence, Human Computer Interaction, Programming Mathematics, Expert System, Selected Topics (1), Selected Topics (2)
8	
9	**Practical Training** - Practical training - 3 Hrs after completing at least 90 Hrs **Graduation Project** - Graduation Project - 3 Hrs after completing at least 90 Hrs

1. **University Requirements:** (24 Credit Hours)

1.1 Compulsory University Requirements: (12 Credit Hours)

Course No.	Course Title	Cr. Hr.	Prerequisite	Corequisite
01101101	Military Sciences (Only for Jordanian *)	3	-	-
01101102	National Education (Only For Jordanian *)	3	-	-
01101111	Arabic Language	3	01100011	-
01101112	English Language	3	01100012	-
	Total	**12**		

1.2 Elective: 12 Credit Hours from the following courses.

Course No.	Course Title	Cr. Hr.	Prerequisite	Corequisite
01101103	Traffic Education	3	-	
01101104	Innovation and Entrepreneurship	3	-	
01101121	Life skills	3	-	
01101131	Islamic Culture	3	-	
01101132	Jerusalem and the Hashemite Custodianship	3	-	
01101141	Sport and Health	3	-	
01101142	Environment and society	3	-	
01101151	Computer Skills	3	01100051	
01101152	Internet and Communication	3	-	
01101161	Economic Systems and Concepts	3	-	
01101171	Psychology and Society	3	-	
01101213	Communication Skills in Arabic Language	3	01101111	
01101214	Communication Skills in English Language	3	01101112	
01101243	Public safety and first aid	3	-	
01101281	Scientific Research Methods	3	-	
01101282	Introduction to Astronomy	3	-	
03011101	Law in our Life	3	-	
03021201	Human Rights	3	-	

2. **Faculty Requirements:** (21 Credit Hours)

2.1 Compulsory Faculty Requirements: (21 Credit Hours)

Course No.	Course Title	Cr. hr.	Prerequisite	Corequisite
11021101	General Physics 1	3	-	
11031101	Calculus (1)	3	-	
06051110	Programming Methodology	3	-	
06051200	Discrete Mathematics	3	-	
06051220	Logic Design	3	11021101	
06051211	Programming Fundamentals	3	06051110	
06032102	Data Structures	3	06051211	
	Total	**21**		

4.2 Faculty Requirements Electives: (zero Credit Hours)

Course No.	Course Title	Cr. hr.	Prerequisite	Corequisite

3. Department Requirements (75 Credit Hours)

3.1 Compulsory Department Requirements: (66. Credit Hours)

Course No.	Course Title	Cr. hr.	Prerequisite	Corequisite
06052232	Information Systems Analysis and Design	3	06032112	
06032112	Object Oriented Paradigm	3	06051211	
06052201	Algorithms	3	06032102	
06032122	Computer Architecture	3	06051220	
06033113	Visual Programming	3	06032112	
06053214	Web Design (1)	3	06032112	
06014115	Web Design (2)	3	06053214	
06053130	Databases	3	06052201	
06053223	Operating System	3	06032122	
06052121	Computer Organization and Design	3	06032122	
06032250	Software Engineering Fundamental	3	06032112	
06052153	Computation Theory	3	06051200	
06013175	Simulation and modeling	3	11031141	
06013256	Smart Phone Programming	3	06033113	-
06042150	Information Security	3	11031141	-
06013176	Artificial Intelligence	3	06052201	-
06054158	Compiler Design	3	06052153	-
06052157	Computer Graphics	3	06051211	-

06054190	Practical Training-CS	3	Pass 90 hrs.	-
06054191	Graduation Project-CS	3	Pass 90 hrs.	-
06043162	Networks & Severs Programming	3	06052140	-
06082240	Computer Networks	3	06051220	-
	Total	**66**		

3.2 Department Electives: (9 Credit Hours)

Course No.	Course Title	Cr. hr.	Prerequisite	Corequisite
06013231	Database Systems Management	3	06053130	
06014254	Information Systems Retrieval	3	06053130	
06033274	Human Computer Interface	3	06033113	
06043273	Advanced Programming	3	06033113	
06033172	Programming Mathematics	3	06032112	
06053273	Expert System	3	06013176	
06053259	Image Processing	3	06052253	
06083141	Wireless Networks	3	06052140	
06034259	Software Projects Management	3	06032250	
06014171	Selected Topics (1)	3	Dept Approval	
06054272	Selected Topics (2)	3	Dept Approval	
	Total			

4. Support Courses (12 Credit Hours)

Course No.	Course Title	Cr. hr.	Prerequisite	Corequisite
11031141	Statistics and Probabilities	3	11031101	
06052253	Numeric Analysis	3	11031101	
11021202	Physics (2)	3	11021101	
11011101	Chemistry (1)	3	-	
	Total	**12**		

5. Free Electives: 3 Credit Hours

Course No.	Course Title	Cr. hr.	Prerequisite	Corequisite
	Total			

Study Plan Guide for the Bachelor Degree in Computer Sciences\Computer Multimedia Systems

First Year				
First Term				
Course No.	**Course Title**	**Cr. hrs.**	**Prerequisite**	**Corequisite**
06051100	Discrete Mathematics	3	-	
06051110	Programming Methodology	3	-	
11031101	Calculus (1)	3	-	
01101111	University Comp. -Arabic Language	3	01100011	
01101112	University Comp.- English Language	3	01100012	
	Total	**15**		
Second Term				
Course No.	**Course Title**	**Cr. hrs.**	**Prerequisite**	**Corequisite**
	Elective University Requirement 1	3		
06051211	Programing Fundamentals	3	06051110	
11031141	Statistics and Probabilities	3	11031101	
06051220	Logic Design	3	11021101	
11021101	Physics (1)	3		
		15		

Second Year				
First Term				
Course No.	**Course Title**	**Cr. hrs.**	**Prerequisite**	**Corequisite**
	Elective University Requirement 2	3		
06052153	Computation Theory	3	06051200	
06032112	Object Oriented Paradigm	3	06051211	
06032102	Data Structures	3	06051211	
06032122	Computer Architecture	3	06051220	
01101102	National Education	3	-	
	Total	**18**		
Second Term				
Course No.	**Course Title**	**Cr. hrs.**	**Prerequisite**	**Corequisite**
	Elective University Requirement 3	3	-	
06052232	Information Systems Analysis and Design	3	06032112	
11011101	Chemistry (1)	3	-	
06052201	Algorithms	3	06032102	
06052221	Computer Organization and Design	3	06032122	
	Electives Department Requirement 1	3		
	Total	**18**		

Third Year				
First Term				
Course No.	**Course Title**	**Cr. hrs.**	**Prerequisite**	**Corequisite**
	Elective University Requirement 4	3	-	
11021202	Physics (2)	3	11021101	
06033113	Visual Programming	3	06032112	
06053130	Databases	3	06052201	
06052140	Computer Networks	3	06051220	
	Electives Department Requirement 2	3	-	
	Total	**18**		
Second Term				
Course No.	**Course Title**	**Cr. hrs.**	**Prerequisite**	**Corequisite**
06053214	Web Design (1)	3	06032112	
06032250	Software Engineering Fundamental	3	06032112	
06042150	Information Security	3	11031141	
06053223	Operating System	3	06032122	
06052253	Numerical Analysis	3	11031101	
	Specialization Elective	3		
	Total	**18**		

Fourth Year				
First Term				
Course No.	**Course Title**	**Cr. hrs.**	**Prerequisite**	**Corequisite**
06054158	Compiler Design	3	06052153	
06013175	Simulation and modeling	3	11031141	
06014115	Web Design (2)	3	06053214	
06013256	Smart Phone Programming	3	06033113	
06043162	Networks & Severs Programming	3	06052140	
06054190	Practical Training – CS	3	Pass 90 Cr.hr.	
	Total	**18**		
Second Term				
Course No.	**Course Title**	**Cr. hrs.**	**Prerequisite**	**Corequisite**
01101101	Military Sciences (Only for Jordanian *)	3	-	
06052157	Computer Graphics	3	06051211	
06013176	Artificial Intelligence	3	06052201	
06054191	Graduation Project-CS	3	Pass 90 Cr.hr.	
	Free Elective	3	-	
	Total	**15**		

Description of Courses offered by the Department of Computer Science\Computer Science.

Compulsory Faculty Requirements

11021101 **General Physics (1) (Prerequisite: - none)** **(3) Cr. Hrs**

Vectors, Basics of Mechanics Description of Motion in one Dimension, Motion in two Dimensions, Applications of Newton's Laws, Work Energy Theorem, Collisions and Rotational Motion

11031101 **Calculus (1) (Prerequisite:- none)** **(3) Cr. Hrs**

Functions and Limits, Continuous functions, derivative, differentiation rules, implicit differentiation, applications integrals, definite integrals, transcendental functions, inverse trigonometric functions.

06051110 **Programming Methodology (Prerequisite: - none)** **(3) Cr. Hrs**

Problem-solving concepts: constants and variables, data types, problem-solving steps, expressions, problem solving tools, algorithms, flowcharts, pseudo-code, programming logic structures (sequential, decision, and loops), Arrays.

06051200 **Discrete Mathematics (Prerequisite: - none)** **(3) Cr. Hrs**

Sets theory, Relations, Functions, Recursion, Proof methods, Logic Theory, Mathematical Induction, Graph & Tree Theory.

06051220 **Logic Design (Prerequisite: -** 11021101**)** **(3) Cr. Hrs**

Number systems, computer codes. Boolean algebra and logic gates. Simplification of Boolean functions, Karnaugh map, combinational logic implementation including PLAs, (adders, comparators, coders, decoders, code converters, multiplexers, de-multiplexers). Sequential circuits, flip flops, counters, shift registers, memories

06051211 **Programming Fundamentals (Prerequisite: -** 06051110**)** **(3) Cr. Hrs**

Fundamental concepts of programming using C++ or Java: classes and objects, modeling object (attributes and behaviors), algorithms, problem solving flowcharts, pseudo codes. Basic blocks of programming such as variable names, data types, control structures, functions, arrays.

06032102 **Data Structures (Prerequisite: -** 06032112**)** **(3) Cr. Hrs**

Algorithmic problem solving, Data Structures (static & dynamic), lists, stacks, queues, graphs, trees, sets and dictionaries). Recursion and iteration. Students are expected to do lab experiments using C++ or Java.

Compulsory Department Requirements

06052232 **Information Systems Analysis & Design (Prerequisite:-**06032112**)** **(3) Cr. Hrs**

System Theory, information systems and information systems types, system analysis and design methods, object oriented system analysis and design methods. Study cases.

06032112 **Object Oriented Paradigm (Prerequisite: -** 06051211**)** **(3) Cr. Hrs**

Introduction to OOP, models, objects, methods, links, message passing, polymorphism, dynamic binding, classes constructors and destructors, association, generalization and specialization, inheritance, overridden methods, aggregation. Students are required to perform some lab experiments using the latest JAVA language version and UML using Rational Rose software.

06052201 **Algorithms (Prerequisite: -** 06032102**)** **(3) Cr. Hrs**

Introduction to the design and analysis of algorithms, mathematical algorithms. Greedy technique, manipulating data: sorting, searching, dynamic programming, space & time tradeoffs. The concept of algorithm efficiency, table, and information retrieval. Combinatorial problems, advancement in Java skills and techniques

06032122 **Computer Architecture (Prerequisite:** -06051220**)** **(3) Cr. Hrs**

Hardware components of a modern computer system, history and performance, the instruction cycle, memory organization, cache memory, I/O organization, CPU, micro-programmed control, instruction formats and modes

06033113 **Visual Programming (Prerequisite: -** 06032112**)** **(3) Cr. Hrs**

Basic Visual Programming, solid foundation of the syntax and semantics of a visual Programming language used to develop both windows-based and web-based application. Coverage of Microsoft's. NET platform architecture.

06053214 **Web Design (1) (Prerequisite: -** 06032112**)** **(3) Cr. Hrs**

Basic concepts of the Internet and Internet browsers, Internet applications, web page creation tools and languages. Basic XHTML (frames, forms), cascading style sheets, scripting and scripting languages. Dynamic XHTML (object based programming and events). Students are required to do a Mini- project.

06014115 **Web Design (2) (Prerequisite:** -06053214**)** **(3) Cr. Hrs**

This unit introduces students to design, development and implementation of server side applications, the use of multimedia and human interaction on the browser side. Students gain practical experience creating dynamic web

applications that interact with a database using client side scripts, server side scripts and compiled server programs. Security, access right, financial transactions and legal issues are also covered. This unit incorporates substantial practical experience in applying theoretical concepts. Students are required to submit mini project.

06053130 **Databases (Prerequisite: -** 06052201**)** **(3) Cr. Hrs**

An in-depth examination of relational databases, modern database technologies, conceptual design and entity relationship modeling, relational algebra and calculus, data definition and manipulation languages using SQL, schema and view management, query processing and optimization, transaction management, security, privacy, integrity, and management. Students are required to do project work.

06053223 **Operating System (Prerequisite: -** 06032122**)** **(3) Cr. Hrs**

Definition of operating system, review of hardware, software and firmware, process concepts, asynchronous concurrent processes, real storage, virtual storage, processor scheduling, distributed computing, disk performance optimization.

06052221 **Computer Organization and Design (Prerequisite: -** 06032122**)** **(3) Cr. Hrs**

Explores the levels of architecture and organization in digital computers: logic circuit design, integrated circuits and assembly language coding.

06032250 **Software Engineering Fundamental (Prerequisite: -** 06012232**)** **(3) Cr. Hrs**

This course provides an overview of engineering as a discipline; the course introduces student to the fundamental principles, models and methodologies of a software engineering. It covers basic knowledge about software processes. It provides minimum prerequisite knowledge for more detailed and specialized study of software engineering. Students gain experience, via a team project, about life-cycle development of software systems.

06052153 **Computation Theory (Prerequisite: -** 06051200**)** **(3) Cr. Hrs**

Regular languages and Regular expressions, Deterministic and Nondeterministic Finite Automata, Converting NFA to DFA, minimization methods of DFA, Context-free languages, pushdown automata, Turing Machine and their languages, Unsolvable problems and computable functions

06013175 **Simulation and Modeling (Prerequisite: -** 11031141**)** **(3) Cr. Hrs**

This course is an introduction to computer simulation for the modeling and analysis of complex real – world systems. Topics include review of the theory, model design and development, comparison to analytical models, input data

preparation, random number generation, output statistical analysis, and model validation.

06013256 Smart Phone Programming (Prerequisite: - 06033113) (3) Cr. Hrs

The smart phone programming course allows students to learn the fundamentals of programming for smart phones. It covers various concepts related to layouts, widgets event handling, processing JSON files, using MySQL database with php service. The course allows students to be familiar with a mainstream of today's technology.

06042150 Information Security (Prerequisite: - 11031141**) (3) Cr. Hrs**

Information security basics, basic cryptography, modern symmetric ciphers, public key cryptosystems, key management, message authentication, hash functions, digital signatures, IP and web security, firewalls and trusted systems, secured software design, application security software threats, social, legal, and ethical issues. Human factors in security.

06013176 Artificial intelligence (Prerequisite: -06052201**) (3) Cr. Hrs**

Introduction to artificial Intelligence, symbolic reasoning and knowledge representation techniques, control strategies, heuristic search, and AI applications (expert systems, neural language processing, robotics…etc.). Introduction to neural networks, genetic algorithm and machine learning.

06054158 Compiler Design (Prerequisite: -06052153**) (3) Cr. Hrs**

Introduction to compiling, lexical analysis, symbol tables, parsing, syntax-directed translation, type-checking, run-time organization, intermediate code generation, code optimization.

06052157 Computer Graphics (Prerequisite: - 06051211**) (3) Cr. Hrs**

Introduction and basic fundamentals of computer graphics. Lines and circles algorithms. Geometrical transformation in two - dimensions and three - dimensions (Translation, Scaling, Rotation).Composing transformations, projection, methods for forming two- dimensional views using curves. Students are required to do lab Assignments.

06054190 Practical Training - CS (Prerequisite: - Pass 90 Cr.hr.**) (3) Cr. Hrs**

Practical training in the public or private sector for at least 8 weeks

06054191 Graduation Project -CS (Prerequisite:-Pass 90 Cr.hr.**) (3) Cr. Hrs**

Student picks one of the projects posted by the department as part of requirements of graduation.

06043162 **Networks & Severs Programming (Prerequisite: -** 06052140**)** **(3) Cr. Hrs**

Introduction to networks programming advanced JAVA (covers I/O Routines, Threading Sockets, URL connections, Server-Side programming), database connectivity, distributed programming, and network security, Students are required to do lab. Assignment.

06052140 **Computer Networks (Prerequisite: -** 06051220**)** **(3) Cr. Hrs**

Logical and physical of computer networks, architecture and transmission alternatives. OSI-reference model, ALOHA protocol, CSMA protocols, LAN, IEEE standards and protocols (token ring, token bus and Ethernet), physical layer basics, data link layer, framing protocols, error detecting and correcting, routing algorithms, flow control, congestion control algorithms, personal computer networks.

Electives Department Requirements

06043273 **Advanced Programming (Prerequisite: -** 06033113**)** **(3) Cr. Hrs**

Advanced features of the language such as handling exceptions, Files and Database connectivity. Other major topics in this course include network programming serialization, properties, multithreading, and security.

06033172 **Programming Mathematics (Prerequisite: -**06032112**)** **(3) Cr. Hrs**

Introduction to MATLAB infrastructure. Working with linear algebra, arrays and matrices. Graphics: plotting, images and GUI. Use of symbolic Math toolbox: flow control, data structures, scripts, functions and calculus. Solving equations.

06013231 **Database Management Systems (Prerequisite: -** 06053130**)** **(3) Cr. Hrs**

Application development, integrated application, XML standards distributed database processing and view support. Data protection problems, recovery, concurrency, security and data integrity. Database administration and tuning, all practical applications shall be implemented in ORACLE.

06014254 **Information Retrieval Systems (Prerequisite: -** 06053130**)** **(3) Cr. Hrs**

Consideration of the basic principles and tools for analysis and retrieval of information in various information systems (textual and Database systems). Topics include differences between data retrieval and information retrieval,

retrieval concepts, types of retrieval systems, web search architectural, tokenization, and query operations.

06033274 **Human Computer Interaction (Prerequisite: -** 06033113**)** **(3) Cr. Hrs**

Tools and techniques for designing, implementation, deploying and evaluation of user interfaces. Interactive systems; dialogue styles, theories of interaction and component integration, human-computer interaction frameworks.

06053273 **Expert System (Prerequisite: -** 06013176**)** **(3) Cr. Hrs**

Introduction to expert systems, expert systems programming languages, knowledge base, rule base, Knowledge analysis, expert systems architecture, case studies.

06053259 **Image Processing (Prerequisite: -** 06052253**)** **(3) Cr. Hrs**

This is an introductory course to the fundamentals of digital image processing. It emphasizes general principles of image processing, rather than specific applications. The student will cover topics such as image acquisition and display, properties of the human visual system, color representations, sampling and quantization, point operations, linear image filtering and correlation, transforms and sub-band decompositions, and nonlinear filtering, image compression using various methods.

06083141 **Wireless Networks (Prerequisite: -**06052140**)** **(3) Cr. Hrs**

Introduction to mobile and wireless networks. Designing computer networks to support, computer mobility. Mobile network architecture. Wireless technologies and protocols. Wireless LAN standards. Models for indoor and outdoor mobile networks. Systems issues such as performance. Quality of service guarantees, reliability, and security in mobile computing environment. Hardware and access protocols for mobile networks. Mobile application protocols.

06034259 **Software Projects Management (Prerequisite: -**06032250**)**

Management activities, Project Planning and scheduling, Risk Management, Managing People, Software Cost Estimation, Quality Management, Software Measurement and Metrics, Process Improvement, Configuration Management.

06014171 **Special Topics (1) (Prerequisite: -** Dept. Approval**)** **(3) Cr. Hrs**

To be set by the department.

06014272 **Special Topics (2) (Prerequisite: -** Dept. Approval **)** **(3) Cr. Hrs**

To be set by the department.

Support Courses

11031141 **Statistics and Probabilities (Prerequisite: -** 11031101**)** **(3) Cr. Hrs**

Definitions and basic elements of probability, Rules of probability, Random Variables: Discrete and continuous random variables and their probability distribution functions, the mathematical expectation. Some discrete and continues distributions: Binomal, Poisson, geometric, Hyper geometric and Normal Distributions. Point and interval estimation of the parameters of one and two populations. Tests of hypotheses concerning the above parameters, and Goodness of fit and independence tests. Simple linear Regression and inference concerning its parameters multiple linear regression. Description and estimate using matrices.

06052253 **Numerical Analysis (Prerequisite: -** 11031101**)** **(3) Cr. Hrs**

The error calculation, roots of nonlinear equations, use of numerical methods to solve systems of linear equations, approximation Functions, find derivatives, find the values of numerical integrals by numerical methods, the use of numerical methods to solve differential equations

11021202 **Physics (2) (Prerequisite: -** 11021101**)** **(3) Cr. Hrs**

Charge and Coulomb's Law, Electric Field, Electric Flux, Gauss's law, Electric Potential, Capacitance and Dielectrics, Current and Resistance, Direct Current Circuits, RC Circuit, Magnetic Field and Magnetic Force, Gauss's Law in Magnetism and Magnetism in Matter.

11011101 **Chemistry (1) (Prerequisite:- none)** **(3) Cr. Hrs**

Descriptive chemistry, elements and compounds; basic chemical calculations, mole problems, stoichiometry, and solution concentrations; gas laws; thermo chemistry; electronic structure of atoms; periodic properties of the elements; chemical bonding.