

### A. General Criteria:

This study plan is subjected to the instructions of awarding B.Sc. degree according to MEU standards.

### B. Components of Study Plan:

The study plan of B.Sc. in Computer Science is composed of 132 credit hours divided as follows:

	Type of Course	Credit Hours
First	University Courses	24
Second	Faculty Courses	18
Third	Department Courses	
	A. Compulsory Courses	52
	B. Optional Courses	9
	C. Supporting Courses	29
D. Free Course	0	
Total		132

### C. Codes System:

#### 1. The Faculty Code

Code	Faculty
04	Faculty of IT

#### 2. Codes of Major:

Code	Major
01	Computer Science

#### 3. Codes of B.Sc. in Computer Science

04	1	1-4	1-5	01-08
faculty	Major	level	field	Order of course

#### Representation of Fields according to the numbers of courses

Code	Field of Specialization
1	Computer Science and Algorithms
2	Programming
3	Main Computer Components
4	Information Sciences and Applications
5	Graduation Projects and Field Training

## D. Courses Distribution

1. University Courses: Consists of (24) Credit Hours					
A. Compulsory University Courses: (18 Cr. Hrs.)					
Course No.	Courses	C.H	Theoretical	practical	Prerequisites
0161101	Arabic Communication Skills	3	3	0	
0161201	English Communication Skills	3	3	0	
0161301	National Education	3	3	0	
0161302	Military Science	3	3	0	
B. Elective University Courses: Consists of (12) Credit Hours					
0161102	Functional Writing	3	3	0	
0161401	Life Skills	3	3	0	
0161501	Islamic Education	3	3	0	
0161502	Contemporary Issues	3	3	0	
0161503	Jerusalem (The Question of Palestine)	3	3	0	
0161504	Law and Everyday Life	3	3	0	
0161303	Community Responsibility	3	3	0	
0161402	Scientific Thinking Skills	3	3	0	
0161403	Introduction to Leadership and Entrepreneurship	3	3	0	
0181501	Computer Skills	3	3	0	0181500
0181601	Man and the Environment	3	3	0	
0181602	Safety and Security	3	3	0	

2- Faculty Courses: (18 Cr. Hrs.)					
A. Compulsory Faculty Courses (18) Hours					
Course No.	Courses		Theoretical	practical	Prerequisites
0181101	Calculus		3	0	-
0181105	Discrete Mathematics		3	0	-
0181502	Digital Logic		3	0	0181105
0181503	Programming Fundamentals		2	0	-
0181504	Programming Fundamentals (Lab)		0	1	0181503 (Concurrent)
0182102	Probability and Statistics	3	3	0	0181101
0182103	Linear Algebra	3	3	0	0181101
B. Elective Faculty Course (0) Hours					

### Third: Major Courses (61) hours

3 Major Courses: Consists of (61) Credit Hours					
A. Compulsory Major Courses: (52 Cr. Hrs.)					
Course No.	Course	C.H	Theoretical	practical	Prerequisite
0411203	Object-Oriented Programming (C++)	3	3	0	0181503, 0181504
0411204	Object-Oriented Programming (C++) Lab	1	0	1	0411203 (Concurrent)
0412201	Object-Oriented Programming in Java	3	3	0	0411203, 0411204
0412301	Computer Architecture	3	3	0	0181502
0412401	System Analysis and Design	3	3	0	0411203, 0411204
0413101	Theory of Computation	3	3	0	0181105
0413201	Web Applications	2	2	0	0411203, 0411204
0413202	Web Applications (Lab)	1	0	1	0413201 (Concurrent)
0413203	Visual Programming	2	2	0	0411203, 0411204
0413204	Visual Programming (Lab)	1	0	1	0413203 (Concurrent)
0413401	Computer Networks	3	3	0	0181502
0413402	Computer Graphics	3	3	0	0432102
0413403	Database Systems	2	2	0	0412401
0413404	Database Systems (Lab)	1	0	1	0413403 (Concurrent)
0413405	Computer and Network Security	3	3	0	0413401
0413406	Principles of Software Engineering	3	3	0	0412401
0414201	Smartphone Programming	2	2	0	0433301, 0433302
0414202	Smartphone Programming (Lab)	1	0	1	0414201 (Concurrent)
0414301	Distributed Systems	3	3	0	0433301, 0433302
0414401	Wireless Networks	3	3	0	0413401
0414405	Project Management	2	2	0	0413406
0414501	Graduation Project (1)	1	1	0	90 C.H, 0413403 0413404
0414502	Graduation Project (2)	2	2	0	0414501
0414503	Field Training	1	1	0	90 C.H.

B. Elective Major Courses: (9 Cr. Hrs.)					
Course No.	Course	C.H	Theoretical	practical	Prerequisite
0413407	Multimedia Systems	3	3	0	0413402
0413408	Information Storage and Retrieval	3	3	0	0413403, 0413404
0414402	Advanced Databases	3	3	0	0413403, 0413404
0414403	Human-Computer Interaction	3	3	0	0413203, 0413204
0414404	Digital-Imaging Processing	3	3	0	0413402
0414406	Special Topics in Computer Science	3	3	0	90 C.H.
0431201	Python Programming	2	2	0	0181503, 0181504
0431202	Python Programming (Lab)	1	0	1	0431201 (Concurrent)
0433406	Internet of Things	3	3	0	0413401

C. Supportive Courses: Consists of (29) Credit Hours					
Course No.	Course	C.H	Theoretical	practical	Prerequisite
0181201	Physics (1)	3	3	0	-
0181202	Physics (1) Lab	1	0	1	0181201 (Concurrent)
0181301	Chemistry	3	3	0	-
0183104	Numerical Analysis	3	3	0	0181101
0432101	Data Structures	3	3	0	0411203, 0411204
0432102	Algorithm Design and Analysis	3	3	0	0432101
0432301	Computer Organization and Design	3	3	0	0412301
0432401	Fundamentals of Artificial Intelligence	3	3	0	0411203, 0411204 , 0181502
0432402	Data Science	3	3	0	0182102
0432501	Professional Ethics	1	1	0	90 C.H.
0433301	Operating Systems	2	2	0	0432101
0433302	Operating Systems (Lab)	1	0	1	0433301 (Concurrent)

- **Free Courses** (0) credit hours chosen by the student from within university courses

- (\*) Students who passed the level test have the right to enroll in the Arabic Communication Skills (0161101), while those who did not pass the level test should enroll in the remedial Arabic course (0161100).
- (\*\*) Students who passed the level test have the right to enroll in the English Communication Skills (0161201), while those who did not pass the level test should enroll in the remedial English course (0161200).
- (\*\*\*) Non-Jordanian students either study Military Sciences or choose another course within the study plan.

## Study Plan for B.Sc. Students in the Computer Science

### First year

First Semester			
Course No.	Courses	C.H	Prerequisites
0181503	Programming Fundamentals	2	-
0181504	Programming Fundamentals (Lab)	1	0181503 (Concurrent)
0181101	Calculus	3	-
0181201	Physics (1)	3	-
0181202	Physics (1) Lab	1	-
0181105	Discrete Mathematics	3	-
-	University Course	3	-
<b>Total: 16 C.H.</b>			

Second Semester			
Course No.	Courses	C.H	Prerequisites
0411203	Object-Oriented Programming (C++)	3	0181503,0181504
0411204	Object-Oriented Programming (C++) Lab	1	0411203 (Concurrent)
0181502	Digital Logic	3	0181105
0181301	Chemistry	3	-
0183101	Numerical Analysis	3	0181101
-	University Course	3	-
<b>Total: 16 C.H.</b>			

### Second year

First Semester			
Course No.	Courses	C.H	Prerequisites
0412201	Object-Oriented Programming in Java	3	0411203,0411204
0432101	Data Structures	3	0411203, 0411204
0412301	Computer Architecture	3	0181502
0412401	System Analysis and Design	3	0411203, 0411204
0182102	Probability and Statistics	3	0181101
-	University Course	3	-
<b>Total: 18 C.H.</b>			

Second Semester			
Course No.	Courses	C.H	Prerequisites
0432301	Computer Organization and Design	3	0412301
0182103	Linear Algebra	3	0181101
0432401	Fundamentals of Artificial Intelligence	3	0411203, 0411204 0181502
0432402	Data Science	3	0182102
0432102	Algorithm Design and Analysis	3	0432101
-	University Course	3	-
<b>Total: 18 C.H.</b>			

### Third Year

First Semester			
Course No.	Courses	C.H	Prerequisites
0413203	Visual Programming	2	0411203,0411204
0413204	Visual Programming (Lab)	1	0413203 (Concurrent)
0413401	Computer Networks	3	0181502
0433301	Operating Systems	2	0432101
0433302	Operating Systems (Lab)	1	0433301 (Concurrent)
0413101	Theory of Computation	3	0181105
0413402	Computer Graphics	3	0432102
-	University Course	3	-
<b>Total: 18 C.H.</b>			

Second Semester			
Course No.	Courses	C.H	Prerequisites
0413403	Database Systems	2	0412401
0413404	Database Systems (Lab)	1	0413403 (Concurrent)
0413405	Computer and Network Security	3	0413401
0413406	Principles of Software Eng.	3	0412401
0413201	Web Applications	2	0411203,0411204
0413202	Web Applications (Lab)	1	0413201 (Concurrent)
-	Elective Major Course	3	-
-	University Course	3	-
<b>Total: 18 C.H.</b>			

### Fourth year

First Semester			
Course No.	Courses	C.H	Prerequisites
0414201	Smartphone Programming	2	0433301,0433302
0414202	Smartphone Programming (Lab)	1	0414201 (Concurrent)
0414301	Distributed Systems	3	0433301,0433302
0414501	Graduation Project (1)	1	90 C.H., 0413403,0413404
0414401	Wireless Networks	3	0413401
-	Elective Major Course	3	-
-	University Course	3	-
<b>Total: 16 C.H.</b>			

Second Semester			
Course No.	Courses	C.H	Prerequisites
0414405	Project Management	2	0413406
0414502	Graduation Project (2)	2	0414501
0414503	Field Training	1	90 C.H.
0432501	Professional Ethics	1	90 C.H.
-	Elective Major Course	3	-
-	University Course	3	-
<b>Total: 12 C.H.</b>			

## Course Description

### University and College Required Courses

**Object-Oriented Programming (C++): (0411203) (3) Credit Hours**

**Pre-requisite "0181503, 0181504"**

An introductory Object-Oriented programming (OOP) course based on C++ Programming language; offers students opportunity to learn how to solve problems and build applications using object-oriented techniques. It includes object-oriented techniques object-oriented programming concepts such as classes, inheritance, and polymorphism. The course also demonstrates programming features such as pointer referencing, strings, operator overloading and error handling.

**Object-Oriented Programming Lab (C++): (0411204) (1) Credit Hour**

**Pre-requisite "0181503, 0181504"**

An introductory Object-Oriented programming (OOP) course based on C++ Programming language; offers students opportunity to learn how to solve problems and build applications using object-oriented techniques. It includes object-oriented techniques object-oriented programming concepts such as classes, inheritance, and polymorphism. The course also demonstrates programming features such as pointer referencing, strings, operator overloading and error handling.

**Object-Oriented Programming in Java: (0412201) (3) Credit Hours**

**Pre-requisite "0411203,0411204 "**

This course introduces basic Object-oriented concepts and techniques. The fundamental concepts and techniques of encapsulation, inheritance, polymorphism, interfaces, and abstract classes are the foundation for object-oriented programming. Building the foundation prepares students to learn object-oriented programming and advanced Java programming.



**Computer Architecture: (0412301) (3) Credit Hours**

**Pre-requisite "0181502"**

Includes concepts of instruction set architecture, organization or micro-architecture, and system architecture; Instruction set architecture; Register and memory model; Data types and formats; Addressing modes; Instruction formats and instruction types; Development of basic instructions of Assembly Language.

**System Analysis and Design: (0412401) (3) Credit Hours**

**Pre-requisite "0411203,0411204"**

This course provides students with an in-depth understanding of the different phases of applications/systems development covering topics like specifying what an application/ system should do, requirements gathering techniques, designing application/system architecture, how the components of the application/system should be implemented, structured and object-oriented models for representing system functions and data structures, human computer interface and database design.

**Theory of Computation: (0413101) (3) Credit Hours**

**Pre-requisite "0181105"**

Introduces the theory of computation through a set of abstract machines that serve as models for computation. Topics include introduction to basic concepts and languages; regular; expression; finite automata and transition graphs; Kleene's theorem and non-determinism; regular languages and decide ability; Context free grammar and Chomsky normal form; pushdown automata and context-free languages; Turing machines and Chomsky hierarchy.

**Web Applications: (0413201) (2) Credit Hours**

**Pre-requisite "0411203,0411204"**

Introduces the theory of computation through a set of abstract machines that serve as models for computation. Topics include introduction to basic concepts and languages; regular; expression; finite automata and transition graphs; Kleene's theorem and non-determinism; regular languages and decide ability; Context free grammar and Chomsky normal form; pushdown automata and context-free languages; Turing machines and Chomsky hierarchy.

**Web Applications Lab: (0413202)**

**(1) Credit Hour**

**Pre-requisite “0413201 (Concurrent)”**

Provides an introduction of web-development techniques that use HTML, CSS and JavaScript as a web development essentials including Basics of PHP, database(MYSQL) connectivity and an advanced technique of web programming.

**Visual Programming: (0413203)**

**(2) Credit Hours**

**Pre-requisite “0411203,0411204”**

Point-and-click methods will be combined with elementary programming concepts to develop Windows applications with a Graphical User Interface (GUI). Topics include input and output tools, control structures, debugging techniques, library functions, file manipulation, database and GUI programming.

**Visual Programming Lab: (0413204)**

**(1) Credit Hour**

**Pre-requisite “0413203 (Concurrent)”**

Point-and-click methods will be combined with elementary programming concepts to develop Windows applications with a Graphical User Interface (GUI). Topics include input and output tools, control structures, debugging techniques, library functions, file manipulation, database and GUI programming

**Computer Networks: (0413401)**

**(3) Credit Hours**

**Pre-requisite “0181502”**

This course is designed to let student demonstrate an understanding of the fundamental operation of computer networks and their associated communication protocols which can then be applied to the design of network architectures and provision of network services. This will be integrated with the use of different communications protocols.

**Computer Graphics: (0413402)**

**(3) Credit Hours**

**Pre-requisite “0432102”**

This course provides an introduction to 2- and 3-dimensional computer graphics, including basic algorithms and the mathematics behind the transformations and viewing operations. We will start with an introduction to computer graphics, functionality of graphics hardware like input devices, hardcopy devices and visual display devices followed by the scan conversion algorithms, and 2D and 3D geometric transformation

techniques. Viewing methods, illumination and shading, clipping, rasterization, texture map, animation, and case studies.

**Database Systems: (0413403) (2) Credit Hours**

**Pre-requisite "0412401"**

Provides an in-depth description of Relational Database Management Systems. Topics covered in this course includes: Relational Database Management Systems; Entity Relationship Modeling; Structured Query Language (SQL); and Database schema design normalization and redundancy elimination.

**Database Systems Lab: (0413404) (1) Credit Hour**

**Pre-requisite "0413403 (Concurrent)"**

Provides an in-depth description of Relational Database Management Systems. Topics covered in this course includes: Relational Database Management Systems; Entity Relationship Modeling; Structured Query Language (SQL); and Database schema design normalization and redundancy elimination.

**Computer and Network Security: (0413405) (3) Credit Hours**

**Pre-requisite "0413401"**

The course intended to give students the fundamental principles of computer security. Students should be able to understand what it means for a system to be secure and know about computing systems' vulnerabilities, threats, and security controls. The course include but not limited to the following topics: Introduction to cryptography, confidentiality, authentication, digital signatures, software security, operating systems security, and network security.

**Principles of Software Engineering: (0413406) (3) Credit**

**Hours Pre-requisite "0412401"**

Provides knowledge and application of the procedures for analyzing and designing applications/systems following the Object Oriented approach including Software Architecture; Unified Modeling Language (UML); Object Oriented Requirements Engineering (use case models and activity diagrams); Object Oriented application/system Design (class diagrams and sequence diagrams); and Design Implementation.

**Smartphone Programming: (0414201)**

**(2) Credit Hours**

**Pre-requisite "0433301,0433302"**

Introduces students to mobile computing and mobile application development. Mobile computing will be discussed from three perspectives: mobile technology, application development, and user interaction. The course will overview various mobile computing applications, technologies, and wireless communication. Next, students will use mobile application frameworks and development environments to reinforce concepts covered in lectures. User interface and user experience will be discussed. Students will be expected to learn at least one mobile application development framework (iOS or Android) and use it to implement their assignments and course projects.

**Smartphone Programming Lab: (0414202)**

**(1) Credit Hour**

**Pre-requisite "0433301,0433302"**

Introduces students to mobile computing and mobile application development. Mobile computing will be discussed from three perspectives: mobile technology, application development, and user interaction. The course will overview various mobile computing applications, technologies, and wireless communication. Next, students will use mobile application frameworks and development environments to reinforce concepts covered in lectures. User interface and user experience will be discussed. Students will be expected to learn at least one mobile application development framework (iOS or Android) and use it to implement their assignments and course projects.

**Distributed System: (0414301)**

**(3) Credit Hours**

**Pre-requisite "0433301,0433302"**

This course considers two closely related topics, Concurrent Systems and Distributed Systems, over 16 lectures. The aim of the first half of the course is to introduce concurrency control concepts and their implications for system design and implementation. The aims of the latter half of the course are to study the fundamental characteristics of distributed systems, including their models and architectures; the implications for software design; some of the techniques that have been used to build them; and the resulting details of good distributed algorithms and application.

**Wireless Networks: (0414401)**

**(3) Credit Hours**

**Pre-requisite "0413401"**

Wireless networks provide an introduction to various current and next generation wireless networking technologies, and undertakes a detailed exploration of fundamental architectural and design principles used at all layers. Related protocols and their performance are studied using formal analytical tools and realistic simulations.

**Project Management: (0414405)**

**(2) Credit Hours**

**Pre-requisite "0413406"**

The course introduces the students to the various concepts and methodologies of Project Management. The course describes the actual procedures and techniques used in planning, monitoring and controlling projects (i.e. Work and Product Breakdown Structures, Cost Benefit Analysis, Gantt and PERT Charts and Measurement Systems). The course introduces a number of exercises and case studies (Workshops) within the learning scope of the course to help students to acquire basic and advanced concepts of project management.

**Graduation Project (1): (0414501)**

**(1) Credit Hour**

**Pre-requisite "90 C.H., 0413403, 0413404"**

This is the first part of a real-life like experience where a team of students solves a real-world problem delivered as an information/software system by applying an incremental iterative software engineering approach. In this part of the graduation project, the team arrives at a baseline architecture and designs for the given problem. The team performs requirements gathering, analysis, and design. The development process applied is either RUP simplified or DevOps. The team should be able to perform at least three iterations covering the inception and elaboration phases or their equivalent if DevOps is used. The minimum deliverables include a running partial prototype, and a series of documents (requirements, analysis, design, testing) detailing each iteration and iterations integrations.

**Graduation Project (2): (0414502)**

**(1) Credit Hours**

**Pre-requisite "0414501"**

This course addresses the design and execution stages of the project initiated in Graduation Project 1. Throughout this course, students are required to produce a comprehensive report encompassing all aspects of software development, including algorithms and models. The design document must be submitted for review by the supervisor before the semester's conclusion. Subsequently, the final design and implementation report is presented, and a committee of faculty members assesses oral presentations that include a public demonstration.

**Field Training: (0414503)**

**(1) Credit Hour**

**Pre-requisite "90 C.H."**

A period of 240 Hours spent as a trainee in industry, business, or government agencies for the purpose of familiarizing the student with the real job world and enabling him to apply and relate his academic knowledge to a real work environment. The student is required to participate in Information Technologies related activities and use his time to be acquainted with the Information Technologies related functions and resources used by his employing organization. Besides progress reports and a closed final evaluation is present from the agency to the Faculty.

**Multimedia Systems: (0413407)**

**(3) Credit Hours**

**Pre-requisite "0413402"**

This course introduces the fundamentals of computer-based multimedia. Audio. Images and graphics. Video Streaming. Compression. Multimedia database. Students will design and develop multimedia applications that combine text, images, sound, video and animation.

**Information Storage and Retrieval: (0413408)**

**(3) Credit Hours**

**Pre-requisite "0413403,0413404"**

Information retrieval is the process through which a computer system can respond to a user's query for text-based information on a specific topic. Web search is the application of information retrieval techniques to the largest corpus of text anywhere -- the web -- and it is the area in which most people interact

with IR systems most frequently. Topics that are covered in this course includes: Text indexing, positional index, Boolean retrieval, vector-space retrieval models, Map-Reduce architecture for building huge indexes, and document classification.

**Advanced Databases: (0414402) (3) Credit Hours**

**Pre-requisite "0413403,0413404"**

Students should be able to move on to more advanced database topics after taking the "Database Systems" course. Advanced Database course is a study of many advanced data models such as: object-oriented model: object-relational model. Parallel and distributed database. Transaction ACID properties and concurrency control. Database backup and recovery. Query processing and optimization. Homogeneous and heterogeneous solution based on XML. Optional topics include: temporal Database, Intelligent Database, query optimization and data warehouse.

**Human-Computer Interaction: (0414403) (3) Credit Hours**

**Pre-requisite "0413403,0413404"**

This course introduces the concepts of 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 behavior 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.

**Digital-Imaging Processing: (0414404) (3) Credit Hours**

**Pre-requisite "0413402"**

This course presents fundamental concepts in computer vision and image processing. Topics may include properties of digital images, digital image formats, image acquisition devices, edge detection, rotation filtering, image segmentation, shape representation, image compression, image morphology, spectral analysis, texture, object recognition, motion analysis and 3D interpretation.

**Special Topics in Computer Science: (0414406)**

**(3) Credit Hours**

**Pre-requisite "90 C.H."**

This course aims at introducing new developments in Computer Science not specifically covered in the curriculum and in which the instructor has developed interest and proficiency. The intention is to provide a rapid response to current trends and to widen student's knowledge in Computer Science field. Course content may vary each offering or may be a repeat.