



College of Computer Science and Informatics

Software Engineering Department

Study Plan for Bachelor's Degree in Software Engineering 2023/2024

Study Plan Credit hours (132)

Major Type:

Type of Program: **Blended/ Online**

Humanities

Scientific/Technical

Science Medical

Teaching Type	Percentage of study plan hours/number	Model used	Actual Ratio
Complete Online E-Learning	20% - 10% Maximum	1:1	20%
Blended learning (for humanities)	60% - 40% Maximum	1:1	
Blended learning (for scientific majors)	50% - 30% Maximum	1:1	45%
Face-to-face learning (for humanities)	20% Minimum	---	
Face-to-face learning (for scientific majors)	30% Minimum	---	35%

Note: The learning types of the courses are disseminated at all academic levels in the program



Department Vision

Excellence in teaching, learning, scientific research, and community service in software engineering field locally and regionally.

Department Mission

Preparing qualified students with competencies in the software engineering field, having the applied and research knowledge and the skills to meet the requirements of the labor market and local community institutions according to quality criteria locally and internationally.

Program Mission

Preparing qualified students in the software engineering field to meet local and international standards and community requirements according to eLearning criteria.

Department Objectives

1. Possess necessary skills of theoretical and applied knowledge in the field of Software Engineering.
2. Gain professional competence and practice their profession with confidence and regional competitiveness with others.
3. Continue lifelong learning and professional development amid future technological changes.
4. Be active members of teamwork with professional and ethical responsibilities, and know the community's needs.

Learning Outcomes

Graduates of the program will have the ability to:

(1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

1.1 (Knowledge): Define principles of computing and other relevant disciplines to identify solutions

1.2 (Skill): Analyze computing problem to identify solutions

(2) (Skill) Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

(3) (Skill) Communicate effectively in a variety of professional contexts.

(4) Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles





4.1 (Knowledge): Recognize professional responsibilities, ethical theories, legal and social issues.

4.2 (Skill): Employ computing practice for software engineering based on legal and ethical principles.

(5) (Competency) **Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline**

(6) [SE] **Apply system development methodologies in conformance with software quality standards.**

6.1: (Knowledge) Explain software engineering principles and practices to satisfy stakeholder's needs.

6.2: (Skill): Evaluate techniques and tools for software engineering problems.

6.3: (Competency) Apply appropriate software methodology principles and practices to a given software development project that conforms to relevant software quality standards.

Contents of the Study Plan

The bachelor's degree program in Computer Information Systems consists of 132 credit hours distributed as follows:

No	Requirement Type	Credited Hours	Percentage
First	University Requirements	27	20%
Second	College Requirements	18	14%
Third	Program Requirements	87	66%
Total		132	100%

University Coding System

4	0	3	-	Year	Term	-	-
College Code	Department Code		Knowledge Area	Course Level		Course Sequence	
4 Faculty of Computer Science and Informatics	0 1 Masters in Computer Science 0 2 Computer Information System 0 3 Software Engineering 0 4 Mobile Computing 0 5 Cybersecurity						



06 Artificial
Intelligence and Data
Science
07 Computer Science

Knowledge Areas

No	Knowledge Area	Credit Hours in the Study Plan
0	Computer Science and Algorithms: Discrete Mathematics, Data Structures, Algorithms.	9
1	Programming: Object-Oriented Programming, Visual Programming, Web Application Programming	12
2	Main Computer Components: Digital Logic Design, Computer Organization and Architecture, Operating Systems, Computer Networks.	12
3	Applications and Information Science: Database, Database Systems Management, Systems Analysis and Design.	9
4	Courses in Software Engineering: Fundamentals of Software Engineering, Software Specification and Design, Software Testing, Software Architecture, Software Development and Documentation, Software Project Management.	18
5	Supporting Knowledge Areas: Statistics, Numerical Analysis.	6
6	Elective Courses: Several courses within the sub-field of the program.	9
7	Field training: 3 hours after passing a minimum of 80 credit hours.	3
8	Graduation Project: 3 credit hours after passing 90 credit hours.	3
9	Laboratories: Several laboratories covering the needs and number of students.	-



First: University Requirements: (27) Credit Hours

A. Compulsory Requirements: (18) Credit Hours

Teaching type			Course Number	Course Title	Credited Hours	Pre-Requisite
Online E-Learning	Blended	Face-to-Face				
√			5051104	Communication Skills -Arabic Language (1)	3	5051108
√			5051105	Communication Skills English Language (1)	3	5051109
√			5051108	Remedial Course in Arabic	0	-
√			5051109	Remedial Course in English	0	-
√			5051110	Remedial Course in Computer Science	0	-
√			50511205	Life Skills	3	-
√			50511206	National Education	3	-
√			50511305	Innovation and Entrepreneurship	3	-
√			50511308	Military Sciences	3	-
Total					18	

B. University Elective: choose (9) Credit Hours from the following courses

Teaching type			Course Number	Course Title	Credited Hours	Pre-Requisite
Online E-Learning	Blended	Face-to-Face				
√			50521106	Communication Skills -Arabic Language (2)	3	5051104
√			50521107	Communication Skills-English Language (2)	3	5051105
√			50521203	Principles of Psychology	3	-
√			50521204	Human Rights	3	-
√			50531101	Islamic Culture	3	-
√			50531205	Quds and Hashemite Custodianship	3	-
√			50541103	Computer Skills	3	5051110
√			50541204	Environment and development	3	-
√			50541206	Health and Community	3	-
√			50541308	Foreign Language	3	-
√			50541309	Digital Culture	3	5051110
Total					9	

**Second: College Compulsory Requirements: (18) Credit Hours**

Teaching type			Course Number	Course Title	Credited Hours	Theoretical	Practical	Pre-Requisite
Online E-Learning	Blended	Face-to-Face						
		√	40512102	Data Structures	3	3	0	40321203
		√	40512103	Laboratory of Data Structure	1	0	3	40512102 (co)
	√		40322101	Websites Design	3	3	0	40511101
		√	40342202	Databases	3	3	0	40512102
		√	40342203	Laboratory of Databases	1	0	3	40342202 (co)
	√		50212104	Linear Algebra	3	3	0	50551105
		√	40321101	Introduction to Programming	3	3	0	
		√	40321102	Laboratory of Introduction to Programming	1	0	3	40321101 (co)
Total					18	15	3	

**Third: Program Requirements (87) Credit Hours****A. Compulsory Requirements: (75) Credit Hours**

Teaching type			Course Number	Course Title	Credited Hours	Theoretical	Practical	Pre-Requisite
Online E-Learning	Blended	Face-to-Face						
		√	40311201	Discrete Mathematics	3	3	0	50551105
	√		40571203	Communication and Writing Skills	2	2	0	
		√	40321203	Object-Oriented Programming	3	3	0	40321101
		√	40321204	Laboratory of Object-Oriented Programming	1	0	3	40321203 (co)
	√		40511101	Fundamentals of Information Technology	3	3	0	
		√	40612204	Algorithms Analysis and Design	3	3	0	40512102
	√		40513103	Operating Systems	3	3	0	40732202
		√	40343101	Database Management Systems	3	3	0	40342202
		√	40322106	Visual Programming	3	3	0	40721203
		√	40322202	Programming of Internet Applications	3	3	0	40322101 40342202 (co)
	√		40332201	Digital Logic Design	3	3	0	40311201
	√		40333202	Computer Organization and Architecture	3	3	0	40332201
	√		40342101	Systems Analysis and Design	3	3	0	40321203
		√	40352201	Fundamentals of Software Engineering	3	3	0	40342101
	√		40353102	Software Requirements Engineering	3	3	0	40352201
	√		40353103	Software Project Management	3	3	0	40354107
		√	40353204	Software Specifications and Design	3	3	0	40353205
	√		40353205	Software Architecture	3	3	0	40352201
		√	40354106	Human Computer Interaction	3	3	0	40322106
	√		40354107	Software Engineering Tools	3	3	0	40353102
	√		40354201	Software Security	3	3	0	40354208
	√		40354208	Software Development and Documentation	3	3	0	40353204
		√	40354209	Software Testing	3	3	0	40352201 + 40322202
	√		40384101	Field Training	3	0	3	Complete 80 CH



Teaching type			Course Number	Course Title	Credited Hours	Theoretical	Practical	Pre-Requisite
Online E-Learning	Blended	Face-to-Face						
	√		40394203	Applied Graduation Project (1)	1	1	0	Complete 90 CH
	√		40394204	Applied Graduation Project (2)	2	2	0	40394203
		√	40542101	Computer Networks	3	3	0	40332202
			Total		75	74	1	

B. Elective Requirements: (9) Credit Hours

Teaching type			Course Number	Course Title	Credited Hours	Theoretical	Practical	Pre-Requisite
Online E-Learning	Blended	Face-to-Face						
	√		40354210	Special Topics in SE	3	3	0	Complete 60 CH
	√		40352212	Introduction to Data Science	3	3	0	40342202
	√		40353213	Business Analysis	3	3	0	40342101
	√		40353214	Software Quality Management	3	3	0	40353102
	√		40354215	Software Engineering Ethics	3	3	0	40352201
	√		40354217	Programming Using Python	3	3	0	40321203
			Total		9	9	0	

C. Support Courses: (3) Credit Hours

Teaching type			Course Number	Course Title	Credited Hours	Theoretical	Practical	Pre-Requisite
Online	Blended	Face-to-Face						
	√		50551105	Principles of Mathematics and Statistics	3	3	0	
			Total		3	3	0	



Advisory Plan

First Year

First Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
50551105	Principles of Mathematics and Statistics	Blended	3		
4051101	Fundamentals of Information Technology	Blended	3		
40321101	Introduction to Programming	Face-to-Face	3		
40321102	Laboratory of Introduction to Programming	Face-to-Face	1		40321101
	University Core Requirement	Online E-Learning	3		
	University Elective Requirements	Online E-Learning	3		
Total			16		

Second Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40311201	Discrete Mathematics	Face-to-Face	3	50551105	
40321203	Object-Oriented Programming	Face-to-Face	3	40321102	
40321204	Laboratory of Object-Oriented Programming	Face-to-Face	1		40321203
40322101	Websites Design	Blended	3	4051101	
	University Core Requirement	Online E-Learning	3		
	University Elective Requirements	Online E-Learning	3		
Total			16		

* Credit Hours





Second Year

First Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40512102	Data Structures	Face-to-Face	3	40321203	
40512103	Laboratory of Data Structure	Face-to-Face	1		40512102
40322106	Visual Programming	Face-to-Face	3	40321203	
40332201	Digital Logic Design	Blended	3	40311201	
40342101	Systems Analysis and Design	Blended	3	40321203	
	University Core Requirement	Online E-Learning	3		
Total			16		

Second Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40333202	Computer Organization and Architecture	Blended	3	40332201	
40342202	Databases	Face-to-Face	3	40512102	
40342203	Laboratory of Databases	Face-to-Face	1		40342202
40322202	Programming of Internet Applications	Face-to-Face	3	40322101	40342202
40571203	Communication and Writing Skills	Blended	2		
40352201	Fundamentals of Software Engineering	Face-to-Face	3	40342101	
	University Core Requirement	Online E-Learning	3		
Total			18		

* Credit Hours



Third Year

First Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
50212104	Linear Algebra (I)	Blended	3	50551105	
40612204	Algorithms Analysis and Design	Face-to-Face	3	40512102	
40354106	Human Computer Interaction	Face-to-Face	3	40322106	
40353102	Software Requirements Engineering	Blended	3	40352201	
40353205	Software Architecture	Blended	3	40352201	
40343101	Database Management Systems	Face-to-Face	3	40342202	
Total			18		

Second Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40542101	Computer Networks	Face-to-Face	3	40332202	
40513103	Operating Systems	Blended	3	40332202	
40353204	Software Specification and Design	Face-to-Face	3	40353205	
40354209	Software Testing	Face-to-Face	3	40352201 + 40322202	
40354107	Software Engineering Tools	Blended	3	40353102	
	Program Elective Requirements	Blended	3		
Total			18		

* Credit Hours





Fourth Year

First Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40354208	Software Development and Documentation	Blended	3	40353204	
40353103	Software Project Management	Blended	3	40354107	40354208
40384101	Field Training	Blended	3	Complete 80 CH	
40394203	Applied Graduation Project (I)	Blended	1	Complete 90 CH	
	Program Elective Requirement	Blended	3		
	University Core Requirement	Online E-Learning	3		
Total			16		

Second Semester					
Course No.	Course Title	Type of Learning	Credited Hours*	Prerequisite	Co-requisite
40354201	Software Security	Blended	3	40354208	
40394204	Applied Graduation Project (2)	Blended	2	40394203	
	University Core Requirement	Online E-Learning	3		
	University Elective Requirements	Online E-Learning	3		
	Program Elective Requirement	Blended	3		
Total			14		

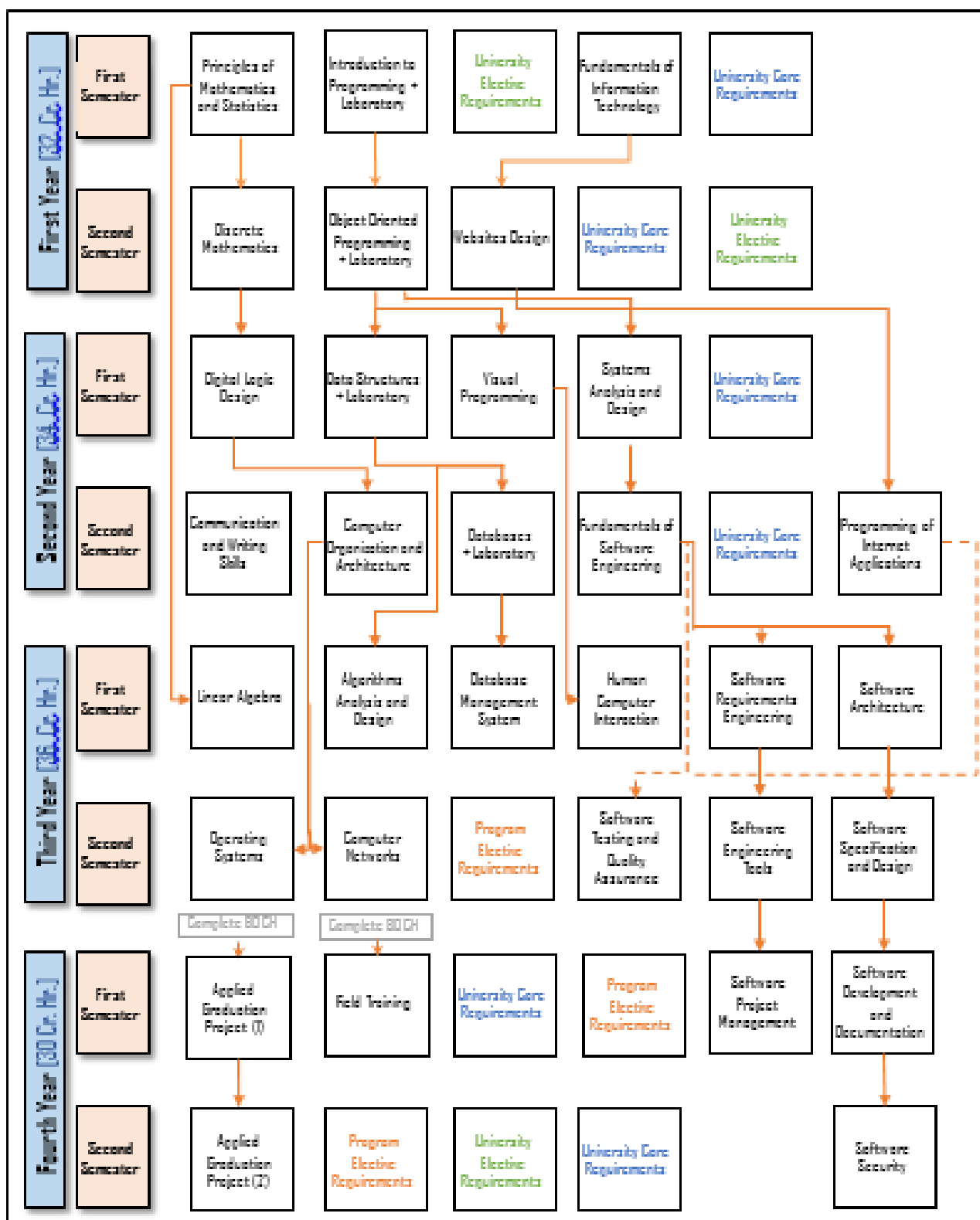


Bachelor degree in Software Engineering

Advisory Plan Tree

Issue Date 01/04/2024







Courses Description

40321101 Introduction to Programming

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: -, Face-to-Face)

This course presents the fundamental concepts of programming using C++. It covers basic structures of programming concepts such as variables, data types, control structures, arrays, functions and pointers. A brief introduction to classes and objects is also given. Students will apply their gained knowledge in a series of assignments. Practical work for three hours weekly is included using Microsoft Visual Studio.

40321102 Laboratory of Introduction to Programming

(1 Credit Hours, Lecture: 0, Lab: 3, Corequisite: 40321101, Face-to-Face)

This lab presents the fundamental concepts of programming using C++ language, focusing on foundational concepts essential for understanding programming principles. Students will explore fundamental programming structures, including variables, data types, control structures, arrays, functions, and pointers. A brief overview of classes and objects will be introduced. Students will apply their understanding of these concepts in practical contexts through a series of assignments. The lab includes three hours of weekly hands-on experience using Microsoft Visual Studio 2017, allowing students to develop and practice their programming skills in a supportive environment.

4051101 Fundamentals of Information Technology

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: -, Blended)

This course provides students with knowledge of the terminology, processes, and components associated with information technology, information Systems concepts, components, tools, applications. It will provide an introductory understanding of computer hardware (units that comprise a computer system), numbering system and knowledge of how data is prepared for computer, instruction processed at a basic machine level, software (operating systems, Database, and web development and applications), introduces the networking, Internet, and the basics of the information security, web searching, in addition to problem solving and algorithms.

40321203 Object-Oriented Programming

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40321101 Introduction to Programming, Face-to-Face)

Object-oriented concepts (encapsulation, data abstraction, inheritance, and polymorphism) along with OO design using UML (unified modeling language). The OOP concepts covered using JAVA programming language. The course emphasizes on the concepts of classes, templates, friend





classes, inheritance, abstract class and virtual functions, exceptions, and generic programming. Upon completion, students should be able to use an object-oriented language to develop rather complex programs, the course includes complete a practical project or research by the students.

40321204 Laboratory of Object-Oriented Programming

(1 Credit Hours, Lecture: 0, Lab: 3, Corequisite: 40321203, Face-to-Face)

This lab aims to add an additional language to the arsenal of IT students. The lab takes advantage of students' C++ advanced knowledge and skills to build additional high professional levels in using Java language to accomplish useful tasks. The lab covers the essential aspects of Java, including its typing system, operators, object-oriented programming approach, collections, interfaces to data sources, and graphical libraries. Practical application is emphasized through a dedicated laboratory component, where students can reinforce their learning through hands-on exercises.

40311201 Discrete Mathematics

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 50551105 Principles of Mathematics and Statistics, Face-to-Face)

The course provides some fundamental aspects of discrete mathematics used in computer science starting with propositions, logical operations, truth tables, set theory, relations and functions, and methods of proofs. The course also introduces the concepts of sequences, matrices, lattices, graph theory, and trees (rooted tree, subtree). The course includes completing a practical project or research by the students.

40512102 Data Structures

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40321203 Object-Oriented Programming, Face-to-Face)

This course teaches the students the basic concepts of data structure and algorithms. The topics that will be covered in this course concerning Data type and structures; Abstract data types and encapsulation; Stacks; Queues; Recursion; Linked Lists; Binary trees; General trees; File organization: sequential and indexed files; Graphs: representation, traversing, shortest path; Sorting: exchange, insertion, quick sort, heap and others; Searching. At the end of this course, students will be able to select the proper data structure and algorithm to solve a specific software problem.

40512103 Laboratory of Data Structures

(1 Credit Hours, Lecture: 0, Lab: 3, Corequisite: 40512102, Face-to-Face)





This Lab. course teaches the students the basic practical concepts to implement data structures and algorithms. The topics that will be covered in this lab concerning Data type and structures implementations; Abstract data types and encapsulation; Stacks; Queues; Recursion; Linked Lists; Binary trees; General trees; File organization: sequential and indexed files; Graphs: representation, traversing, shortest path; Sorting: exchange, insertion, quick sort, heap and others; Searching. At the end of this course, students will be able to select the proper data structure and algorithm to solve a specific software problem using a proper Data Structures and implements it.

40322101 Websites Design

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40511101 Fundamentals of Information Technology, Blended)

This course introduces the basic concepts of the World Wide Web, internet technology, current Web protocols, and client-server programming. Students will learn standard Hypertext Markup Language (HTML) for creating the web pages, basics of Cascading Style Sheets (CSS) for design and layout the web pages, and JavaScript for creating interactive webpages. Students will apply their gained knowledge in a series of practical assignments. At the end of this course, students will create and maintain a small web page project on a live web server.

40342202 Databases

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40512102 Data Structure, Face-to-Face)

This course introduces students to basic relational database concepts. The course teaches students relational database terminology, as well as data modeling concepts, building Entity Relationship Diagrams (ERDs), and mapping ERDs; Database integrity Constraints. Oracle SQL Developer Data Modeler is utilized to build ERDs and The Structured Query Language (SQL) is used to interact with a relational database and manipulate data within the database and train student on how to design Relational algebra.

40342203 Laboratory of Database

(1 Credit Hours, Lecture: 0, Lab: 3, Corequisite: 40342202, Face-to-Face)

This lab provides students with a foundational understanding of relational databases, emphasizing practical skills in database design and manipulation. Students will explore essential relational database concepts, terminology, and data modeling principles, including the creation of Entity Relationship Diagrams (ERDs) and the application of database integrity constraints. Through hands-on exercises using Oracle SQL Developer Data Modeler, students will learn to construct ERDs effectively. Additionally, the course will focus on utilizing the Structured Query Language (SQL) to interact with databases, manipulate data, and implement relational algebra for database design.



40322106 Visual Programming

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40321203 Object-Oriented Programming, Face-to-Face)

This course is a practical introduction to visual programming (VP). Students will learn about VP concepts, event driven, and how to use VP to construct graphical user interface (GUI) concepts. Students will apply their gained Knowledge in a series of practical assignments.

40571203 Communication and Writing Skills

(2 Credit Hours, Lecture: 2, Lab: 0, Prerequisite: -, Blended)

This course aims to introduce the student to the concept of administrative communication and to develop some of the skills he needs in his private life and career, in addition to his definition of the basic concepts of communication as a core and vital in the life of business organizations. To achieve this, the course will deal with the following topics: the nature, importance and objectives of the communication process, trends, elements and channels of communication, obstacles to effective communication, the basis of successful correspondence writing. In addition to the recognition of listening skills and teamwork and the management of meetings and interviews, the course includes complete a practical project or research by the students

40612204 Algorithms Analysis and Design

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40512102 Data Structures, Face-to-Face)

This course introduces the concepts of designing and analyzing algorithms. Topics covered: review of abstract data types and data structures, definition of algorithms, classifying functions and computational complexities of algorithms, algorithms analysis and design techniques including divide-and-conquer, greedy method, searching and sorting, trees, graphs, hashing, and solving some combinatorial problems.

40513103 Operating Systems

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40333202 Computer Organization and Architecture, Blended)

This course covers the definition and role of the operating systems. Topics spanned functionality and structuring methods of a typical operating system; Introduction to modern operating systems, including device control, interrupts, synchronization and inter-process communication, process scheduling, memory management and virtual memory, disk management, and security. Students will apply their gained knowledge in a series of assignments.





40322202 Programming of Internet Applications

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40322101 Websites Design, Corequisite: , Face-to-Face)

This course provides the knowledge and the tools to design and implement internet web applications for desktop computers and smartphones using PHP language as a server-side language. Initially, the course will introduce HTML language and web applications. Students will learn about concepts of PHP, functionality of web server, install and configure Apache HTTP server or Microsoft IIS. This course goes over the syntax and usage of PHP language such as data types, operators, arrays, control statements, expressions, sessions, cookies, as well as create programs that interact with MySQL databases. At the end of this course, students will create and maintain a small web application project on a live web server for desktop computers and smartphones. The course includes complete a practical project or research by the students.

40352201 Fundamentals of Software Engineering

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40342101 Systems Analysis and Design, Face-to-Face)

This course develops a knowledge of the Information Systems environment and develops a strong foundation by covering topics including Planning, requirements, analysis and specification, design; testing; debugging; maintenance; and documentation. It includes complete a practical project or research by the students.

40343101 Database Management Systems

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40342202 Databases, Face-to-Face)

This course covers the principles, design, implementation, architecture and applications of DBMS; Advanced Structured Query Language (SQL) such as: views, exit, with, create type, authorization, metadata, dynamic SQL, triggers, recursion; data dictionary; Normalization processes: 1NF, 2NF, 3NF and BCNF; DB Security; Modern DBMSs: Object-Oriented DBMSs; Physical Database design; Centralized and distributed Database systems. Advanced databases topics: Storage and File Structure, Indexing and Hashing, Transactions, Concurrency Control, and UML, the course includes complete a practical project or research by the students.

40332201 Digital Logic Design

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40311201 Discrete Mathematics, Blended)

This course provides an introduction to computer logic design. Topics covered: numbering systems and their internal representation, Boolean expressions, Boolean functions simplification methods. Combinational and sequential circuits, design of combinational logic basic building blocks (adders,





comparators, multiplexers, decoders, encoders), and sequential logic basic building blocks (flip-flops, registers, counters), Read Only Memory "ROM", and Programming Logic Array "PLA", and basic concepts of the Random Access Memory "RAM". Students will apply their gained knowledge in a series of assignments.

40333202 Computer Organization and Architecture

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40332201 Digital Logic Design, Blended)

Principles of computer organization and architecture concepts covers the following topics: computer system hardware organization and architecture; instruction set architectures; addressing modes; register transfer notation; processor design and computer arithmetic; memory systems; hardware implementations of virtual memory, and input/output control and devices, the course includes complete a practical project or research by the students.

40342101 Systems Analysis and Design

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40321203 Object-Oriented Programming, Blended)

This course introduces the main concepts of the system development life cycle. Information gathering and reporting activities from the analysis phase through the maintenance and support phase will be covered. At the end of this course, students will be able to design, implement, and document the system development cycle. The main topics that will be covered are: introduction to systems development; development life cycle; Requirements Determination; Functional Modelling (Use case Diagram); Functional Modelling (Use Case Discription); Process Modelling (Activity Diagram); behavioral Modelling (Sequence Diagram); Behavioral Modelling (Collaborative Diagram); Data Modeling (ER-Diagram); Structural Modelling (Class Diagram); Implementing Objects with Java. Case studies are used to emphasize the points covered, the course includes completing a practical project or research by the students.

40353102 Software Requirements Engineering

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40352201 Fundamentals of Software Engineering, Blended)

Basic concepts and principles of software requirements engineering, its tools, methods, validation techniques to analyze and specify prototypes and maintaining software requirements. Topics include requirements elicitation, prototyping, functional and non-functional requirements, object-oriented techniques, and requirements tracking.

**40353103 Software Project Management****(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40354107 Software Engineering Tools, Blended)**

Introduction to issues and techniques of project management. Project evaluation and selection, scope of management, team building, stakeholder management, risk assessment, scheduling, quality, rework, negotiation, and conflict management. Professional issues including career planning, lifelong learning, software engineering ethics, and the licensing and certification of software professionals.

40353204 Software Specifications and Design**(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40353205 Software Architecture, Face-to-Face)**

This course introduces the software design process and differentiates between its activities. Special emphasis to work with clients and to learning about the needs of users who interact with a system. It concentrates on requirements elicitation and specifications in software design document. The course addresses elicitation, specification, and management of software system requirements. It emphasizes on the concept of architectural styles and detailed design patterns against to SRS from two perspectives: the software engineering principles that enable development of quality software, and the application of design patterns as a means of reusing design models that are accepted best practices.

40353205 Software Architecture**(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40352201 Fundamentals of Software Engineering, Blended)**

This course introduces a holistic view to software architecture and its related quality attributes; it aimed to discuss the most common architectures, their qualities, and tradeoffs. As well as how architectures are evaluated, what makes a good architecture, and its related improvements. In addition, the course presents important new tools and techniques related to the software architecture life cycle including the design philosophy, testing of software architecture, and current technologies used such as cloud programming architecture, and social networks, the course includes complete a practical project or research by the students.

40354106 Human Computer Interaction**(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40322106 Visual Programming, Face-to-Face)**

This course explores the following topics as an introduction to the subject of Human-Computer Interaction (HCI) (i) Specifying, Designing, Programming, and Implementing Graphical User





Interfaces, Human-Centered Software Evaluation, Human-Centered Software Development; (ii) HCI Aspects of Multimedia Systems and Web-based Systems. The focus will be on (i) Understanding Human Behavior with Interactive Objects; (ii) Knowing how to develop and evaluate interactive software using a Human-Centered Approach; (iii) General Knowledge of HCI Design Issues with multiple types of interactive software.

40354107 Software Engineering Tools

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40353102 Software Requirements Engineering, Blended)

This course provides students with a high-level discussion of tools successfully used in today's software engineering projects. Beyond state-of-the-art technology and current trends, it also provides them with a discussion of visions and possible future trends of software development. Likewise, it will provide them with explanation of how tools support several activities in a software engineering life cycle; tools for managing work products, for requirements engineering, design, coding, testing, version control, configuration management, deployment, and documentation are considered, as are tools for project management and tracking. Therefore and after summarizing the features of each software engineering tool on a conceptual level, student can be able to estimate the potential risks and rewards of various software tools to decide which is best suited for their task, the course includes complete a practical project or research by the students.

40354208 Software Development and Documentation

(3 Credit Hours, Lecture: 3, Lab: 1, Prerequisite: 40353204 Software Specifications and Design, Blended)

This course discusses issues, methods and techniques associated with software development. Topics include detailed design methods and notations, implementation tools, coding standards and styles, and maintenance issues. The course also introduces major concepts of software documentation. Emphasis on construction of software system artifacts that support team development and evolution of software systems (e.g. Project proposals, progress reports, requirements, specifications, design, test plans, test reports, project reports), the course includes a complete practical project or research by the students. Practical assignments are included using Java, Javadoc, NetBeans, Git, and GitHub.

40354209 Software Testing and Quality Assurance

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40352201 Fundamentals of Software Engineering, Corequisite: 40322202 Programming of Internet Applications, Face-to-Face)

This course provides an overview of software testing. Covers software quality assurance; black-box and white-box testing including graph coverage criteria; integration and regression testing;





and selected topics from the following: object-oriented software testing, acceptance testing, conformance testing, diagnostic testing, test execution, distributed systems testing, test languages and test tools, GUI testing, interoperability testing, test metrics, and standards for software quality and testing.

40384101 Field Training

(3 Credit Hours, Lecture: 0, Lab: 0, Prerequisite: Complete 80 Credit Hours, Blended)

This course directly connects the student to the labor market so that the student spends the specified hours in the related industries and companies to obtain the necessary experience in the field of specialty after graduating, under academic supervision and incorporation with the institutions to evaluate the student's performance. Various vocational experiences and field adaptability are enhanced by experiencing and applying the technical knowledge obtained during study and develop their workplace skills to match high international standards.

40394203 Applied Graduation Project (1)

(1 Credit Hours, Lecture: 0, Lab: 0, Prerequisite: Complete 90 Credit Hours, Blended)

Phase 1 (Analysis and Design), Applied project includes theoretical and practical practices related to the current problems and applications in Software Engineering, applied research oriented, technical report, and presentation .

40394204 Applied Graduation Project (2)

(2 Credit Hours, Lecture: 0, Lab: 0, Prerequisite: 40394203 Applied Graduation Project (1), Blended)

Phase 2 (Implementation), Applied project includes theoretical and practical practices related to the current problems and applications in Software Engineering, applied research oriented, technical report, and presentation.

40542101 Computer Networks

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40333202 Computer Organization and Architecture, Face-to-Face)

This course explores Key Concepts of Computer Networks; Broad Range of Topics in Networking (e.g. Networks Applications, Network Classifications and Topologies, Network Layers, Channel Performance Measures, Transmission Media, Communication Network Protocols and Architecture); Data Link Layer (e.g. Framing, Error Detection and Correction, CSMA/CD, LAN IEEE Standards); Network Layer (e.g. IP service model, IP Addressing, Sub-netting, Host Configuration DHCP, ARP Protocol, ICMP protocol); Transport Layer (e.g. UDP Protocol, TCP Protocol, TCP Reliable Transfer



and Sliding Window, TCP Flow and Congestion Control); Application Layer (e.g. DNS Protocol, NAT Protocol, HTTP Protocol, Persistent and Non-Persistent HTTP Connection).

40354210 Special Topics in SE

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: Complete 60 CH, Blended)

Special topics of current trends in Software Engineering, the course includes completing a practical project or research by the students.

40353214 Software Quality Management

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40353102 Software Requirements Engineering, Blended)

The course emphasizes the importance of nonfunctional requirements for the software development life cycle. Quality attributes and software metrics represent the core principles for software performance evaluation. In addition, Dimension of Software Quality, Measuring Software Quality using Quality Metrics, Quality Function Deployment (QFD) in Software Quality, Quality Assurance (QA) vs Quality Control (QC), Quality Assurance Models and software quality models. Also, Total quality management (TQM) will be introduced.

40352212 Introduction to Data Science

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40342202 Databases, Blended)

This course will provide undergraduate students with fundamental concepts, principles to extract and generalize knowledge from data. Students will acquire an integrated set of skills spanning data processing, statistics and machine learning, along with a good understanding of the synthesis of these skills and their applications to solving problem.

40353213 Business Analysis

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40342101 System Analysis and Design, Blended)

A solid foundation in business analysis, exploring the strategy, phases, components and process a BA uses to develop a project. From conducting an enterprise analysis to assessing the solution's implementation, student will learn the basics of how to manage the process and determine the appropriate parties to be involved. This course will discuss project requirements (the needs that must be fulfilled to complete the initiative), how to develop a communications plan, distributing work responsibilities, creating a business model and more. The course finishes with a discussion about tasks that the BA encounters when the solution is put into place.



**40354201 Software Security****(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40354208 Software Development and Documentation, Blended)**

An overview of security issues for software, and provides programming methods for the development of secure applications. By the end of the course, students should be able to perform security risk management to assess the security risk of a system under development. Moreover, students will be able to perform all types of security testing. They will understand secure coding practices to prevent common vulnerabilities from being injected into software. Besides, students will be able to write security requirements (which include privacy requirements). They will be able to validate these requirements and to perform additional verification practices of static analysis and security inspection.

40354215 Software Engineering Ethics**(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40352201 Fundamentals of Software Engineering, Blended)**

Ethical problems that software engineers face, the codes of ethics of computing professional societies, legal issues involved in technology, and the social implications of computers, computing, and other digital technologies.

40354217 Programming using Python**(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: 40321203 Object-Oriented Programming, Blended)**

Programming using Python introduces students to programming concepts using Python. Basic knowledge of Python control structures, functions, files, data structures, and the numpy library is assumed. The course will cover data collection from various sources, including web scraping, Web APIs, CSV, and other organized data files, as well as databases. Data will be analyzed using the pandas library for data analysis. The curriculum will also include regular expressions, string manipulation techniques, classes, object-oriented programming, and building real-world software applications.

50551105 Principles of Mathematics and Statistics**(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: -, Blended)**

The course covers limits and continuity for functions at a point and in an interval, derivation, rules of derivation, chain rule, implicit differentiation, derivatives of trigonometric, exponential and logarithmic functions, hyperbolic functions, tangents and perpendiculars, indefinite formulas,



L'Hopital's rule, increase and decrease, extreme values, concavity, drawing curves. Bounded and infinite integration, applications to bounded integration.

50212104 Linear Algebra

(3 Credit Hours, Lecture: 3, Lab: 0, Prerequisite: - 50551105 Principles of Mathematics and Statistics, Blended)

It includes the study of linear equations, Matrix form of linear systems, Methods of solving system of linear equation, homogeneous and nonhomogeneous systems, Gaussian elimination, Matrices And Operation On Matrices, elementary matrices and a method for finding A^{-1} , Eigenvalues And Eigenvectors, Characteristic Polynomial, Dimension, Row Space, Column Space, Null Space.