جامعة الإسراء
ISRA UNIVERSITY

Faculty of Information Technology

Software Engineering Department

BSc Syllabus in

Software Engineering

2024/2023

Vision

The distinction and leadership in the field of software engineering at both local and global levels, academically and research-wise, as well as in serving the local community according to local and international standards.

Mission

Preparing a distinguished and effective elite in the fields of software engineering capable of developing the software industry to meet the needs of the labor market and serve the local community

Educational Program Goals

Providing high-quality and effective education using a variety of contemporary teaching methods, including blended online education as a means to enhance efficiency and increase student learning opportunities.

1. Offering scholarships for outstanding students.
2. Attracting distinguished faculty members.
3. Building an interactive partnership with the local community.

(1) Objectives of the Bachelor's Program:

A. Teaching software engineering as a clear step-by-step method for building software.
B. Providing modern curricula in the technical and scientific knowledge necessary for our students' professional and academic goals.
C. Enabling students to acquire self-learning skills for new knowledge in a rapidly changing world.
D. Graduating students in the field of software engineering to meet the growing demands of the job market.

the educational outcomes of the program

The student outcomes describe what a student is expected to know and be able to do by the time of graduation. They relate to the knowledge, skills, and behaviors that a student acquires through the program. By the time a student graduates from the Software Engineering program, they will have:

A. The ability to apply knowledge in the fields of computing and mathematics relevant to their specialization.

B. The ability to analyze problems, identify suitable computing requirements, and define them with the aim of solving them.

C. The ability to design, implement, and evaluate computer-based systems, processes, components, or programs to meet required needs.

D. The ability to work effectively in teams to achieve common goals.

E. Familiarity with professional, ethical, legal, security, and social responsibilities and aspects.

F. The ability to communicate effectively with diverse groups of stakeholders.

G. The ability to analyze the impacts of computing on local and global levels, as well as on individuals, institutions, and society.

H. An understanding of the need for ongoing professional development.

I. The ability to use current technologies, skills, and tools necessary for computing applications.

J. Awareness of contemporary issues.

K. The ability to use modern engineering technologies, skills, and tools necessary for practicing engineering.

L. The ability to assist in creating an effective project plan.

Syllabus Components of the plan

The study plan for the Bachelor's degree in Software Engineering consists of (135) credit hours distributed as follows:

Credit Hours	Requirement Type	Serial
24	University Requirements	1
21	Faculty Requirements	2
72	Compulsory Department Requirements	3
15	Elective Department requirements +support	4
3	Free courses	5
135	Total	

University Code Approval

0	6	0	3	سنة	فصل	0-9	0-9
Faculty Code		Department Code		Course Code		Knowledge Area	Seril No.

Faculty Code

0	6
IT College Code	

Department Code:

Department Name	Department Code

Information Systems	**01**
Computer Science/Multimedia	**02**
Software Engineering/Software Engineering	**03**
Information Security & Cybersecurity	**04**
Computer Science/Computer Science	**05**
Computer Science / Networks	**08**

Courses Level Code

Year/Semester	Semester Code
First year/First Semester	11
First Year/Second Semester	12
Second Year/First Semester	21
Second Year/Second Semester	22
Third Year/First Semester	31
Third Year/Second Semester	32
Fourth Year/First Semester	41
Fourth Year/Second Semester	42

Knowledge Area

Number of Hours in SE Plan	Knowledge Area	Code Domain
9	Computing and algorithms Algorithms, Discrete Mathematics, Data Structures	0
18	Programming Programming Methodology, Programming fundamental, Object Oriented Paradigm, Web Design (1), Web Design (2), visual programming	1
9	Computer Basic Fundamentals Logic Design, Computer Architecture, Operating Systems	2
9	Computer Application and data information	3

	Information Systems and design, database, database management systems	
3	**Networks** **Network Management Systems**	**4**
33	**Software compulsory courses** **Fundamental of software engineering, software requirements, software design, object oriented software engineering, software engineering tools, web engineering, software quality assurance, software documentation, software testing, software maintenance and re-engineering, and software project management.**	**5** **6**
9	**Selective requirements** **Multimedia systems, information security, programming mathematics, advanced programming, artificial intelligence, human computer interaction, smart phones programming, distributed systems, electronic transactions, selected topics (1), selected topics (2), and software errors tolerance**	**7** **8**
6	**Training/ project** **Practical training for SE/** **Graduation Project for SE**	**9**

1. **University Requirements:** (24 Credit Hours)
   2. 1. Compulsory University Requirements: (12Credit Hours)

Prerequisite	Cr. Hours	Course Name	Course No
-	3	Military Sciences	01101101
-	3	National Education	01101102
	-	Volunteer Work	01101105
01100011	3	Arabic Language	01101111
01100012	3	English Language	01101112

If student does not Pass the following Remedial Courses **

Computer Skills/ Remedial (01100012) English Language/ Remedial (01100011) Arabic Language/Remedial (01100051)

2.2 Elective: 12 Credit Hours from the following courses.

Prerequisite	Cr. Hours	Course Name	Course No
-	3	Traffic Education	01101103
-	3	Innovation and Entrepreneurship	01101104
-	3	Life Skills	01101121

-	3	Islamic Education	01101131
-	3	Jerusalem and the Hashemite Custodianship	01101132
-	3	Sport and Health	01101141
-	3	Environment and Society	01101142
01100051	3	Computer Skills	01101151
-	3	Internet and Communication	01101152
-	3	Economic Systems and Concepts	01101161
-	3	Psychology and Society	01101171
01101111	3	Communication Skills in Arabic	01101213
01101112	3	Communication Skills in English	01101214
-	3	Safety and First Aid	01101243
-	3	Scientific Research Methods	01101281
-	3	Introduction to Astronomy	01101282
-	3	Law in our Life	03011101
-	3	Human Rights	03021201

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

2. 1. Compulsory Faculty Requirements: (21 Credit Hours)

Prerequisite	Practical	Theoretical	Cr.Hours	Course Name	Course No.
-	0	3	3	General physics (1)	11021101
-	0	3	3	Calculus (1)	11031101
-	0	3	3	Programming Methodology	06051110
-	0	3	3	Discrete Mathematics	06051200
06051110	2	2	3	Programming Fundamentals	06051211
11021101	2	2	3	Logic Design	06051220
06051211	0	3	3	Data Structures	06052102

Department Requirements (87Credit Hours)
Department Compulsory Requirements (Software Engineering) (33) Credit Hours:

Prerequisite	Practical	Theoretical	Credit Hours	Course Name	Course No
06051211	2	2	3	Object Oriented Paradigm	06052112
06051220	0	3	3	Computer Architecture	06052122
06052102	2	2	3	Algorithm	06052201
06052112	0	3	3	Information Systems Analysis and Design	06052232
06051220	0	3	3	Computer Networks	06052140
06052112	0	3	3	Visual Programming	06053113
06052201	2	2	3	Databases	06053130
06053130	2	2	3	Database Systems Management	06013231
06052112	2	2	3	Web Design (1)	06053214
06053214	0	3	3	Web Design (2)	06014115
06052122	0	3	3	Operating Systems	06053223

Department Compulsory Courses /Software Engineering (39) Credit Hours

Prerequisite	Practical	Theoretical	Credit Hours	Course Name	Course No
06052112	0	3	3	Fundamental Software Engineering	06032250
06032250	0	3	3	Software Requirements Engineering	06033151
06033151	0	3	3	Software Design	06033252
06033151	0	3	3	Object Oriented Software Engineering	06033253
06032250	0	3	3	Software Engineering Tools	06033260
06032250	0	3	3	Web Engineering	06034154
06033252	0	3	3	Software Quality	06034155
06033252	0	3	3	software Documentation	06034156
06033253	0	3	3	Software Testing	06034157
06034157	0	3	3	Software Maintenance and Reverse Engineering	06034258
06032250	0	3	3	Software Projects Management	06034259
اجتياز 90 ساعة	0	3	3	Practical Training for SE	06034190
اجتياز 90 ساعة	0	3	3	Graduation project for SE	06034291

Department Electives: (9 Credit Hours)

Prerequisite	Practical	Theoretical	Credit Hours	Course Name	Course No.

-	0	3	3	Multimedia Systems	06022173
11031141	0	3	3	information Security	06042150
06052112	0	3	3	Programming Mathematics	06033172
06012201	0	3	3	Artificial intelligence	06013176
06053113	0	3	3	Advanced Programming	06043273
06053113	0	3	3	Human Computer Interface	06033274
06053113	0	3	3	Smart Phones Programming	06013256
06013130	0	3	3	Distributed Systems	06014155
06053214	0	3	3	Electronic Transactions	06014157
06033252	0	3	3	Software Errors Tolerance	06034280
Department Approval	0	3	3	Selected Topics (1)	06014171
Department Approval	0	3	3	Selected Topics (2)	06014272

Support Courses (6 credit Hours)

prerequisite	practical	Theoretical	Credit Hours	Course Name	Course No.
11031101	0	3	3	Statistics and Probabilities	11031141
11031101	0	3	3	Numerical Analysis	06052253

Free subject: (3) Credit Hours chosen from the courses offered by the University.

Study Plan Guide for the Bachelor Degree in Software Engineering

First Year						
First Semester						
Synch. Requisite	Prereq uisite	Practical	Theoretical	Credit Hours	Course Name	Course No
	01100011	0	3	3	Arabic Language	01101111

	-	0	3	3	Programming Methodology	06051110
	-	0	3	3	Calculus (1)	11031101
	-	0	3	3	General physics (1)	11021101
	01100012	0	3	3	English Language	01101112
		15	Total			
Second Semester						
Synch. requisite	Prerequisite	practical	Theoretical	Credit hours	Course name	Course no.
		0	3	3	University selective requirement (1)	
	-	0	3	3	Discrete Mathematics	06051200
	06051110	2	2	3	Programming Fundamentals	06051211
	11031101	0	3	3	Statistics and Probabilities	11031141
	11021101	2	2	3	Logic Design	06051220
		15	المجموع			

Second Year						
First Semester						
Synch. Requisite	**Prerequisite**	**Practical**	**Theoretical**	**Credit Hours**	**Course Name**	**Course No.**
		0	**3**	**3**	**University selective requirement (2)**	
	06051211	**2**	**2**	**3**	Object Oriented Paradigm	**06052112**
	06051211	**0**	**3**	**3**	Data Structures	**06052102**
	06051220	**0**	**3**	**3**	Computer Networks	**06052140**
	06051220	**0**	**3**	**3**	Computer Architecture	**06052122**
	للأردنيين فقط*	**0**	**3**	**3**	National Education	**01101102**
		18	**المجموع**			
Second Semester						
Synch. Requisite	**Prerequisite**	**Practical**	**Theoretical**	**Credit Hours**	**Course Name**	**Course No.**
		0	**3**	**3**	**University selective requirement (3)**	
	06052112	**0**	**3**	**3**	Fundamental Software Engineering	**06032250**
	06052112	**0**	**3**	**3**	Information Systems Analysis and Design	**06052232**
	06052102	**2**	**2**	**3**	Algorithms	**06052201**
	11031101	**0**	**3**	**3**	Numerical Analysis	**06052253**
		0	**3**	**3**	Free subject	
		18	**المجموع**			

Third Year						
First Semester						
Synch. requisite	**Prerequisite**	**Practical**	**Theoretical**	**Credit hours**	**Course Name**	**Course No.**
		0	**3**	**3**	**University selective requirement (3)**	
	06032250	**0**	**3**	**3**	Software Requirements Engineering	**06033151**
	06052112	**0**	**3**	**3**	Visual Programming	**06053113**
	06052201	**2**	**2**	**3**	Databases	**06053130**
	06052122	**0**	**3**	**3**	Operating Systems	**06053223**
		0	**3**	**3**	Department Requirements (1)	
		18	**المجموع**			
Second Semester						
synch. requisite	**Prerequisite**	**Practical**	**Theoretical**	**Credit Hours**	**Course Name**	**Course No.**
	06032250	**0**	**3**	**3**	Software Engineering Tools	**06033260**
	06033151	**0**	**3**	**3**	Object Oriented Software Engineering	**06033253**
	06033151	**0**	**3**	**3**	Software Design	**06033252**
	06052112	**2**	**2**	**3**	Web Design (1)	**06053214**
	06053130	**2**	**2**	**3**	Database Systems Management	**06013231**
		0	**3**	**3**	Department Requirements (2)	
		18	**المجموع**			

Fourth Year						
First Semester						
Synch requisite	**Prerequisite**	**practical**	**Theoretical**	**Credit hours**	**Course Name**	**Course No.**
	06032250	**0**	**3**	**3**	Web Engineering	**06034154**

	06033253	0	3	3	Software Testing	06034157
	06033252	0	3	3	Software Documentation	06034156
	06033252	0	3	3	Software Quality	06034155
	06053214	0	3	3	Web Design (2)	06014115
	Pass 90 hrs.	0	3	3	Practical Training for SE	06034190
		18			المجموع	

Second Semester						
Synch. Requisite	prerequisite	practical	Theoretical	Credit Hours	Course Name	Course No.
	06032250	0	3	3	Software Projects Management	06034259
	06034157	0	3	3	Software Maintenance and Reverse Engineering	06034258
		0	3	3	Department Requirements (3)	
	Pass 90 hrs.	0	3	3	Graduation project for SE	06034291
	Only Jordanian	0	3	3	Military Science	01101101
		15	المجموع			

Course Descriptions

Description of Courses offered by the Department of Software Engineering

General physics (1)(11021101)

(3credit hours, Prerequisite :None)

Motion in one Dimension, Vectors, Motion in two Dimensions, Newton's law of motions, Circular Motion and Other Applications of Newton's Laws, work energy Theorem, Conservation of Energy, Linier momentum and Collisions, Rotation of a Rigid Object About a Fixed Axis.

Calculus(11031101)

(3credit hours, Prerequisite :None)

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

.

Programming Methodology(06051110)

(3credit hours, Prerequisite : None)

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.

Discrete Mathematics (06051200

(3credit hours, Prerequisite :None)

Introduces discrete structures and techniques for computing. Sets, graphs and trees. Functions, relation properties, recursive definitions, solving recurrences, equivalence, partial order. Proof techniques, inductive proof counting techniques and discrete probability.

Logic Design (06051220)

(3credit hours, Prerequisite : 11021101)

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.

Programming Fundamentals (06051211))

(3credit hours, Prerequisite : 06051110)

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

Data Structures (06052102)

3 credit hours prerequisite (06051211)

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.

Information Systems Analysis (06052232)

3 credit hours prerequisite(06052112)

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

Data Base Management Systems (06013231)

(3 credit hours prerequisite 06053130)

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.

Object oriented paradigms (06052112)

(3 credit hours: prerequisite 06051211)

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.

Algorithms (06052201)

(3 credit hours prerequisite 06052102)

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.

Computer Architecture (06052122)

(3 credit hours, prerequisite 06051220)

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.

Visual Programming (06053113)

(3 credit hours, prerequisite: 06052112)

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.

Web Design (1) (06053214)

(3 credit hours, prerequisite: 06052112)

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.

Database (06053130)

(3 credit hours Prerequisite: 06052201)

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.

Operating Systems (06053223)

(3 credit hours, prerequisite: 06052122)

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.

Web Design (2) (06014115)

(3 credit hours, prerequisite: 06053214)

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.

Computer Networks (06052140)

(3 credit hours, prerequisite: 06051220)

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.

Software Engineering Fundamentals (06032250)

(3 credit hours, prerequisite: 06052112)

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

Object Oriented Software Engineering (06033253)

(3 credit hours, prerequisite: 06033151)

The object-oriented paradigm in software engineering context, Object-oriented concepts, Object-oriented design methods, Design by contract for software reliability and extendibility, Software design for a medium-size software product, Software design and evaluation for reuse and the use of design patterns, Object-oriented testing: incremental system development with process and product metrics, Using CASE tools for rapid object-oriented design and implementation.

Requirements Engineering (06033151)

(3 credit hours, prerequisite: 06032250)

The main objective of this course is to provide students with a broad perspective on requirements engineering process. By improving these processes, students will create descriptions of system and user requirements which are easier to understand, complete and testable. Students will also have more effective procedures for managing changes to these requirements and assessing the impact and cost of these changes.

Web Engineering (06034154)

(3 credit hours, prerequisite: 06032250)

A study of the concepts, principles, techniques, and methods of Web engineering. Topics include requirements engineering, modeling and architectures, design and technologies, testing, operational maintenance, Web project management, application development process, usability and performance, and security of Web applications. Technologies (particularly on Web 2.0), business models and strategies, and societal issues of Web 2.0 and Semantic Web are also discussed.

Software Design (06033252)

(3 credit hours, prerequisite: 06033151)

The course covers elementary methods for developing robust, efficient, and re-usable software. Specific topics include memory management and the pragmatic aspects of implementing data structures such as lists and hash tables. Debugging tools and techniques are discussed and common programming errors are considered along with defensive programming techniques to avoid such errors. Testing regimes, such as regression testing are introduced. The course is taught from a practical engineering viewpoint and it includes a considerable amount of programming practice, using existing tools as building blocks to complete a large-scale task.

Software Testing (06034157)

(3 credit hours, prerequisite: 06033253)

Role of verification and validation in the system life cycle. Verification and validation planning. Requirements oriented testing, test plan design, effective testing techniques, symbolic execution. Model checking, debugging, Critical system validation.

Software Documentation (06034156)

(3 credit hours, prerequisite: 06033252)

Documentation life cycle: analysis, design, productions usability testing and fulfillment. Users: customers, managers, system engineers, system maintenance engineers. Structure: traditional and IEEE. Documentation enhancements: audit, form and questionnaire design, embedded indexing, legacy documentation and metrics.

Software Quality Assurance (06034155)

(3 credit hours, prerequisite: 06033252)

Software quality, SQ factors, components of SQA system. Development and quality plans, quality activities in the project life cycle, reviews, procedures and work instructions. Documentation control, software quality metrics.

Software Maintenance and Reverse Engineering (06034258)

(3 credit hours, prerequisite: 06034157)

The course addresses the knowledge and techniques necessary to enhance, perfect and modify software overtime. It covers the issues of software maintenance, extensibility, and software adaptability to different environments, as well as software reverse engineering process, such as reverse engineering and restructuring, how legacy systems can be assessed to decide if they should be scrapped, maintained, re-engineered or replaced. Finally the destruction between Software reverse engineering and data re- engineering is demonstrated.

Software Project Management (06034259)

(3 credit hours, 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.

SE Practical Training (06034190)

(3 credit hours, prerequisite: pass 90 credit hours)

At least 8 weeks of practical training in public or private sectors.

SE Graduation Project (06034291)

(3 credit hours, prerequisite: pass 90 credit hours)

Typical projects in SE involve a review of state-of-the-art designs for the targeted in software engineering field. Project includes theoretical and practical aspects in SE; the project includes: project proposal, analysis, design, implementation, testing and evaluation stages, and completing the project in its final version. A documentation of the whole project should be delivered to the department and the supervisor. Finally, the project should be submitted for final examination.

Software Engineering Tools (06033260)

(3 credit hours, prerequisite: 06032250)

CASE definition. Building blocks of CASE. A taxonomy of CASE tools, Rational Unified Process (RUP), Unified Modeling Language(UML), project management tools, analysis and design tools. Programming tools, integration and testing tools, prototyping tools. Maintenance tools, framework tools. CASE and AI, integrated CASE environments

Information Security (06042150)

(3 credit hours, prerequisite: 11031141)

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.

Distributed Systems (06014155)

(3 credit hours, prerequisite: 06053130)

Characterization of distributed systems, system models, network and internetworking. Intercrosses communication, distributed objects and remote invocation, operating system support, distributed file systems. Name services, peer-to peer systems, time and global states, coordination and agreement, concurrency control, replication, CORBA.

Electronic Transactions (06014157)

(3 credit hours, prerequisite: 06053214)

This Unit aimed at providing the students with the basic concepts and strategies of electronic commerce and electronic government, as well as current applications, opportunities, threats, and social implications. The unit is specifically focused on delivering material to address issues in current technologies and trends enabling e-commerce and e-government. It also covers security and legal issues. And discuss the future of e-commerce and e-government.

Multimedia Systems (06022173)

(3 credit hours, prerequisite: none)

Introduction to the study and creation of multimedia, using various software programs. Students will learn both the aesthetic and technical aspects of multimedia design and production. Students will be introduced to Web production and the business process behind multimedia, working in teams to produce a Web-based product for a real business clients. Students will use software programs such as Macromedia Dreamweaver, Flash, Director, and Adobe Photoshop.

Human Computer Interaction (06033274)

(3 credit hours, prerequisite: 06053113)

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.

Software Fault Tolerance (06034280)

(3 credit hours, prerequisite: 06033252)

Software Design Faults, Software Reliability Metrics, Single-Version Software Fault Tolerance Techniques, Multi-Version Software Fault Tolerance Techniques, Fault Tolerance in Operating Systems, Computer Fault Tolerance.

Selected Topics (1) (06014171)

(3 credit hours, prerequisite: Department Approval)

To be set by the department.

Selected Topics (2) (06014272)

(3 credit hours, prerequisite: Department Approval)

To be set by the department.

Programming Mathematics (06033172)

(3 credit hours, prerequisite: 06052112)

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.

Advanced Programming (06043273)

(3 credit hours, prerequisite: 06053113)

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.

Artificial Intelligence (06013176)

(3 credit hours, prerequisite: 06052201)

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

Smart phone Programming (06013256)

(3 credit hours, prerequisite: 06053113)

The mobile programming course allows students to learn the fundamentals of programming for smart phones. It covers various concepts related to layouts, widgets, audio and video files, processing JSON files, using SQLite database and firebase database, using Google API. The course allows students to be familiar with a main stream of today's technology.

Statistics and Probabilities (11031141)

(3 credit hours, prerequisite: 11031101)

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: Bi-nomal, 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.

Numerical Analysis (06052253)

(3 credit hours, prerequisite: 11031101)

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.