Course Name	Introduction to Computing			مقدمة علم الحاسب			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS110	**0901110**	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☒ Common ☐ Core ☐ Elective ☐ Free ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	1st Semester			**Prerequisite**			

Course Description:

This course introduces the main concepts of computer science. It includes the basics of computing: hardware, Software, Connectivity, and users, the different types and features of computers. It presents also the data types and data Representation. A Simple Computer System architecture is presented so to emphasize on main components, secondary storage devices, types of memory, Hardware, software and people. The principal Peripheral Devices are also presented: Input, Output and storage, Data preparation, Factors affecting input, Input Devices, Output Devices, Secondary Storage devices, Communication between CPU and input/output devices. Software aspects are introduced like Problems-Solving and programming: Algorithm development, Flowcharts, Looping, Some programming Features, Pseudo code, Some structured programming concepts, Documentation, as well as Programming Languages: Machine language and assembly language, High-Level and Low-Level languages, assemblers, compilers and Interpreters. Finally, the course presents the computer and communication aspects, as well as different features of operating Systems.

Course Objectives:

After completing this course, students are expected to:

1. Have a complete background about the main aspects of computing systems especially for hardware and software,
2. Develop skills in hardware basics: computer architecture, peripheral devices,
3. Develop skills in software basics: data types and representations, problem solving concepts, compilers, assemblers, and programming languages,
4. Understand the main concepts of computer networking and communication,
5. Understand the main concepts of operating systems and their role in a computer system.

Grading	☒ **Mid-term**	**20%**	☐ **Project**		☒ **Quizzes**	**10%**
	☒ **Final**	**40%**	☒ **Lab**	**25%**	☒ **Participation**	**5%**

Textbook:

G.Anderson, D.Ferro, R.Hilton, "Connecting with Computer Science" Course Technology, 1st ed. (January 6, 2005) – 061921290x

Reference Book:

Raymond P. Canale, "**Introduction To Computing for Engineers**", McGraw-Hill**,** 3rd ed., 2000, ISBN: 0079116094.

Course Name	Fundamentals of Information Systems			**مبادئ نظم المعلومات**			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	IS111	**0902111**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☒ Common ☐ Core ☐ Elective ☐ Free ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	3rd Semester			**Prerequisite**			

Course Description:

This course aims to introduce students to the basic concepts and topics related to Information Systems (IS). It covers topics such as: systems concepts; system components and relationships; cost/value and quality of information; competitive advantages of information; specification, design, and re-engineering of IS; application versus system software; package software solutions; procedural versus non-procedural programming languages; object oriented design; database features, functions, and architecture; networks and telecommunication systems and applications; characteristics of IS professionals and IS career path; information security, crime, and ethics. Practical exercises may include developing macros, designing and implementing user interface and reports; developing a solution using database software.

Course Objectives:

The course objectives aim :

1. To provide an introduction to the Organizational uses of information to improve overall quality.
2. To present hardware, software, and related information technology concepts.
3. To provide concepts and skills for the specification and design or the re-engineering of organizationally related systems of limited scope using information technology.
4. To show how information technology can be used to design, facilitate, and communicate organizational goals and objectives.
5. To explain the concepts of individual decision making, goal setting, trust worthiness, and empowerment.
6. To show career paths in information system. To present and discuss the professional and ethical responsibilities of the IS practitioner

Grading	☒ **Mid-term**	**30%**	☐ **Project**		☒ **Quizzes**	**15%**
	☒ **Final**	**50%**	☐ **Lab**		☒ **Participation**	**5%**

Textbook:

Ralph, M. Stair, " **Principles of Information Systems** ", Thomson Learning, 2003, ISBN 0619216077.

Reference Book:

1) Ralph, M. Stair, George W. Reynolds, and George Reynolds, "**Fundamentals of Information Systems**", Course Technology Inc, 2nd ed., 2003, ISBN 0619064919.
2) Steven A., "**Information Systems Foundation of E-Business**", 4th edition, 2002.

Course Name	Calculus			التفاضل والتكامل			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	Math111	**0817111**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☒ Common ☐ Core ☐ Elective ☐ Free ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	1st Semester			**Prerequisite**			

Course Description:
The limit. Continuity, the intermediate value theorem. Definition of derivatives. Rules for differentiation. Applications of the derivative. The mean value theorem. L'hospital rule. The definition of the integral. The indefinite integral and the of calculus. Applications of the integral. Sequences. Convergence and limits of sequences. Series. Convergence of series. Power series. The formal power series of rational functions

Course Objectives:
Upon completing this course the student should be able to:

1. Solve problems involving computing limits
2. Identify continuous functions and their properties
3. Understand and use the definition of derivate, and compute derivatives using the rules of differentiation
4. Apply the derivative in problems involving graphing and in problems involving maximization and minimization
5. Understand the concept of integral and use the basic techniques of integration to compute integrals
6. Apply integrals in solving some geometric problems
7. Understand the relationship between the integral and derivative (the fundamental theorem of calculus)
8. Understand the concept of sequence and compute limits of sequences
9. Understand the concept of series and some of the tests for convergence
10. Find the (formal) series expansion for rational functions

Grading	☒ **Mid-terms**	**30%**	☒ **Assignment**	**10%**	☒ **Quizzes**	**15%**
	☒ **Final**	**40%**	☐ **Lab**		☒ **Participation**	**5%**

Textbook:
Earl W. Swokowski **" Calculus"** Brooks/Cole, 5th edition, 1991 ISBN 0534924921

Reference Book:
George B. Thomas, **"Calculus"** Addison Wesley, 11th edition, 2008 ISBN 0321526791

Course Name	Physics			الفيزياء			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	PHY132	**0814132**	**4**		**4**	**0**	**4**
Track	☐ University Requirement ☐ Common ☒ Core ☐ Elective ☐ Free ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	1st Semester			**Prerequisite**			

Course Description:

Charges and electrical forces. Charge quantization and conservation. Insulators, conductors and semiconductors. Electric field and principle of superposition for electric field. Electric dipoles and the effect of electric field on it. Electric potential due to charges and potential difference. Equipotential surfaces. Magnetic field and magnetic force. Introductory to modern physics and semiconductors. N-type and P-type crystals. Semiconductor carrier properties and action. Depletion layer and electric potential through it. Diode and types of diodes.

Course Objectives:

The student will be able to

1. Develop an understanding of electrical phenomena,
2. Develop an understanding of the magnetic phenomena,
3. Give the student the basic principles needed to study electronic courses, and
4. Give the student good background and experience in solving and dealing with problems.

Grading	☒ **Mid-term**		☐ **Project**		☒ **Quizzes**	
	☒ **Final**		☐ **Lab.**		☒ **Participation**	

Textbook:

Haliday, Resnic and Walker, "**Fundamental of Physics**", 2002.

Reference Books:

1. John D. Cutnell ,"**Problems Version Physics**", Volume 1, 2003.
2. Haliday, Resnic and Walker "**Fundamentals of Physics**", Volume 1, Chapters 1 - 21, Enhanced, 2002**.**

Course Name	Fundamental of Programming			مبادئ البرمجة			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS120	**0901120**	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☒ Common ☐ Core ☐ Elective ☐ Free ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	2nd Semester			**Prerequisite**	0901110		

Course Description

This knowledge area consists of those skills and concepts that are essential to programming practice independent of the underlying paradigm and programming language. Specific topics covered include: an overview of algorithms and problem-solving (problem solving strategies, role of algorithms in the problem-solving process, etc), fundamental programming constructs (variables, types, expressions, simple I/O, conditional and iterative control structures, functions, recursion, pointers, etc.).
The study of programming language features and programming paradigms. Control, run-time environments, and semantics are examples of procedural, functional, logical, and object oriented programming.
In practice the programming language used is ANSI-C, the syntax aspect of language and some pragmatic aspects such as comparison of interpreters and compilers and language translation phases must be studied in laboratory.

Course Objectives:

1. Discussing the importance of algorithms in the problem-solving process and using pseudo-code.
2. Describing the phases of program translation from source code to executable code and the files produced by these phases.
3. Designing, implementing, testing, and debugging a program that uses fundamental programming constructs.
4. Familiarizing students with the taxonomy of programming language characteristics and their effect upon the structure.
5. Familiarizing students with some accepted models of programming language semantics. This should include models for both an imperative and a functional language.
6. Acquiring a sound understanding of the theory and practice behind procedural, Object-oriented, functional and logic programming languages.

Grading	☒ **Mid-term**	**20%**	☐ **Project**		☒ **Quizzes**	**10%**
	☒ **Final**	**40%**	☒ **Lab**	**25%**	☒ **Participation**	**5%**

Textbook:
Robert Sedgewick, "**Algorithms in C: Fundamentals, data structures, sorting, searching, and graph algorithms"**, Addison-Wesley 2001, ISBN: 0201756080

Reference Book:
Herbert Schildt, "**C: the complete reference"**, McGraw-Hill 2000, ISBN:0-07-212124-6

Course Name	Electronics			الإلكترونيات			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CE121	**0903121**	**4**		**4**	**1.5**	**5.5**
Track	☐ University Requirement ☐ Common ☒ Core ☐ Elective ☐ Free ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	2nd Semester			Prerequisite	0814132		

Course Description:

DC Circuits : Circuit Variables (Voltage, Current, Power, and Energy), DC Circuit Elements (Resistors, DC Voltage Sources), Simple Resistive Circuits(Resistors in Series, Resistors in Parallel, Voltage and Current Dividers) , Circuit Analysis (Ohm's Law, Kirchhoff Laws , Node-Voltage Method, Mesh Current Method, Source Transformation, Thevinin and Norton Equivalent), Maximum Power Transfer and Superposition. AC Circuits: AC Circuit Components and Simple AC Circuit Analysis . Diodes: Diode Structures, Diode Circuits, Diode Types (Zenner Diode, Varactor Diode, Schottky Diodes), Diode Clippers, Diode Limiters, Diode Clampers, and Diode Rectifications. Transistors: Bipolar Junction Transistors, N-P-N Structures, P-N-P Structures, Modes Of Operations (Active Mode, Reverse Mode and Saturation Mode), CB, CE, CC Connections, Field Effect Transistors (FET), (JFET, MESFET, MISFET, and MOSFET) , Transistor Circuits And Applications, Transistor Switching. Opto Electronics Devices: Photodiodes, LED, Lasers, Semiconductor Lasers. Integrated Circuits: Background, Advantages of Integration, Types of Integration, Monolithic And Hybrid Circuits, Evolution of Integrated Circuits, CMOS ICs, TTL ICs. Operational Amplifiers and applications**.** Student will be trained on the available software such as: Circuit maker 2000, EWB50a, MultiSim 6.01, CirCAD, DCCAD, and DCCHALING in addition with the products and components of Heathkit educational systems (EWS-3600 analog modules)

Course Objectives:

Making the student to

1. Understand the fundamentals of basic DC and AC circuit elements,
2. Be able to tackle the analysis of DC and AC circuits,
3. Study the basics of diodes, transistors, and optical devices,
4. Understand the principles and types of integration,
5. Study the evolution of integrated circuits, and
6. Understand the operational amplifies and their applications.

Grading	☒ **Mid-term**	**20%**	☐ **Project**		☒ **Quizzes**	**10%**
	☒ **Final**	**40%**	☒ **Lab.**	**25%**	☒ **Participation**	**5%**

Textbook:

Thomas L. Floyd, " **Electronics Fundamentals: Circuits, Devices, and Applications**", Prentice Hall , 7th edition, 2006, ISBN 0-13-219709-0

Reference Books:

1. Thomas L. Floyd ,"**Principles of Electric Circuits** : **Conventional Current Version**", 7th Edition, 2002.
2. Richard Drof," **Introduction to Electric Circuits**", John Wiley, 6th edition, 2004, ISBN 0471447951.

Course Name	Biology			الأحياء			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	Bio 101	**0816101**	**4**		**4**	**1.5**	**5.5**
Track	☐ University Requirement ☐ Common ☒ Core ☐ Elective ☐ Free ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	2nd Semester			**Prerequisite**			

Course Description:
Introduction to biology, structure, function and division of plant and animal cell. Classification of living beings into kingdoms. Study of biological activities (nutrition, digestion, respiration, reproduction and secretion).

Course Objectives:
To fulfill the information about the science of life and understand the activity of living beings.

Grading	☒ **Mid-term**		☐ **Project**		☒ **Quizzes**	
	☒ **Final**		☒ **Lab.**		☒ **Participation**	

Textbook:
Biology Sixth Edition
By: Campbell & Reece. Benjamin Cummings 2002 (www.aw.com)

Reference Books:
Biology Sixth Edition
By : Peter Raven & George Johnson. Wm. C. Brown Publishers, 2002

Course Name	Introduction to Statistics & Probability Theory			مقدمة في الإحصاء ونظرية الاحتمالات			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	Math208	**0817208**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☐ Common ☒ Core ☐ Elective ☐ Free ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	2nd Semester			**Prerequisite**	0817111		

Course Description:

Counting. Introduction to probability. Conditional probability and statistical independence. Bayes theorm. Random variables. Mathematical expectation. Variance. Covariance and the correlation coefficient for two random variables. Some important discrete distributions

Course Objectives:

Upon completing this course a student should be able to:

1. Identify some counting techniques
2. Know the concept of event and probability of events
3. Know the concept of conditional probability and statistical independence and apply Bays rule
4. Understand the concept of random variable , expectation, variance, and the covariance of two random variables
5. Know some of the important discrete distributions

Grading	☒ **Mid-terms**	**60%**	☐ **Project**		☐ **Quizzes**	
	☒ **Final**	**40%**	☐ **Lab**		☐ **Participation**	

Textbook:

David S. Moore: "**Introduction to the Practice of Statistics**"

Reference Book:

Arnold Allen:"**Probability, Statistics, and Queuing Theory with Computer Science Applications**"

Course Name	Object Oriented Programming (1)			البرمجة كائنة التوجه (١)			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS210	**0901210**	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☐ Common ☒ Core ☐ Elective ☐ Free ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	3rd Semester			Prerequisite	0901120		

Course Description:

The purpose of this course is to provide students with fundamental knowledge of object oriented programming (OOP). It emphasizes good software engineering principles and developing programming skills. Specific topics covered include: fundamental concepts of object oriented (classes, methods, instantiation, communication by message, encapsulation, inheritance, overriding, dynamic dispatch, polymorphism, etc.), advanced techniques of OOP (exceptions, multithreaded programming, etc.) and some interesting packages (I/O, strings, etc.). As an OOP programmer, student will be able to translate solution problem into object oriented form, he should acquire some understanding of object oriented concepts and tools such as the Unified Modeling Language (UML), this will give student a firm foundation on which to build high-quality software systems. In practice the programming language used is JAVA, as an introduction to JAVA language; students should acquire some understanding of abstraction mechanisms, JAVA Virtual Machines (JVM) and the byte code notion.

Course Objectives:

1. Describe the importance and power of abstraction in the context of virtual machines and explain the benefits of intermediate languages in the compilation process.
2. Justify the philosophy of object-oriented design and the concepts of encapsulation, inheritance and polymorphism.
3. Explain how abstraction mechanisms support the creation of reusable software components.
4. Acquire basics of how translate solution problem into object oriented form.
5. Design and implement simple programs in an object-oriented programming language.
6. Design and implement program that use exceptions and multithreads.

Grading	☒ Mid-term	20%	☐ Project	15%	☒ Quizzes	10%
	☒ Final	40%	☒ Lab	15%	☒ Participation	

Textbook:

Bruce E. Wampler, "**Essence of Object Oriented Programming with JAVA and UML**", Addison Wesley 2001, ISBN: 0-201-73410-9

Reference Book:

Herbert Schildt, "**JAVA 2: The complete reference**", McGraw-Hill, 5th edition 2002, ISBN: 0072224207

Course Name	Data Structure			هيكلة البيانات			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS211	**0901211**	**2**		**2**	**1**	**3**
Track	☐ University Requirement ☒ Common ☐ Core ☐ Elective ☐ Free ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	3rd Semester			**Prerequisite**	0901120		

Course Description

This course is complementary to the course "Fundamentals of Programming". The aim of this course is to provide the fundamentals of data structures and algorithm design needed in the remainder of the curriculum, to introduce algorithm analysis tools, and to develop students' problem solving and computer programming skills.
Topics covered include: basic elements, data types, internal representation (Arrays, records, strings, stacks, queues, trees, lists and linked lists, records and files, pointers) and data structure manipulation such as array manipulations, sorting, searching, trees and files manipulations, string processing, stacks ,queues, and list manipulations, pointer operations...
The data structures representation and manipulations are exercised using ANSI-C language.

Course Objectives:
The student will be able to:

1. Describe, construct, and use various implementations for fundamental data abstractions such as lists, stacks, queues, trees, and graphs.
2. Design and implement efficient algorithms for manipulating data Structures.
3. Compare the efficiency of various data structures and algorithms and to choose the most appropriate ones for a given application.
4. Describe the internal representation of numeric and nonnumeric data.
5. Describe the internal representation of basic and advanced data structures
6. Write programs by using fundamental and advanced data structures

Grading	☒ **Mid-term**	**20%**	☐ **Project**		☒ **Quizzes**	**10%**
	☒ **Final**	**40%**	☒ **Lab**	**25%**	☒ **Participation**	**5%**

Textbook:
Robert Sedgewick, "**Algorithms in C: Fundamentals, data structures, sorting, searching, and graph algorithms"**, Addison-Wesley 2001, ISBN: 0201756080

Reference Book:
Herbert Schildt, "**C: the complete reference"**, McGraw-Hill 2000, ISBN:0-07-212124-6

Course Name	Technical Reports			كتابة التقارير التقنية			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	IS212	**0902212**	**2**		**2**	**0**	**2**
Track	☐ University Requirement ☒ College Requirement ☐ Core ☐ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	3rd Semester			**Prerequisite**	0902111		

Course Description:

This course is designed to help students develop an effective method of planning and completing writing tasks so that student can meet professional writing demands. Since succeeding in the professional world requires not only technical knowledge but also effective writing skills. This course focuses on the writing skills necessary for advanced academic and professional writing, tailored specifically to student academic career work as professional in a technical field. Successful technical communicators know how to organize and present complex information so that the ideas are understandable to many readers, viewers, and listeners. In this course, students will complete several small technical and recommendation reports on a topics related to IT related majors. Indeed, this course requires intensive writing, reading, and peer commentary.

Course Objectives:

Upon successfully completing this course, students will understand how to:

1. Examine sources in your field for their relevance and credibility,
2. Identify and analyze different audiences for particular types of writing,
2. Organize and present arguments effectively,
3. Write memos, letters, abstracts, short reports, and long, formal reports ,
4. Edit your own work and the work of your peers for content, organization, and style,
5. Use graphics and page layout to support and enhance your written message,
6. Present your research findings to your peers.

Grading	☒ **Mid-term**	**25%**	☒ **Project**	**20%**	☒ **Quizzes**	**15%**
	☒ **Final**	**35%**	☐ **Lab**		☒ **Participation**	**5%**

Textbook:

Woolever, K., "**Writing for the Technical Professions**", N.Y., Fourth Ed. Longman, 2007, ISBN: 0205597882.

Reference Books:

1. Hannigan Carrie, **"Kaplan Technical Writing: A Resource for Technical Writers at All Levels",** Kaplan Pub, 2008, ISBN: 1427797218
2. Alred , "**Handbook of Technical Writing**", 7th ed., Published by Bedford, 1997

Course Name	Digital hardware			الأجهزة الرقمية			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CE213	**0903213**	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☒ College Requirement ☐ Core ☐ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	3rd Semester			**Prerequisite**	0903121		

Course Description:

Digital Systems: digital computer and digital systems, binary, decimal, octal and hexadecimal number systems, number base conversion, complements, signed and unsigned numbers, binary codes, binary storages and registers, and binary logic. Boolean algebra and logic gates: basic definitions, axioms definitions of Boolean algebra, basic theorem and properties of Boolean algebra, Boolean functions, canonical and standard forms, logic operations, and digital logic gates. Simplification of Boolean functions: the map methods, product of sum simplification, NAND and NOR implementation, and the tabulation method. Combinational logic circuits: adders, subtractors, decoders, encoders, multiplexers, de-multiplexers, look-up table, function implementation using multiplexers/ decoders and memories . Sequential logic circuits: flip-flops, synchronous and asynchronous circuits, counters (types of counters), registers, memories, design of counters, design of sequential circuits, analysis of counters, and analysis of sequential circuits. Analog-to-digital converters and digital-to-analog converters. Programmable logic devices (PLD) : PLA, PAL and FPGA. Student will be trained on the available software such as: Circuit maker 2000, EWB50a, and MultiSim 6.01 in addition with the products and components of Heathkit educational; systems (EWS-3700 analog modules)

Course Objectives:

The student are introduced to

1. Study the fundamentals of digital systems, Boolean algebra, and logic expressions,
2. Simplify and implement Boolean functions using elementary logic gates,
3. Study the combinational and sequential digital circuits,
4. Design and analysis of combinational and sequential logic circuits, and study briefly the advanced mask and field programmable logic devices.

Grading	☒ **Mid-term**	**20%**	☐ **Project**		☒ **Quizzes**	**10%**
	☒ **Final**	**40%**	☒ **Lab.**	**25%**	☒ **Participation**	**5%**

Textbook:

Ronald J, Tocci, Neal S. Widmer, and Gregory L. Moss, "**Digital Systems: Principles and Applications**", Prentice Hall, 10th edition, 2006, ISBN 0-13-172579-3

Reference Books:

M. Morris Mano,"**Logic Computer Design Fundamentals and Xilinx Student Edition 4.2 Package**", Prentice Hall, 3rd Edition, 2004, ISBN 0-13-124711-5.

Course Name	Communication and Network Fundamentals			أساسيات الاتصالات والشبكات			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CN214	**0904214**	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☒ College Requirement ☐ Core ☐ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	3th Semester			**Prerequisite**	0901110		

Course Description:

Fundamentals of data communications: Essential Elements Of Data Communications: Simplex, Half-Duplex and Full Duplex Transmission, Analogue And Digital Signals, Periodic and Non Periodic Signals , Signal Parameters, Time and Frequency Domains Concepts, Types of Channels, Transmission Impairment). Transmission Media: Guided Media, Unguided Media, and Types of Propagation. Basic concepts of networking: network concepts, network criteria, and network applications and benefits. Configurations, topologies and categories of networks: line configuration, network topologies (mesh, star, tree, bus, ring, hybrid), scopes of networks (LAN, WAN, MAN), internetwork or internet, types of network connection (peer-to-peer network, server based network, combined network), intranet and extranet. Introduction to OSI and TCP/IP models: The OSI Model The OSI layers, TCP/IP Protocol Suite. Error detection and correction techniques: VRC, LRC, CRC, Checksum, and Hamming code techniques. Circuit and packet switching. Data link layer control: framing, error control, and flow control. Networking and internetworking devices. Student will be trained on the existing components and product related to Cisco such as wireless networking, Switches, routers, etc. in addition with the products, components and software of Heathkit educational systems for wireless networking.

Course Objectives:

Making the student understand the main concepts of:

1. Fundamentals of data communication, and transmission media,
2. Fundamentals of Networking, Network protocols, and networking devices,
3. Circuit and packet switching,
4. Data link layer concepts and control,
5. Error detection and correction techniques, and
6. Networking and internetworking devices.

Grading	☒ **Mid-term**	**20%**	☐ **Project**		☒ **Quizzes**	**10%**
	☒ **Final**	**40%**	☒ **Lab.**	**25%**	☒ **Participation**	**5 %**

Textbook:

Behrouz A Forouzan, "**Data Communications and Networking**," 4th Edition, McGraw-Hill, 2007, ISBN 0072967757.

Reference Books:

1. William Stallings, "**Data and Computer Communication**", Pearson Education, 7th Edition, 2003, ISBN 0131006819.
2. Andrew S. Tanenbaum, "**Computer Networks**", Prentice Hall and Pearson Education, 5th edition, 2003, ISBN 0-13-066102-3.

Course Name	Discrete math			رياضيات متقطعة			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	Math301	**0817301**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☒ College Requirement ☐ Core ☐ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	3rd Semester			**Prerequisite**	0817208		

Course Description:
Integer functions. Equivalence modulo n, and its uses. The binomial theorem. Permutations and combinations. Counting methods: generating functions and recurrence relations. Computing generating functions. Using generating functions in counting. Graph theory. Paths and circuits. Shortest paths. Trees, binary trees, search trees, matrices and matrix operations concepts.

Course Objectives:
Upon completing this course the student should be able to

1. Identify integer functions and some important relations on the integers
2. Know counting permutations and combinations
3. Know generating functions and their role in counting and the method for computing theses functions
4. Know graphs and paths and their applications
5. Know trees and their use in searching
6. Know the matrices and matrix operations

Grading	☒ **Mid-term**	**30%**	☒ **Assignments**	**10%**	☒ **Quizzes**	**15%**
	☒ **Final**	**40%**	☐ **Lab**		☒ **Participation**	**5%**

Textbook:
Seymour Lipschutz and Mark Lipson**," Discrete Mathematics"** McGraw-Hill, second edition, 1997 ISBN 0070380457

Reference Book:
Kennetk Rosen **"Discrete Mathematics and its Applications"** , McGraw Hill, fourth edition, 1999, ISBN 0072899050

Course Name	Object Oriented Programming (2)			**البرمجة كائنة التوجه (٢)**			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS220	**0901220**	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☒ College Requirement ☐ Core ☐ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	4th Semester			**Prerequisite**	0901210		

Course Description

Students should be able to move on to more advanced programming techniques after taking the first object oriented programming course. The main purpose of course consists of the advanced object-oriented programming techniques such as: applets, event-driven programming, application programming interfaces (APIs) and the object oriented graphical user interfaces using SWING. Students should acquire some understanding to create a simple application that supports a graphical user interface and implement simple procedures that perform simple graphical transformations (graphics API, color models, affine transformation), design and implement event-driven programs that respond to user events (event-handling methods, event propagation, exception handling). Finally, the software validation and the testing techniques is studied (test plan creation, test case generation, black-box and white-box testing techniques, object-oriented testing), emphasis will be placed on how create, evaluate, and implement a test plan for a medium-size object oriented code.

Course Objectives:

1. Describe the appropriateness of graphics architectures for given applications.
2. Explain the value of APIs in software development and Create images using a standard graphics API.
3. Implement applets and programs that use large-scale API packages and create images using a standard graphics API.
4. Use SWING to create a simple application that supports a graphical user interface.
5. Distinguish between program validation and verification and between the different types and levels of testing.
6. Discuss the issues involving the testing of object-oriented software

Grading	☒ **Mid-term**	**20%**	☐ **Project**	**15%**	☒ **Quizzes**	**10%**
	☒ **Final**	**40%**	☒ **Lab**	**15%**	☒ **Participation**	

Textbook:

Kathy Walrath, "**The JFC Swing Tutorial: A Guide to constructing GUIs**", Addison-Wesley, 2nd edition 2004, ISBN: 0201914670

Reference Book:

Herbert Schildt, "**The Complete Reference JAVA 2"**, McGraw-Hill, 5th edition 2002, ISBN: 0072224207

Course Name	Operating Systems			نظم التشغيل			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS221	**0901221**	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☒ College Requirement ☐ Core ☐ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	4th Semester			Prerequisite	0903213		

Course Description:

In this course the student will study the basic concepts of operating systems (OS), the following concepts will be studied in this course**:** OS Overview (objectives, functions, evolution of OS, characteristics of modern OS), process description and control (process definition, process states, process description and process control), threads (definition, why use thread, relationship between processes and threads), microkernel (benefits of microkernel organization, microkernel design), uni-processor scheduling (types of scheduling, short term scheduling criteria, scheduling algorithms), memory management (memory management requirements, loading programs into main memory -fixed partitioning, dynamic partitioning, simple paging, simple segmentation-), virtual memory (paging, segmentation, combined paging and segmentation), operating system software (fetch policy, placement policy, replacement policy, resident set management, cleaning policy, load control), I/O management and disk scheduling (I/O devices, organization of I/O function, I/O buffering, disk I/O), and file management (file management system, file organization and access, file directories, secondary storage management).

Course Objectives:

1. Understand the basic concepts underlying operating systems and how a typical operating system works.
2. Describe the functions and design of operating systems.
3. Understand the main concept behind traditional (non-distributed) operating systems.
4. Analyze and explain the Algorithms used in Virtual Memory Management.
5. Discuss the algorithms used in I/O and File Management.

Grading	☒ **Mid-term**	**20%**	☐ **Project**		☒ **Quizzes**	**10%**
	☒ **Final**	**40%**	☒ **Lab**	**25%**	☒ **Participation**	**5%**

Textbook:

W. Stallings, "**Operating Systems: Internals and Design Principles"**, Prentice Hall International, 5th edition 2005, ISBN: 0-13-147954-7

Reference Books:

Jean Bacon, Tim Harris "**Operating Systems**", Addison-Wesley 2003, ISBN: 0321117891.

Course Name	Database Concepts and Design			مفاهيم وتصميم قواعد البيانات			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	IS222	**0902222**	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☐ College Requirement ☒ Core ☐ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	4th Semester			Prerequisite	0902111		

Course Description:

This course aims to discuss the basic concepts and design of database. It covers topics such as: data model, levels of abstraction, data independence, and concurrency control. Focuses on how to design databases for given problems, and how to use database effectively, these including ER model, key and participation constraints, weak entities, class hierarchies, aggregation and conceptual DB design using the ER model. Relational model: creating and modifying relation using query language, enforcing integrity constrains, ER to relational and view. Schema refinement and normal forms: Functional dependencies, reasoning about functional dependencies, normal forms, decompositions and normalization. Relational Queries: Relation algebra and calculus and commercial query languages. Object database systems: User defined abstract data type, structured types, objects; object identity; and reference type, inheritance, and database design for an ORDBMS. Students will be trained on some software tools such as: Oracle, Sybase, DB2, and Informix.

Course Objectives:

1. Describe and discuss the concepts of database design.
2. Students learn how to design a conceptual data model and logical database model, convert the logical database designs to physical designs and develop the physical database.
3. Students learn how to evaluate a set of query using relational algebra and calculus.
4. Students learn how to evaluate a set of query using query language.
5. Discuss and explain database design for an ORDBMS.

Grading	☒ **Mid-term**	**20%**	☒ **Project**	**15%**	☒ **Quizzes**	**10%**
	☒ **Final**	**40%**	☒ **Lab**	**10%**	☒ **Participation**	**5%**

Textbook:

Elmasri, Ramez. Navathe, Shamkant B, "**Fundamentals of Database Systems**" Addison-Wesley, Fifth Edition 2006, ISBN: 0321369572

Reference Books:

1. Elmasri, R., Navath,S., and Navath, B.,"**Fundamentals of Database Systems**" , Addison-Wesley, 4th Ed., 2003, ISBN 0321122267.
2. Date, C. J., "**Introduction Database Systems**", Addison-Wesley, 8th ed., 2003, ISBN 0321197844.

Course Name	Network Protocols and E-Commerce Technology			بروتوكولات الشبكات والتجارة الإلكترونية			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CN223	**0904223**	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☒ College Requirement ☐ Core ☐ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	4th Semester			Prerequisite	0904214		

Course Description:

This course covers two parts. The first part of the course covers the principles underlying the interconnection of large numbers of computers and includes transmission technologies: Ethernet, optical fiber, gigabit networks, cellular transmission and infrared. This course covers also the network technologies: servers clients, access control, intranets, reliable message passing, and interoperability. The second part of the course covers the electronic commerce technology. Topics include: communication and networking, mobile E-Commerce, and architecture of Web systems, data interchange, electronic payments, and all relevant application tied to EC (virtual stores, electronic government, etc...) with appropriate EC suites relying on appropriate tools like php, asp, asp-net, etc. Student will be trained on the existing components and product related to Cisco such as wireless networking, Switches, routers, etc. in addition with the products, components and software of Heathkit educational systems for wireless networking

Course Objectives:

After completing this course, the student will be able to :

1. Understand the software required to support a network,
2. Acquire knowledge underlying the interconnection of large number of computers and protocols that handle their interconnection,
3. Understand the hardware and interface components of a computerized communication network,
4. Understand most recent network technologies and underlying concepts such as servers clients, access control, intranets, reliable message passing, and interoperability,
5. Design efficient EC software (virtual stores, electronic government, etc) with appropriate EC suites relying on appropriate tools like php, asp, asp-net, etc.

Grading	☒ Mid-term	20%	☐ Project		☒ Quizzes	10%
	☒ Final	40%	☒ Lab	25%	☒ Participation	5%

Textbooks:

1) B.A. Fourouzan, " **Data communication and networking**", 4th edition, 2004.
2) Jim A. Carter, "**Developing e-Commerce Systems"**, Prentice Hall, 2002, ISBN: 0-130911127

Reference Books:

1. Hunt, Craig , "**TCP/IP Network administration**", Computers-O'Reilly programming series, Ed. Loukides,Mike, 1997, ISBN: 1565923227.
2. Harvey M. Deitel, Paul J. Deitel, Tem Nieto, Deitel, "**e-Business and e-Commerce How to Program**", Prentice Hall, 2001, ISBN: 0-13-028419-X .

Course Name	Business I (Management: Fundamentals and Skills)		إدارة أعمال (١)				
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	MGT290	**0622290**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☐ College Requirement ☒ Core ☐ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	4th Semester		**Prerequisite**	0902111			

Course Description:
This course introduces the essentials of management as they apply within the contemporary work environment. It combines a focused overview of recent scholarship with a practical approach to key functional areas (planning, organizing, leading, and controlling). Topics include the dynamic new workplace, management- past to present, ethical behavior and social responsibility, environment, global dimension of management, entrepreneurship and small business, foundation of planning, mission, goal setting, strategy formulation and implementation, planning tools and techniques, managerial decision making, organizational design and processes, managing change and innovation, individual and group behavior, communication and information technology, interpersonal skills, managing personal stress, time management, and creativity, corporate culture, work teams, motivation and leadership, empowering and delegation, managing conflict, foundation of control and value chain management.

Course Objectives:
Students at the end of the course should be able to understand the followings:

1. Foundations of planning and decision making,
2. Basic organization designs,
3. Leadership and fundamentals of individual & group behavior, and
4. Principles of control and value chain management.

Grading	☐ **Mid-term**		☐ **Project**		☐ **Quizzes**	
	☐ **Final**		☐ **Lab**		☐ **Participation**	

Textbook:
Robbins, S. and Coulter, M. **Management with One Key**, 8e, Prentice Hall, 2005.
ISBN: 0-13-143994-4

Reference Book:
Schermerhorn, J. **Management**, 8, Wiley, John&Sons, Inc. 2004.
ISBN: 0471454761

Course Name	Software Engineering			هندسة البرمجيات			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS310	**0901310**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☐ College Requirement ☒ Core ☐ Elective ☒ Comp Science ☐ Information System ☐ Comp Network ☐ Comp Network						
Level	5th Semester			Prerequisite	0901220 & 0902222		

Course Description:

This course present both technical and managerial software engineering problems, before studying in depth some life cycle phases, student should understand fundamentals aspects such as : the software life cycle and its phases, the software development models and different specialized systems. In this course, emphasis will be placed on the latest software engineering life cycle phases: the software validation (testing, testing levels, test case generation, black-box and white-box testing techniques) and the software evolution (maintenance, reuse, reengineering, legacy systems). The main topics covered in software validation include formal methods (formal specification languages, formal verification). The construction process considered as one of the inputs to testing process is not studied here; students acquire understanding of coding at programming courses. Students should acquire some fundamentals of software project management: team management; project scheduling; risk analysis; software configuration management; project management tools. Students will be trained on some software tools such as: Rational Unified Process, and Z Language.

Course Objectives:

1. Understand software validation: Validation planning; testing fundamentals, including test plan creation and test case generation; formal methods concepts, formal verification.
2. Understand software evolution: Software maintenance; characteristics of maintainable software; reengineering; legacy systems; software reuse.
3. Work in team, take a project, test and maintain a small or medium-scale system.
4. Prepare a project plan for a software project that includes estimates of size and effort, a schedule, resource allocation, configuration control, and project risk.
5. Make use of available case tools.

Grading	☒ **Mid-term**	**30%**	☐ **Project**		☒ **Quizzes**	**15%**
	☒ **Final**	**50%**	☐ **Lab**		☒ **Participation**	**5%**

Textbook:

Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, "**Fundamentals of Software Engineering**", Prentice Hall Copyright: 2003, ISBN: 0-13-305699-6,

Reference Book:

Daniel J. Mosley, Bruce A. Posey, "**Just Enough Software Test Automation**", Prentice Hall PTR Copyright 2002, ISBN: 0-13-008468-9

Course Name	Algorithm Analysis & Design			تحليل وتصميم الخوارزميات			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS311	**0901311**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☐ College Requirement ☒ Core ☐ Elective ☒ Comp Science ☐ Information System ☐ Comp Network ☐ Comp Network						
Level	5th Semester			Prerequisite	0817301		

Course Description:

This course includes both algorithms and complexity, the purpose of the first part is to provide students with techniques for designing and analyzing algorithms. The algorithm design paradigms, such as Brute-force; greedy; divide-and-conquer; backtracking; branch-and-bound; heuristics; pattern matching and string/text algorithms; numerical approximation. Students should acquire some understanding on design techniques and algorithms that address an important set of well-defined problems: Depth- and breadth-first traversals; shortest-path algorithms (Dijkstra's and Floyd's algorithms); transitive closure (Floyd's algorithm); minimum spanning tree (Prim's and Kruskal's algorithms); topological sort. In addition, the course will provide different complexity characteristics (P and NP classes, NP-completeness, reduction techniques). Finally, advanced algorithm analysis is studied (randomized algorithm, dynamic programming and combinatorial optimization).

Course Objectives:

1. Use big O, omega, and theta notation to give asymptotic upper, lower, and tight bounds on time and space complexity of algorithms.
2. Determine the time and space complexity of simple algorithms.
3. Select and apply algorithms appropriate to a particular situation.
4. Describe various heuristic problem-solving methods and use numerical approximation to solve mathematical problems, such as finding the roots of a polynomial.
5. Solve problems using the fundamental graph algorithms, including depth-first and breadth-first search, etc.
6. Define the classes P and NP, and explain the significance of NP-completeness.
7. Explain the use of randomization in the design of an algorithm for a problem where a deterministic algorithm is unknown and implement a dynamic programming solution to a problem.

Grading	☒ **Mid-term**	**30%**	☒ **Project**	**10%**	☒ **Quizzes**	**15%**
	☒ **Final**	**40%**	☐ **Lab**		☒ **Participation**	**5%**

Textbook:

Richard Johnsonbaugh, Marcus Schaefer, "**Algorithms**", Prentice Hall 1st edition 2003, ISBN: 0023606924

Reference Book:

Anany V. Levitin, "**Introduction to the design and Analysis of Algorithms**", Addison Wesley, 1st edition 2002, ISBN: 0201743957

Course Name	Professional Responsibility			**المسؤولية المهنية**			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	IS312	**0902312**	**2**		**2**	**0**	**2**
Track	☐ University Requirement ☐ College Requirement ☒ Core ☐ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	5th Semester			**Prerequisite**	0902212		

Course Description:

This course introduces the students to the legal, social, and ethical issues of information technology and use; information rights, property rights, liability, accountability, privacy, security, crime, ethical principles, codes of ethics, "the digital divide", role of PTTs, role of government, role of law enforcement, role of business and industry; professional conduct, social responsibility , and rigorous standards for software testing and reliability, students read, write, discuss, and present reports on these topics, fraud and abuse, electronic communication privacy, mail fraud, credit card abuse, privacy protection, copyright and patent statute, communication decency, law and computer, software engineering code of ethic, name dispute resolution policy.

Course Objectives:

The course is designed to enable students to:

1. Understand selected codes of ethics/professional conduct and apply them to fact situations.
7. Identify certain situations of potential civil or criminal liability arising from the use of technology, including invasions of the rights of persons and violations of laws.
8. Demonstrate the ability to communicate, both in written and oral form, an analysis of fact situations indicating potential problems (e.g., civil or criminal liability, unethical conduct).
9. Demonstrate the ability to advocate, both in class and electronically, for a particular solution, position or analysis relating to issues presented in class

Grading	☒ **Mid-term**	**30%**	☐ **Project**		☒ **Quizzes**	**15%**
	☒ **Final**	**50**	☐ **Lab**		☒ **Participation**	**5%**

Textbook:

Sara Baase, "**A Gift of Fire: Social, Legal, and Ethical Issues for Computing and the Internet**", Third edition, Prentice Hall, ISBN: 0-136-00848-8

Reference Book:

Ernest Kallman and John Grillo, "**Ethical Decision making &Information Technology: an introduction with cases**", 2nd edition, 2001.

Course Name	Computer Organization			معمارية الحاسب			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CE313	**0903313**	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☒ College Requirement ☐ Core ☐ Elective ☒ Comp Science ☐ Information System ☐ Comp Engineering ☐ Comp Network						
Level	5th Semester			Prerequisite	0903213		

Course Description:

Register transfer and microoperations: register transfer language, bus and memory transfer, arithmetic, logic and shift microoperations. Basic computer organization and design: instruction codes, computer registers and common bus systems, computer instruction set, timing and control, instruction cycle, memory reference instructions, input-output and interrupt instructions, complete computer description, and design of basic computer. Hardwired and microprogrammed control: hardwired control methods, hardwired control examples, control memory, address sequencing, microprogram example, and design of control unit. Central processing unit: general register organization, stack organization, single-accumulator organization, instruction formats, addressing modes, data transfer and manipulation, program control, CISC and RISC computers, and examples of CISC and RISC processor. Computer arithmetic: addition , subtraction, multiplication and division algorithms, and floating point arithmetic operations. Input-output organization: input-output interface, asynchronous data transfer, priority interrupt, DMA, IOP, and serial communication. Memory organization: memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory. Student will be trained on the available software such as: MultiSim 6.01, Mentor graphics and Xilinx software product in addition with the products and components of Heathkit educational systems such as Microprocessor modules (EWS 3800 microprocessor modules) beside to the Xilinx product and components for FPGA technology.

Course Objectives:

The student are introduced to

1. Understand the architecture and organization of computing systems and electronic computers,
2. Study the program execution, instruction format and instruction cycle,
3. Design a simple computer using hardwired and microprogrammed control methods,
4. Study the basic components of computer systems besides the computer arithmetics, and
5. Understand input-output organization, and memory organization and management.

Grading	☒ Mid-term	20%	☐ Project		☒ Quizzes	10%
	☒ Final	40%	☒ Lab.	25%	☒ Participation	5 %

Textbook:

William Stallings, "**Computer Organization and Architecture: Designing for Performance**", Prentice Hall , 6th edition , 2004, ISBN: 0-13-035119-9.

Reference Books:

1) V. Carl Hamacher, et al," **Computer Organization**", McGraw Hill, 2001, ISBN: 0071122184.
2) David A. Patterson, John L. Hennessy," **Computer Organization & Design: The Hardware-Software Interface**", Morgan Kaufmann, 2004, ISBN 1558606041.

Course Name	Logic & Proof Techniques			**المنطق وطرق الإثبات**			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	Math125	**0817125**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☐ College Requirement ☒ Core ☐ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	5th Semester			**Prerequisite**	0817301		

Course Description:

The course includes two formal systems: The proposition logic (statements, connective, conditional, negation) and predicate logic (quantifier, occurrence, and free variables). The course starts by presenting a review of the basic concepts of the set theory, functions, and relations. The emphasizes will be placed on types of the proof (direct, contra-positive, contradiction, counterexample, and existence). In addition the course covers other proof techniques useful in computer sciences such as mathematical induction.

Course Objectives:

1. Know the basic of the set theory, function, and relation
2. Analysis and explain the fundamental concepts of proposition logic.
3. Analysis and explain the fundamental concepts of predicate logic.
4. Explain and apply types of proofs.
5. Explain and apply mathematical induction.

Grading	☒ **Mid-terms**	**30%**	☒ **Assignments**	**10%**	☒ **Quizzes**	**15%**
	☒ **Final**	**40%**	☐ **Lab**		☒ **Participation**	**5%**

Textbook:

Krantz, Steven G. **"Logic and Proof technique for computer science"** Springer, 2002, ISBN 9780817642204

Reference Book:

G. C. Chartrand, A. D. Polimeni, P. Zhang **"Mathematical Proofs"** second edition, Addison Wesley, 2008, ISBN 0321526732.

Course Name	Computer Data Security & Privacy			سرية وحماية بيانات الحاسب			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS320	**0901320**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☐ College Requirement ☒ Core ☐ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	6th Semester			**Prerequisite**	0904223 & 0901221		

Course Description:

This course presents relevant aspects of computer security and privacy. It includes the following topics: Security fundamentals: concepts and principles, vulnerability, threat models, attacks to computer systems. Data base and networks, cryptography: notion of public key, private key. Cryptology, authentication, digital signatures, key management and cryptography protocols, building secure systems, security in operating systems: protection mechanisms, OS services, access control, UNIX and windows NT security, network security: architecture and standards, authentication, access control, confidentiality, integrity, network management, internet security, firewalls , DNS and routers, computer security policy and procedures, and ISO security standards. Students will also be trained to use some specific security software like: PGP software.

Course Objectives:

The main objectives of this course are:

1. To introduce students to concepts and principles of security, cryptographic systems, and protection mechanisms of operating systems,
2. To make the student able to design and build secure system and secure networks relying on well-known security software,
3. To make the student able also to manage networks,
4. To introduce the student to standard computer security policies and procedures.

Grading	☒ **Mid-term**	**30%**	☒ **Project**	**10%**	☒ **Quizzes**	**15%**
	☒ **Final**	**40%**	☐ **Lab**		☒ **Participation**	**5%**

Textbook:

Rick Lehtinen, Deborah Russel, G.T. Gangemi, Sr **"Computer Security Basics"**, Second Edition, June 2006, Oreilly publication, ISBN: 0-596-00669-1

Reference Books:

W. Stallings & L. Brown, **"Computer Security, Principles and Practice**" , Pearson Education, ISBN: 0-136-00424-5

Course Name	Language Theory & Finite Automata			**نظرية اللغات**			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS321	**0901321**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☒ College Requirement ☐ Core ☐ Elective ☒ Comp Science ☐ Information System ☐ Comp Network ☐ Comp Network						
Level	6th Semester			**Prerequisite**	0817125		

Course Description:

The purpose of this course is to provide students with a theoretical base in formal language theory for understanding concepts related to programming, automata theory and compilation techniques. The explicit purpose of the course is to illustrate the correspondence between the generation system (grammar) and recognition system (automata). Recognition systems include deterministic and non-deterministic acceptors, process with finite state machines to recognize regular grammar and process with push-down stores, to recognize context-free grammars. Finite automata and regular language present aspects of automata theory (alphabets, languages, transition diagram, deterministic finite automata). Pushdown automata and context-free grammars employs formal language theory as the vehicle for presenting concepts related to the theory of programming languages (syntax analysis LL(k), syntax analysis LR(k). Finally, one give an introduction to Turing's machine (recognition languages, decidable language, Church-Turing thesis), student should understand limits and capacities of Turing's machine (therefore a computer) to recognize (or not) a language.

Course Objectives:

1. Understand the language notion.
2. Analyze and explain the behavior of finite automata.
3. Understand limits and capacities of finite automata do the link with regular grammar.
4. Analyze and explain the behavior of push-down automata.
5. Understand limits and capacities of push-down automata do the link with context-free grammar.
6. Describe how to develop syntax analyze procedure (LL, LR) from a given grammar.
7. Understand limits and capacities of Turing's machine to recognize languages.

Grading	☒ **Mid-term**	**30%**	☐ **Project**		☒ **Quizzes**	**15%**
	☒ **Final**	**50%**	☐ **Lab.**		☒ **Participation**	**5 %**

Textbook:

John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman "**Introduction to Automata Theory, Languages, and Computation**", Third Edition, Pearson/Addison-Wesley, 2007, ISBN 0-321-46225-4

Reference Books:

Michael Sipser, "**Introduction to the Theory of Computation**", 2nd Edition Thomson, 2006.

Course Name	Human Computer Interaction			اتصال الإنسان بالحاسب			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	IS322	**0902322**	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☐ College Requirement ☒ Core ☐ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	6th Semester			Prerequisite	0901220		

Course Description:

This course provides an overview and introduction to the field of HCI. It introduces students to tools, techniques, and sources of information about HCI and provides systematic approach to design. The course increases awareness of good and bad design through observation of existing technologies, and teaches the basic skills of task analysis, and analytic and empirical evaluation methods. The student will be acquainted with the whole design process: HCI in the design process, design rules, implementation support, evaluation techniques, universal support, etc...He also studies some relevant models and theories: cognitive models, communication models, task analysis, dialog notations and design, modeling rich interaction, etc. Final chapters will cover some alternative realities, multimedia, global information systems, and the Web. Students will also participate in a laboratory where they will practice HCI techniques in an independent, self defined project. Students will be trained on some HCI software like: AlphaUIMS, SuperCard, ISA dialog Manager, InterMaphics.

Course Objectives:

After completing this course the student will:

1. Acquire some useful HCI techniques in practice,
2. Cover the latest topics in multimedia, global information systems, and the web-based models for rich interaction,
3. Increase coverage of social and contextual models and theories related to HCI design processes,
4. Be acquainted to new topics like: interaction design, universal access, and rich interaction.

Grading	☒ Mid-term	25%	☒ Project	15%	☒ Quizzes	10%
	☒ Final	30%	☒ Lab	15%	☒ Participation	5%

Textbook:

Alan Dix, Janet E. , Gregory D., and Russell Beale, "**Human-Computer Interaction**", Prentice Hall, 3rd Ed. , 2003, ISBN: 0-13-046109-1.

Reference Book:

M.Kaffman, "**HCI Models, theories and frameworks**", 2003, ISBN: 1-55860-808-7.

Course Name	Web-Based Systems			النظم المبنية على الويب			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	IS323	**0902323**	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☐ College Requirement ☒ Core ☐ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	6th Semester			**Prerequisite**	0904223 & 090222		

Course Description:

Overview of web based application, setup and configuration of web server, setup and configuration of eclipse and MySQL, Introduction to HTML: Basic Tags, Tables, Lists, Form, Frames, Images, Hyper links, Introduction to JDBC: Drivers, Types of Drivers, Connection pooling, Java Server; Pages: Scriplet, Expression, Declaration, JDBC & JSP, Implicit JSP Objects, Introduction to XML; Introduction to JavaScript: JavaScript Popup Boxes, Functions, Events, Objects, Web Security and credit card Transactions; Web Performance: Packaging and Deployment, Internationalization and localization. Java Servlet, Parameter externalization.

Course Objectives:

The objectives of the course are:

1. To develop and apply powerful tools to retrieve information from the Internet,
2. To understand modern text indexing methods,
3. How to design e-commerce sites
4. How to help Educators to use the web to support their own teaching,
5. How to build a Web based Education system,
6. To assign projects involving Web-based search engines,
7. To focus on development tools such as Java, JSP, ERVLET, XML, HTML, JavaScript, etc.

Grading	☒ **Mid-term**	**25%**	☒ **Project**	**15%**	☒ **Quizzes**	**10%**
	☒ **Final**	**30%**	☒ **Lab**	**15%**	☒ **Participation**	**5%**

Textbook:

Marty Hall, Larry Brown **"Core Web Programming",** 2nd Edition, A Sun Microsystems Prentice Hall PTR Book, ISBN: 0-13-089793-0

Reference Books:

1. Nicholas C. Zakas "**Professional JavaScript for Web Developers**", (2009), ISBN: 047022780X
2. Allaramaju, Subrahmanyam "Professional Java Server Programming J2ee: 1.3" WROX Press Ltd, ISBN: 1861005377
3. Thomas A. Powell, "HTML: The Complete Reference", McGRAW-Hill, ISBN: 0-07- 212951-4

Course Name	Numerical Analysis			**التحليل العددي**			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	Math___	**0817___**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☐ College Requirement ☒ Core ☐ Elective ☒ Comp Science ☐ Information System ☐ Comp Engineering ☐ Comp Network						
Level	6th Semester			**Prerequisite**	0817111		

Course Description:

Numerical analysis is concerned with finding numerical solutions to problems that analytical solutions do not exist or are not readily obtainable. This course provides an introduction to the subject and treats the topics of solving nonlinear equations in one variable, interpolation and approximation of functions by simpler computational building blocks, numerical differentiation and divided differences, numerical integration, numerical solutions of ordinary differential equations and boundary value problems, and direct methods for solving linear systems. These topics are of great practical importance in science, engineering, and also have intrinsic mathematical interest.

Course Objectives:

At the end of semester, students will be in a position to:

1. Develop efficient and stable algorithms for finding roots of non-linear equations,
2. Understand the use of interpolations and approximation of function.
3. Investigate the principle of numerical differentiation and integration,
4. Develop stable solution algorithms for ordinary differential equations,
5. Able to solving linear systems of equations.

Grading	☒ **Mid-term**	**30%**	☒ **Project (Assignment)**	**10%**	☒ **Quizzes**	**10%**
	☒ **Final**	**40%**	☐ **Lab.**		☒ **Participation**	**5 %**

Textbook:

Kendall E. Atkinson.” **Elementary Numerical Analysis**.” Wiley, New York, second edition, 1993. (ISBN: 0-471-60010-5).

Reference Books:

Mathews, J. H., and K. D. Fink. **“Numerical Methods Using MATLAB.”** 3rd edition. Upper Saddle River, NJ: Prentice Hall, 1998. (ISBN: 9780132700429).

Course Name	Training (Co-op) Course			التدريب (التعاوني) العملي		
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Training	Tot.
	CS330	**0901330**	**3**		**12**	**12 weeks**
Track	☐ University Requirement ☐ College Requirement ☒ Core ☐ Elective ☒ Comp Science ☐ Information System ☐ Comp Network ☐ Comp Network					
Level	Between 3rd and 4th year			**Prerequisite**	90 Credit hours	

Course Description:

This course should be taken by those students completed 90 credit hours. The course period is 12 weeks long and must be during summer of the third academic year in. Students must be oriented in one of the companies, and well supervised so to accomplish correctly this training. The course must constitute a link between the theoretical and scientific academic background and the work environment. It provides a better understanding and a clear view of the real-world work environment. It provides also students complementary knowledge and training such as facing and dealing with real-world problems, being trained to work in team-works. After completing the summer training, students must submit a report. An oral exam is held by a committee consisting of both faculty members and outsider supervisors.

Course Objectives:

1. Develop student skills using practical applications.
2. Acquaintance the work environment.
3. Prepare the students to transfer from learning environment to work environment.
4. Acquaintance the applied work systems.
5. Understand mechanism of different applications.
6. Understand the attitude and the manner of the work.
7. Compare the studying courses with real world.

Grading	**Report**	**40%**	**Final Project**	**60%**

Textbook:

Reference Books:

Course Name	Project Proposal			مقترح مشروع			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS410	**0901410**	**2**		**2**	**0**	**2**
Track	☐ University Requirement ☐ College Requirement ☒ Core ☐ Elective ☒ Comp Science ☐ Information System ☐ Comp Network ☐ Comp Network						
Level	7th Semester			Prerequisite	Department Approval		

Course Description:

In this course, students choose a project subject and define the objectives of the project under the supervision of a faculty member, and prepare the project proposal including: defining the statement of the problem, defining system requirements, defining different candidate solutions for the problem of study, making feasibility study for different candidate solutions, defining the best candidate solution, defining time table schedule. Students should present the project interim report at the end of the semester, grading will be obtained by oral examination to be held by a committee from faculty members. Students will be allowed to work individually or in groups.

Course Objectives:

After completing this course, the student will have skills to:

1. Deal with a real life project.
2. Define the statement of the problem;
3. Define the system requirements;
4. Perform a feasibility study;
5. Define different alternative solutions;
6. Learn how to make a time table; and follow up strictly its content
7. Develop skills in oral presentation
8. Write project proposal.

Grading	☒ Bi Weekly Reports	40%	☒ Final oral presentation and report.	60%

Textbook:

Lynn E. Miner & Jeremy T. Miner , "**Proposal Planning and Writing**", Greenwood Publishing Group; 3rd edition (February 28, 2003), ISBN 1573564982.

Reference Book:

David L. Olson, David Olson "**Introduction to Information Systems Project Management**", 2003. ISBN: 0072872705.

Course Name	Artificial Intelligence			الذكاء الاصطناعي			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab	Tot.
	CS411	0901411	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☐ College Requirement ☐ Core ☒ Elective ☒ Comp Science ☐ Information System ☐ Comp Network ☐ Comp Network						
Level	7th Semester			**Prerequisite**	0817125		

Course Description:

This course is an introduction to AI topics, its main purpose is to provide students with techniques for representing knowledge and their treatments in a software (knowledge base, meta-knowledge, rule, frame, script, Bayesian nets, fuzzy sets and possibility theory). Student should know advantages and difficulties to make explicit intelligence,it means he should know how to represent knowledge and reasoning. The purpose is to produce students capable of representing knowledge and solving problem using classic and heuristic search (Problem spaces, brute-force search, best-first search, Hill-Climbing, A*, minimax search, alpha-beta pruning), reasoning and inference techniques (forward and backward chaining, inference in propositional logic and first order logic, no monotonic inference, probabilistic reasoning, default reasoning, temporal and spatial reasoning, fuzzy logic). The course provides a set of tools for solving problems that are difficult or impractical to solve with other methods, such as: speech and language understanding, computer vision, multi-agents systems, speech recognition, natural language understanding and robotics. These tools capabilities are covered by a broad set of general and specialized knowledge representations and reasoning mechanisms. The student has to know when an AI approach is appropriate for a given problem, and to be able to select and implement a suitable AI method.

The main topics covered include an overview of knowledge based systems and an practical view of expert systems, their use as an organizational decision making tool and method for representing knowledge and fundamental techniques for developing knowledge-based systems. Students must be introduced to Prolog, Lisp, and moreover some popular knowledge-based systems software like: CLIPS, Protest, and some expert system shells like Corvid, Visirule, Babylon, mike, experts.

Course Objectives:

We expect that by the end of the course students will have skills to:

1. Differentiate the concepts of optimal reasoning and human-like reasoning/behavior.,
2. List examples of intelligent systems that depend on models of the world,
3. Describe the role of heuristics and the need for tradeoffs between optimality and efficiency,
4. Compare and contrast the most common models used for structured knowledge representation, highlighting their strengths and weaknesses,
5. Have skills in selecting appropriate knowledge representation tools; designing knowledge-Based systems to process knowledge using logic programming tools or expert system shells.
6. Have skills in expressing knowledge in natural (fuzzy) expressions, and designing fuzzy inference systems.

Grading	☒ **Mid-term**	**20%**	☒ **Project**	**10%**	☒ **Quizzes**	**10%**
	☒ **Final**	**35%**	☒ **Lab.**	**20%**	☒ **Participation**	**5 %**

Textbook:

Stuart J. Russell, Peter Norvig, "**Artificial Intelligence: A Modern Approach**", Prentice Hall, 2nd Ed., 2003, ISBN: 013103805-2

Reference Book:

A.Cawsey,"**The Essence of Artificial Intelligence**", Ed.Wesley 2003,ISBN:013571779-5

Course Name	Mobile Computing			**الحوسبة المتنقلة**			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS412	**0901412**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☐ College Requirement ☒ Core ☐ Elective ☒ Comp Science ☐ Information System ☐ Comp Network ☐ Comp Network						
Level	7th Semester			**Prerequisite**	0904223		

Course Description:

This course presents aspects of mobile computing. It shows how mobile devices like PDA's, notebooks, and mobile phones can work with fixed network computers in building files, database and web client-server systems for achieving the goal of computing in wireless mobile environment anytime and anywhere. The technologies involved to realize such a system are covered as well as the fundamental concepts of mobile computing. This course focuses on data management in mobile computing environment, and in particular in distributed mobile file, database, web client-server, and object systems. Students in this course are assigned a project to demonstrate their ability to handle mobile computing operations. The student will use some systems like Aglete and Concord systems.

Course Objectives:

1. Study software architecture in a mobile computing environment,
2. Understand system support for dealing with disconnected operations, weak connectivity, broadcast and mobility,
3. Understand information representation,
4. Study dissemination and management, Location management, caching and replication, and
5. Study concurrency and recovery and many other important related issues.

Grading	☒ **Mid-term**	**25%**	☒ **Project**	**15%**	☒ **Quizzes**	**10%**
	☒ **Final**	**45%**	☐ **Lab.**		☒ **Participation**	**5 %**

Textbook:

C.S.R. Prabhu **"Mobile Computing: A Book of Readings"** illustrated Edition, Orient Blackswan, 2004, ISBN: 8-173-71404-5

Reference Books:

1. Geoffrey," **Mobile Commerce and Wireless Computing Systems**", Addison-Wesley, 2003, ISBN 0201752409.
2. Deitel H. Deitel et al," **Wireless Internet & Mobile Business**", Prentice Hall, 2001, ISBN 0-13-062226-6.

Course Name	Project Implementation			تنفيذ مشروع			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS420	**0901420**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☐ College Requirement ☒ Core ☐ Elective ☒ Comp Science ☐ Information System ☐ Comp Network ☐ Comp Network						
Level	8th Semester			**Prerequisite**	0901410		

Course Description:
Project implementation course offers students an opportunity to assemble their knowledge acquired throughout their BS curriculum to realize a final project. This would require them to gather information about the proposed subject and realize a final report as well as to develop a system practically. At this stage, students must carry on all phases system development of the subject already defined in the precedent course (Project proposal), and under the supervision of the same supervisor (as possible). At the end of the semester, students are asked to make an oral presentation with the presence of faculty members as referees.

Course Objectives:
After completing this course, the student will have the:

1. Ability to conduct a real life project.
2. Ability to find alternative solutions.
3. Ability to implement the selected project.
4. Ability to establish time table, and follow up strictly its content.
5. Ability to learn how to test the implementation.
6. Ability to develop skills in oral presentation, and present project work.
7. Ability to communicate through seminars
8. Ability to highlight strengths of the project

Grading	☒ **Weekly Report**	**40%**	☒ **Final Report**	**60%**

Textbook:
There is no text book for this course

Reference Book:
John McManus, Trevor Wood-Harper "**Information Systems Project Management: Methods, Tools and Techniques**", 2003. ISBN: 0273646990.

Course Name	Selected Topics in Computer Sciences			موضوعات مختارة في علوم الحاسب			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS421	**0901421**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☐ College Requirement ☒ Core ☐ Elective ☒ Comp Science ☐ Information System ☐ Comp Network ☐ Comp Network						
Level	8th Semester			Prerequisite	0901410		

Course Description:

Topics are selected from different areas in Computer Science that are not covered in the description of the courses listed in the curriculum. This course will cover subjects of recent issues and trends in computer science and may be let to the willing of the instructor, and must cover but not limited to the following advanced subjects: new trends in the Web technology, new trends in distributed and mobile computing, new trends in Artificial intelligence, new trends in software engineering, etc. Students are assigned individual projects in these specific fields: Project Reports and seminars, so to demonstrate their ability in research and oral presentations. Projects are discussed in workgroups so to involve the whole class in these subjects.

Course Objectives:

After completing this course, the student will:

1. Develop abilities and skills in various advanced topics in computer science,
2. Develop skills in collecting information and documentation,
3. Develop skills in reporting,
4. Develop skills in oral presentation, and presenting seminars,
5. Develop abilities in research.

Grading	☒ **Mid-term**	**25%**	☒ **Project**	**25%**	☐ **Quizzes**	
	☒ **Final**	**45%**	☐ **Lab**		☒ **Participation**	**5%**

Textbook: (*)

(*) It is let to the willing of the student with the collaboration of the instructor in choosing the appropriate manuals and references in the specific subjects.

Reference Books: (*)

Course Name	Basic Language Translation			**مترجمات لغات البرمجة**			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS413	**0901413**	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☐ College Requirement ☐ Core ☒ Elective ☒ Comp Science ☐ Information System ☐ Comp Network ☐ Comp Network						
Level	8^{th} -9^{th} Semester			**Prerequisite**	0901321		

Course Description:

Fundamental concepts in the design and implementation of compilers: lexical analysis, syntax analysis, intermediate code generation, code generation and optimization.

Course Objectives:

1. Apply the principles in the theory of computation to the various stages in the design of compilers;
2. Explain the stages involved in the translation process;
3. Analyze problems related to the stages in the translation process;
4. Design a compiler for a simple programming language; and
5. Implement a compiler based on its design.

Grading	☒ **Mid-term**	**25%**	☒ **Project**	**15%**	☒ **Quizzes**	**10%**
	☒ **Final**	**45%**	☐ **Lab**		☒ **Participation**	**5%**

Textbook:

Alfred V. Aho, Monica Lam, Ravi Sethi, and Jeffrey D. Ullman **"Compilers: Principles, Techniques, and Tools"**, Second Edition Pearson Addison-Wesley, 2006. ISBN: 0-321-48681-1

Reference Book:

Y.N.Srikant, P. Shankar, "**The Compiler design handbook"**, CRS Press2002, ISBN: 084931240X

Course Name	Modeling & Simulation			النمذجة والمحاكاة بالحاسب الآلي			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS414	**0901414**	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☐ College Requirement ☐ Core ☒ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	7^{th} -8^{th} Semester			Prerequisite	0817301		

Course Description:

There are four classifications of models: discrete or continuous, probabilistic or deterministic, static or dynamic, and open loop or closed loop. The course objective is to produce students who are capable of modeling and simulating discrete, probabilistic, dynamic, and open loop system as well analyzing, verifying and validating the simulations results. The purpose of this course is to provide students with a theoretical base in discrete-event modeling and simulation for applying concepts related to computer networks and information system modeling (random numbers, Monte Carlo methods, Probabilistic modeling, Queuing theory models, Markov models and chains, arrival laws, service laws, birth-dead process, stochastic process, stationary process, stochastic analysis, networks analysis and routing algorithms, verification and validation of simulation models). Discrete production systems are studied (time flow mechanism, Petri nets). Students should complete a major project using simulation models and a standard simulation language. Students will be trained on some software tools such as: ARENA, QNAP, and PETRI NETS

Course Objectives:

1. Discuss the fundamental concepts of computer modeling and simulation
2. Be proficient in the use of computer simulation tools.
3. Describe several established techniques for prediction and estimation.
4. Compare and contrast methods for random number generation.
5. Design, code, test, and debug simulation programs.
6. Design and build a simulation model for computer area (communication and computer networks, management information system).

Grading	☒ **Mid-term**	**25%**	☒ **Project**	**15%**	☒ **Quizzes**	**10%**
	☒ **Final**	**45%**	☐ **Lab**		☒ **Participation**	**5%**

Textbook:

Jerry Banks, John S. Carson, "**Discrete-event system simulation"**, Prentice Hall 2001, ISBN: 0130887021

Reference Books:

1) Chris Chung, Christopher A. Chung, "**Simulation modeling Handbook: A practical approach** ", CRC Press 2003, ISBN: 0849312418
2) Claude Girault, Rudiger Valk, "**Petri Nets for Systems Engineering**", Springer verlag 2002, ISBN: 3540412174

Course Name	Advance Programming Language			لغة برمجة متطورة			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS415	**0901415**	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☐ College Requirement ☒ Core ☐ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	7^{th}-8^{th} Semester			**Prerequisite**	0901221 & 0901321		

Course Description

Work with the .NET Frame work, with Common Type System and class libraries, Decompose applications into libraries and namespaces, Recognize and use common .NET and C# idioms like IDisposable and using Write code that works well with the garbage collector, Handle and throw exceptions properly, Write Windows Forms and WPF applications, Design and develop network services using WCF, Develop web applications using ASP.NET , You will learn how to develop both rich client, Windows Forms applications as well as effective and efficient Web applications. In addition, many of the supporting technologies and classes, such as ADO.NET and Web Services, will be covered. Connected data access, Connecting to a database, Data Readers, Stored Procedures, Introduction to Web Services, Introduction to UDDI, Introduction to WSDL, Consuming a Web Service , Creating a Web Service , Serializing .NET types via Web Services

Course Objectives:

The student are introduced to

1. How is .NET similar to other environments and what features are unique than other languages.
2. What are best practices for dealing with the Garbage Collector, Exceptions, and Threads.
3. How do they deal with versioning and deployment.
4. List the major elements of the .NET Framework and explain how they fit into the .NET platform. How are the .NET class libraries and the C# language evolving in .NET 3.5.
5. Explain the main concepts behind the common language runtime and use the features of the .NET Framework to create a simple application.
6. Create and use components in Windows Forms-based and ASP.NET-based applications.
7. Use the .NET Framework class library to efficiently create and manage strings, arrays, collections, and enumerators.
8. Use delegates and events to make an event-sender object signal the occurrence of an action to an event-receiver object.
9. Read from and write to data streams and files.

Grading	☒ **Mid-term**	**20%**	☐ **Project**		☒ **Quizzes**	**10%**
	☒ **Final**	**40%**	☒ **Lab**	**25%**	☒ **Participation**	**5%**

Textbook:

James Conard, Patrick Dengler, Brian Francis, et al ," **Introducing .Net** ", Wrox Press, ISBN: 1861004893.

Reference Book:

1. Vincent Varallo," **ASP.NET 3.5 Enterprise Application Development with Visual Studio 2008**", Wrox Press, ISBN: 0470396865
2. Microsoft corporation " **Developing Web Applications with Microsoft Visual Basic .NET and Microsoft Visual C# .NET**", Microsoft Press.

Course Name	Data Mining and Data Warehousing			التنقيب عن وتخزين البيانات			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	IS414	**0902414**	**3**		**3**	**1.5**	**4.5**
Track	☐ University Requirement ☐ College Requirement ☐ Core ☒ Elective ☒ Comp Science ☒ Information System ☐ Comp Network ☐ Comp Network						
Level	7^{th} -8^{th} Semester			**Prerequisite**	0901120 & 0902222		

Course Description:

Data mining concepts: why data mining?, cycles of data mining, the various cycles in practice, data mining methodology, measurement of the effectiveness of data mining. It will introduce various data mining techniques: the market based analysis, clustering, link analysis, decision trees, artificial neural networks, genetic algorithms,; data mining and the corporate data warehouses, OLAPs, and choosing the right tool for the job, putting data mining to work. The course introduces also data warehouse concepts: Gradual changes in computing, dynamic reports, data Marts, operational Data stores, and data warehouse cost-benefit analysis. Some other concepts are described such as: Warehousing strategy, warehouse management and support processes, data warehouse planning, data warehouse implementation, data warehouse maintenance and evolution, warehouse applications and warehouse software, and recent warehouse trends. Student will be trained on some well-known data mining software like: Matryx98, Cart, Megaputer PolyAnalyst, KnowledgeAccess, Cognos Power Play.

Course Objectives:

1. Understand Data Warehouse and OLAP technology for data mining: Data preparation, data mining primitives, languages, and system architectures,
2. Make mining association with rules in large databases, do classification and prediction (with various techniques: Cluster analysis, neural nets, genetic algorithms.),
3. Develop and understand data mining applications and trends of data mining,
4. Deal with Warehousing strategy, warehouse management and support processes,
5. Have skills in data warehouse planning, data warehouse implementation, data warehouse maintenance and evolution,
6. Use some warehouse software related to some warehouse applications, and be acquainted with recent warehouse trends.

Grading	☒ **Mid-term**	**20%**	☒ **Project**	**15%**	☒**Quizzes**	**10%**
	☒ **Final**	**40%**	☒ **Lab**	**10%**	☒**Participation**	**5%**

Textbook:

J. Han, M. Kanber, "**Data Mining: Concepts and Techniques**", 2000, Morgan Kauffman Publishers, ISBN: 1-55860-489-8.

Reference Books:

1. Margaret H. Dunham "**Data Mining: Introductory and Advanced Topics**", Prentice Hall; 1^{st} edition, 2002, ISBN: 0130888923.
2. M.Humphies, M.W.Hawkins, M. C.Dy. Harrys, "**Data Warehousing: Architecture and Implementation**", Prentice Hall, 1999, ISBN: 0130809020. 0262232138.

Course Name	Multi Agents			تعدد الوكيل			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS422	**0901422**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☐ College Requirement ☐ Core ☒ Elective ☒ Comp Science ☐ Information System ☐ Comp Network ☐ Comp Network						
Level	8^{th} -9^{th} Semester			**Prerequisite**	0901221		

Course Description:

Multi-agent system is a subfield of artificial intelligence. It studies the interactions of computational agents. These agents can represent real world parties, and they can have different preference structures. A key research goal is to design open distributed systems in a principled way that leads to globally desirable outcomes even though every participating agent only considers its own good and may act insincerely. The course covers relevant results in AI, game theory, market mechanisms, voting, auctions, coalition formation, and contracting. Effects of different computational limitations of the agents are discussed. Software tools for multi-agent systems are also presented. This course is elective and targeted to senior-level undergraduates. Application examples are presented in networks, operating systems, and manufacturing. Students will be trained on a multi-agent system software like: IDEAL: That is a Web-based, distributed, multi-agent learning system.

Course Objectives:

2. Understand Game Theoretic and Decision Theoretic Agents ;
3. Deal with multi-agency including: Communication, Security , Agent Adaptation and learning, and how Modal Logics as logical foundations of multi-agency is used to represent notions in multi-agency;
4. Understand Agent Architecture: Mobility, Autonomy and Teaming;
5. Deal with Agent Oriented Software Engineering: Multi-Agent organization,
6. Communication, negotiation, coordination, cooperation;
7. Understand Social issues: Sociability, Benevolence, Preference, Power, Trust, Teaming, Norms, Roles, etc.
8. Be aware of some recent Cognitive models.

Grading	☒ **Mid-term**	**25%**	☒**Project**	**15%**	☒**Quizzes**	**10%**
	☒ **Final**	**45%**	☐ **Lab**		☒**Participation**	**5%**

Textbook:

Gerhard Weiss, "**Multi-agent Systems: A Modern Approach to Distributed Artificial Intelligence**", MIT press, 2000, ISBN: 0262731312.

Reference Books:

1. Jacques Ferber, "Multi-agent Systems: **An Introduction to Distributed Artificial Intelligence**", Addison-Wesley Pub Co; 1999, ISBN: 0201360489.
2. Michael J. Wooldridge, "**Reasoning About Rational Agents**", MIT Press; 2000, ISBN: 0262232138.

Course Name	Computer Graphics & Vision			الرؤية والرسومات بالحاسب الآلي			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS423	**0901423**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☐ College Requirement ☐ Core ☒ Elective ☒ Comp Science ☐ Information System ☐ Comp Network ☐ Comp Network						
Level	8^{th} -9^{th} Semester			**Prerequisite**	0901220		

Course Description:

Computer graphics is extremely exciting to students and can serve as an excellent motivator for students, particularly to the extent that the course structure offers students the opportunity to create graphical systems as complementary skills to the basic curriculum courses. Although implementation must be a central component of this course, it is equally important to emphasize the mathematical underpinnings of the area, thereby reinforcing the relationship between theory and practice. The main topics of the course include: Computer vision concepts, graphic systems, fundamental techniques in graphics, graphical algorithms, graphical user-interface design, graphical user-interface programming, and computer animation. Students will also be trained on some well- known graphics software like: Lxb (GUI builder), AlphaUIMS, and many other User Interface Software tools.

Course Objectives:

The main objectives of this course is to make the student :

1. Offer a meaningful critique of graphical interfaces that incorporates an understanding of the principles of HCI design,
2. Apply the principles that underpin the design of graphics systems,
3. Describe the range of tools that can be used to support the development of graphical systems,
4. Build GUI's and programming environments,
5. Use existing graphics packages to develop appropriate graphical applications.

Grading	☒ **Mid-term**	**25%**	☒ **Project**	**15%**	☒ **Quizzes**	**10%**
	☒ **Final**	**45%**	☐ **Lab**		☒ **Participation**	**5%**

Textbook:

B. Jahne, "**Computer Vision and Applications**", Elsevier Ed., 2000, ISBN 0123797772

Reference Books:

1. R. Parent, "**Computer Animation: Algorithms and Techniques**", Ed. Elsevier, 2002, ISBN: 1-55860-579-7
2. A.Paeth, "**Graphics Gems V**", Ed. Kauffman, 1995, ISBN: 0-12-543455-3.

Course Name	Advanced Operating Systems			نظم تشغيل متقدمة			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS424	**0901424**	**3**		**3**	**0**	**3**
Track	☐ University Requirement ☐ College Requirement ☐ Core ☒ Elective ☒ Comp Science ☐ Information System ☐ Comp Network ☐ Comp Network						
Level	7^{th}-8^{th} Semester			**Prerequisite**	0901311 & 0904223		

Course Description:

This course presents a review of the basic concepts of the operating systems (processes and threads, process states, process scheduling), an introduction to distributed systems (what is a distributed system? What is a real-time system? What is a parallel system?) And some sample distributed application. This course includes both concurrency and distributed systems; the purpose of the first part is to provide students with some understanding on mutual exclusion and synchronization (principles of concurrency, mutual exclusion - software and hardware approaches-, semaphores, monitors, message passing, readers/writers problems) and on deadlock and starvation (principles of deadlock, deadlock prevention, deadlock detection, deadlock avoidance, dining philosophers problem). The distribution concerns: memory management (review of centralized memory management, simple and shared memory model, distributed shared memory and memory migration), distributed process management (distributed scheduling algorithm choices, scheduling algorithm approaches, coordinator elections and orphan processes) and distributed file systems (distributed name service, distributed file service, distributed directory service and NFS. X.500). Students will be trained on some software tools such as: Unix, WINDOWS.NT, and CORBA.

Course Objectives:

1. Understand the concepts of the distributed systems.
2. Describe the principle of the concurrency and the approaches to achieve mutual exclusions
3. Investigate the principle of the deadlock and the approaches used in handling it.
4. Analyze and explain the algorithms used in shared memory management.
5. Be able to understand the algorithms used in distributed process management.
6. Discuss the algorithms used in distributed file systems.

Grading	☒ **Mid-term**	**25%**	☒**Project**	**15%**	☒ **Quizzes**	**10%**
	☒ **Final**	**45%**	☐ **Lab**		☒ **Participation**	**5%**

Textbook:

Andrew S. Tanenbaum, Maarten Van Steen, "**Distributed systems: principles and paradigms**", Prentice Hall, 1^{st} edition 2002, ISBN: 0130888931

Reference Books:

W. Stallings, "**Operating Systems: Internals and Design Principles"**, Prentice Hall International, 4^{th} edition 2000, ISBN: 0130319996

Course Name	Mobile Application Programming			برمجة تطبيقات الأجهزة المتنقلة			
Course Information	Course Code	Course No	Credit Hours	Contact Hours	Lec.	Lab.	Tot.
	CS425	**0901425**	**3**		**1.5**	**3**	**4.5**
Track	☐ University Requirement ☐ College Requirement ☐ Core ☒ Elective ☒ Comp Science ☐ Information System ☐ Comp Engineering ☐ Comp Network						
Level	7^{th} -8^{th} Semester			**Prerequisite**	0904223		

Course Description:

This course gives an introduction into the programming of applications for smart mobile phones. The intention of this course is to provide students with information to make their own applications for mobile phones. Main focus is on applications with network support such as client-server applications. So far *Symbian OS*, *Windows Mobile* and *Maemo* are taken under consideration as development platforms. *Python* for *S60*, Java 2 Micro Edition (*J2ME*) and *Symbian C++* are the programming languages chosen for applications' development during the course. The course can be held at different levels offering basic and enhanced knowledge, thus students will gain technical issues that improve their programming skills and opens mass of jobs opportunities.

The course will give a detailed introduction to the different platforms and programming languages for mobile phones. It will also provide students with the skills to program in Python for S60. After this course the students will be able to program their own applications.

Course Objectives:

6. It provides students with information to make their own applications for mobile phones.
7. It enables the students to build effective user interfaces for mobile applications.
8. It makes the students able to design and build mobile applications.

Grading	☒ **Mid-term**	**20%**	☐ **Project**	**20%**	☒ **Quizzes**	**5%**
	☒ **Final**	**25%**	☒ **Lab.**	**25%**	☒ **Participation**	**5 %**

Textbook:

Frank H.P. Fitzek, Frank Reichert, "**Mobile Phone Programming and its Application to Wireless Networking**," Springer, 2007.

Reference Books:

1. Valentino Lee; Heather Schneider; Robbie Schell, "**Mobile Applications: Architecture, Design, and Development,"** Prentice Hall, 2004.
2. Martyn Mallick, "*Mobile and Wireless Design Essentials*," Wiley, 2003.
3. Ivo Salmre, "Writing Mobile Code: Essential Software Engineering for Building Mobile Applications," Addison-Wesley Professional, 2005.