وزارة التعليم العالي والبحث العلمي / جامعة الموصل

كلية علوم الحاسوب والرياضيات مناهج قسم علوم الحاسوب

نظام (بكالوريوس 2022-2023)

Logical Design	**اسم المادة**
COMP١٠1	**رمز المادة**
اجباري قسم	**نوع المادة**
٣	**عدد الوحدات**
٢ نظري + ٢ عملي	**عدد الساعات**
This course presents the introductory concepts that are needed in order to design digital systems. Classical methods, including Boolean algebra, combinational and sequential logic design methods as well number systems will be presented. Additionally this course will present an introduction of the logical circuits such as AND, OR, NOR, and NAND gates and will introduce students to design combinational and sequential circuits using Kit board and circuit maker simulators in the Lab.	**وصف المقرر**
Syllabus 1. Number systems: Decimal system, Binary system, Octal system, Hexadecimal system. 2. Conversion between systems. 3. 1's and 2's complements 4. Subtraction using 1's and 2's complements. 5. Signed binary numbers. 6. Binary coded decimal (BCD). 7. Digital codes: Gray Code, Excess 3 code. 8. Logical gates AND | OR | NOT | NAND | NOR | XOR | XNOR 9. Boolean algebra. 10. Demorgan's theorems 11. Karnaugh Maps. 12. Combinational logical CKT1:Decoder, Encoder. 13. Multiplexer: De multiplexer – comparator. 14. Adders Half and Full, Subtractor Half and Full. 15. Sequential logic CKT1. 16. Flip – Flop: RS-ff, D-ff, T-ff, JK-ff. 17. Counters shift registers	**المنهج المقرر**
1. Digital Design, Fourth Edition, M. Morris Mano, 2009. 2. Th. L. Floyd, Digital Fundamentals, Prentice Hall, 2003. 3. J F Wakerly, Digital Design, Prentice Hall, 2000.	***Text books***

Discrete Mathematics	اسم المادة
COMP102	رمز المادة
اجباري قسم	نوع المادة
2	عدد الوحدات
نظري 2	عدد الساعات
This course is one of the basic courses in computer science, through which the student acquires basic knowledge of what is discrete structures and how to transform and formulate any application from a theoretical point of view to a set of symbols and variables through which software can be formulated to achieve the desired goal. Relating to objects such as data, variables and functions and their use in computer programming and algorithms.	وصف المقرر
Syllabus 1. Introduction to D.S. 2. Propositional logic. 3. Predicate definition. 4. Quantification and its types. 5. Logical equivalence. 6. Introduction to sets 7. Adjacency list and matrix. 8. Computing problems. 9. Pascal's triangle. 10. Sequences. 11. Relations. 12. Summation and product notation. 13.Graphs algorithms and their programming. 14.Trees defintion. 15. Correctness to algorithms. 16. Assigning meaning to programs (numeric expressions and program semantics). 17. Counting computer programs.	المنهج المقرر
1. Discrete Mathematics And Its Applications, 7th Edition By Kenneth H. Rosen, 2012. 2. Discrete Mathematics With Applications, 4th Edition By Susanna S. Epp,2011. 3. Discrete Mathematics Using a Computer, 2nd Edition By John O'Donnell, Cordelia Hall and Rex Page,2006.	***Text books***

Programming	اسم المادة
CCSM104	رمز المادة
اجباري كلية	نوع المادة
٣	عدد الوحدات
2+ ٢ عملي نظري	عدد الساعات
This course provides a general introduction to computer programming focusing on the concepts of problem solving, basic programming constructs, and program design. It introduces how to design, write and test simple programs.	وصف المقرر
Syllabus 1. Programming Fundamentals – constructs • Basic syntax and semantics of a higher-level language • Variables, types, expressions, and assignment • Simple I/O • Conditional and iterative control structures • Methods (functions) and parameter passing • Structured decomposition 2. Programming Fundamentals – problem solving • Problem-solving strategies • The role of algorithms in the problem-solving process • Implementation strategies for algorithms 3. Programming Fundamentals – data structures • Representation of numeric data • Range, precision, and rounding errors • Arrays • Representation of character data • Strings and string processing	المنهج المقرر
- Deitel and Deitel, C++: How to Program, Pearson Education, 2017.	***Text books***

Advanced Programming	اسم المادة
COMP103	رمز المادة
اجباري قسم	نوع المادة
3	عدد الوحدات
٢ نظري + ٢ عملي	عدد الساعات
This course provides a general introduction to computer programming focusing on the concepts of problem solving, basic programming constructs, and program design. It introduces how to design, write and test simple programs.	وصف المقرر
Syllabus 1. Functions. 2. Recursion Function . 3. Array 4. One dimensional array (1D). 5. Two dimensional (2D). 6. String of characters 7. Functions to manipulate strings 8. Structures 9. Array of structure 10. Nested structure 11. Pointer 12. Files 13. The File pointer, Opening a file, Closing a file, Using feof( ), rewind ( ), writing a character in to a file, reading a character from a file, reading a string from a file , writing a string in to a file.	المنهج المقرر
- Deitel and Deitel, C++: How to Program, Pearson Education, 2017.	***Text books***

Computer Organization	اسم المادة
COMP104	رمز المادة
اجباري قسم	نوع المادة
٢	عدد الوحدات
١ نظري + ٢ عملي	عدد الساعات
This course has been designed with two goals. The first is to cover basic concepts on which the stored program digital computer is formulated. These include the functional units of a computer (hardware), the flow (buses) and storage (memory management) of information, The second goal is to provide students with a firm foundation for follow-on courses later in their program. In particular, the introduction to the Microprocessors and assembly language programming provides a basis for Computer Architecture.	وصف المقرر
Syllabus 1. Processor and its Architecture. 2. Memory Hierarchy. 3. System Bus, I/O and storage topics. 4. Introduction to Microprocessors and Microcomputers. 5. Software architecture of 8088/8086 microprocessors, 6. Instruction set architecture, Addressing mode. 7. Architecture of the Intel 8086 based microprocessors. 8. Micro assembler programming techniques involving building. 9. Incorporating and maintaining libraries using assembler speedups and directives.	المنهج المقرر
1. C. Hamacher, Z. Vranesic and S. Zaky, "Computer Organization", McGraw Hill, 2002. 2. W. Stallings, "Computer Organization and Architecture: Designing for Performances" , Prentice Hall of India, 2002. 3. Barry B. Brey, "8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, and Core2 with 64-Bit Extensions Architecture, Programming, and Interfacing", Eighth Edition 2009. 4. Sunil Mathur"Microprocessor 8086 Architecture Programming and interfacing",2011.	***Text books***

Theory of Computation	اسم المادة
COMP207	رمز المادة
اجباري قسم	نوع المادة
3	عدد الوحدات
٣ نظري	عدد الساعات
The course introduces fundamental concepts in automata theory and formal languages including grammar, finite automaton, regular expression, formal language, pushdown automaton and Turing machine. And will help in many branches of computer science as compilers, software engineering.	وصف المقرر
Syllabus: 1. Overview on Set theory 2. Regular Expression 3. Finite Automata (Deterministic finite Automata (DFA) and non-deterministic Finite Automata (DFA)) 4. Regular expression to NFA conversion 5. Pumping lemma for regular language 6. NFA to DFA conversion. 7. Minimizing DFA 8. Grammars 9. Chomsky hierarchy of Grammars 10. Chomsky Normal Form (CNF) of Context Free grammars (CFG) 11. Greibach Normal Form (GNF) of Context-Free Grammar 12. Pumping Lemma for context-free grammar 13. Context-Free Grammar and Pushdown Automata 14. building PDA from a given Context-Free Grammar 15. Non Context-Free Grammar Turing Machine 16. Turing Machine as a Computer	المنهج المقرر
1. P. Linz. Introduction to Formal Languages and Automata, 6th edition, 2017 (or 5th or 4th edition), Jones and Barlett; and 2. Michael Sipser, Introduction to the Theory of Computation, 3rd edition (or 1st edition), 2013, Cengage Learning.	***Text books***

Website Design	اسم المادة
COMP208	رمز المادة
اجباري قسم	نوع المادة
٢	عدد الوحدات
١ نظري + ٢ عملي	عدد الساعات
This course introduces students to basic web design using HTML (Hypertext Markup Language) and CSS (Cascading Style Sheets). The course does not require any prior knowledge of HTML or web design. Throughout the course students are introduced to planning and designing effective web pages; implementing web pages by writing HTML and CSS code; enhancing web pages with the use of page layout techniques, text formatting, graphics, images, and multimedia; and producing a functional, multi-page website.	وصف المقرر
Syllabus 1- Introduction to HTML 2- HTML Tags – Part 1 3- HTML Tags – Part 2 4- HTML Tags – Part 3 5- Styles / Links 6- HTML Images 7- HTML Colors 8- HTML Tables – Part 1 9- HTML Tables – Part 2 10- HTML Forms & Input 11- HTML Frames 12- HTML CSS Styles	المنهج المقرر
- Learn HTML and CSS with W3Schools. Refsnes, H., Refsnes, S., Refsnes, K. J., &Refsnes, J. E., (2010). Wiley Publishing, Inc., Hoboken, NJ, USA.	***Text books***

اسم المادة	*Object Oriented Programming (OOP)*
رمز المادة	COMP٢٠١
نوع المادة	اجباري قسم
عدد الوحدات	٣
عدد الساعات	٢ نظري + ٢ عملي
وصف المقرر	This course gives a detailed explanation for Object Oriented Programming with a language that supports this property like C#. It introduces the concepts of object-oriented programming to students with a background in the procedural paradigm. The practical part is an implementation for Object Oriented Concepts in C# language.
المنهج المقرر	***Syllabus*** 1. Introduction (Object Oriented Programming Characteristics, OOP Definition, OOP Concepts, Differences from Procedure Oriented Programming (POP)). 2. Classes and Objects (methods, properties). 3. Constructors and Destructors. 4. Inheritance (Single Inheritance, Multilevel Inheritance, Hierarchical Inheritance). 5. Polymorphism (Function Overloading, Operator Overloading, Virtual Function). 6. Constructors in Derived Classes. 7. Abstract Classes and Methods, Sealed Classes. 8. Interfaces, Generic types and methods. 9. Delegates and Events. 10. Collection Classes. 11. Exception Handling.
Text books	1. Simon Kendal, Object Oriented Programming Using C#, Ventus, 2011. 2. Kurt Normark, Object-oriented Programming in C#, Alborg University, 2010. 3. Dan Clark, Beginning C# Object Oriented Programming, Apress, 2011.

Microprocessors	اسم المادة
COMP202	رمز المادة
اجباري قسم	نوع المادة
٣	عدد الوحدات
2 نظري + ٢ عملي	عدد الساعات
The student will learn the low-level programming model of microprocessor based on digital systems. They will study and analyse the basic concepts related to the low-level programming resources and integration of programs developed as a low-level (assembly). The different programming strategies of input/output subsystem resources will be analysed. This is complemented with the study and analysis of the buses and input/ output computer interfaces. The Intel 80x86 microprocessor family will be used to get the particularization of all the theoretical concepts. The course involves a practical part where the student becomes familiar with the development tools and debugging of programs written in low-level languages. However settle the knowledge through the design and implementation of small programs in assembly language.	وصف المقرر
Syllabus 1- Arithmetic Logic Unit (ALU): Introduction, Arithmetic Circuits, ALU, Number Systems 2. Microprocessor I (8086): Instruction Data Set. Machine Language Introduction, Assembly Language, Machine Language Programming, Addressing Modes, Compiling, Assembling, and Loading. 3. Microprocessor II (8x86 family): Control and Datapath Design. Single-Cycle Processor Introduction, Performance Analysis, Single-Cycle Processor. 4. Microprocessor III: Control and Datapath Design. Multi-cycle Processor Introduction, Performance Analysis, Multi-cycle Processor, Pipelined Processor 5. Memory systems and I/O. Introduction, Memory System, Caches, Virtual Memory, Memory-Mapped I/O, Memory map, I/O Devices, Buses and organization.	المنهج المقرر
1. Digital Design and Computer Architecture. D.M. Harris y S.L. Harris. Morgan Kaufman Pub. 2007. 2. Computer Organization And Design: The Hardware/Software Interface. D.A. Patterson y J.L. Hennessy. Morgan Kaufmann. 3. The Student's Guide to VHDL. P. Ashenden. Morgan Kaufman Pub. 1998.	***Text books***

Data Structures	**اسم المادة**
COMP٢03	**رمز المادة**
اجباري قسم	**نوع المادة**
٣	**عدد الوحدات**
٢ نظري + ٢ عملي	**عدد الساعات**
This course covers the design, analysis, and implementation of data structures and algorithms to solve problems using an object□oriented programming language. Topics include array and linked representation of elementary data structures (including arrays, stacks, queues, and lists), the algorithms used to manipulate these structures, the recursion concept, and the divide and conquer strategy using recursion.	**وصف المقرر**
Syllabus 1. Runtime storage management 2. Array representation of List, Stack, and queue. 3. Linked structures: 4. Implementation strategies for stacks, queues, and hash table 5. Implementation strategies for trees 6. Strategies for choosing the right data structure 7. Recursion 8. The concept of recursion 9. Recursive mathematical functions 10. Simple recursive functions 11. Divide-and-conquer strategies	**المنهج المقرر**
- Michael Mcmillan, Data Structures and Algorithm using C#, Cambridge University Press, 2007.	***Text books***

Software Engineering	**اسم المادة**
COMP٢04	**رمز المادة**
اجباري قسم	**نوع المادة**
٣	**عدد الوحدات**
١ نظري + ٢ عملي	**عدد الساعات**
This course provides a general introduction to software engineering. It introduces concepts such as software processes and essential software development activities, from initial specification through to system maintenance. The course gives the fundamental principles of system development with object oriented technology using UML. The course will initiate students to the different software process models, project management, software requirements engineering process, systems analysis and design as a problem-solving activity, and the place of the analysis and design phases within the system development life cycle. There is a focus on software testing, from unit testing to the testing of software releases. Project management will also be covered.	**وصف المقرر**
Syllabus 1- Introduction to software engineering. 2- Software Process. 3- Software Development Life cycle: Classical Water fall Model, Iterative Waterfall Model, Prototyping. Evolutionary development, Formal systems development, Reuse-Oriented Development. 4- Software Requirements analysis and specification. 5- Analysis Model Types and examples: DFD, STD, ERD, Data Dictionary. 6- Formal Specifications. 7- Software Design and Fundamental Design Concepts. 8- Functional independence: Cohesion and Coupling. 9- Top-Down and Bottom-Up Design, Structured Design. 10- Software Testing, Test case design, Software Testing Strategies: White box testing and Black Box Testing. 11- Software project management. 12- Project Scheduling.	**المنهج المقرر**
1- Software engineering, Ninth Edition, Ian Somerville, 2011. 2- Enterprise Architect User Guide, by Geoffrey Sparks, 2009. 3- Sams Teach Yourself UML in 24 Hours, 3rd edition, by Joseph Schmuller, 2009, SAMS.	***Text books***

Computer Architecture	**اسم المادة**
COMP٢05	**رمز المادة**
اجباري قسم	**نوع المادة**
٣	**عدد الوحدات**
٣ نظري	**عدد الساعات**
This course covers the definition of the computer structure, how its units work and explain the components of the computer. It also illustrates all types of the computer's memory. In addition to the CPU and its parts and how to implement the instructions within. It is also deals with the Input and Output devices and who it is work. Explain parallel processing allow the student to understand how computers interact with each other and with the operating system of computer in order to perform various functions.	**وصف المقرر**
Syllabus 1- Number Systems 2- Introduction to computer architecture (ISA+HAS) + NON VON NEUMANN MACHINE 3- MEMORY SYSTEM ARCHITECTURE 4- RAM +ROM ITS TYPES 5- MEMORY ORGANIZATION 6- RAM DESIGN+ CACHE MEMORY 7- MAPPIMG FUCTION IN ACHE 8- INTERLEAVE MEMORY+VIRTUAL MEMORY 9- CPU ARCHITECTURE + CONTROL UNIT 10- INSTRUCTION MICROPROGRAM 11- INPUT OUTPUT DEVICE 12- Define pipeline and its types 13- Define PARALLEL ROCESSING 14- Type of PARALLEL ROCESSING	**المنهج المقرر**
Computer Architecture, Kai Hwang, McGraw-Hill,1988.	***Text books***

Algorithm Designandanalysis	اسم المادة
COMP3٠1	رمز المادة
اجباري قسم	نوع المادة
٢	عدد الوحدات
٢ نظري	عدد الساعات
This course introduces formal techniques to support the design and analysis of algorithms, focusing on both the underlying mathematical theory and practical considerations of efficiency. Topics include asymptotic complexity bounds, techniques of analysis, and algorithmic strategies.	وصف المقرر
Syllabus 1- Asymptotic analysis of upper and average complexity bounds 2- Identifying differences among best, average, and worst case behaviors 3- Big O, little o, omega, and theta notation 4- Standard complexity classes 5- Empirical measurements of performance 6- Time and space tradeoffs in algorithms 7- Brute-force algorithms 8- Greedy algorithms 9- Divide-and-conquer 10- Dynamic Programming 11- Simple numerical algorithms 12- Sequential and binary search algorithms 13- Quadratic sorting algorithms (selection, insertion) 14- O(N log N) sorting algorithms (Quicksort, heapsort, mergesort) 15- Hash tables, including collision-avoidance strategies 16- Binary search trees	المنهج المقرر
1. AnanyLevitin, Introduction to the Design and Analysis of Algorithms, Pearson Education, 2007. 2. Sara Baase, Computer Algorithms: Introduction to Design and Analysis, Third Edition, Addison-Wesley, 2000.	***Text books***

System DesignandAnalysis	اسم المادة
COMP3٠2	رمز المادة
اجباري قسم	نوع المادة
٢	عدد الوحدات
٢ نظري	عدد الساعات
This subject introduces students to systems and System development life cycle, also It aims to enable students to analysis exsiting systems and develop other new systems of by using different approaches and techniques.	وصف المقرر
Syllabus 1. System Analysis: Introduction. 2. System Development Life Cycle. 3. Systems Development Methodologies. 4. System Planning Phase. 5. Project Management. 6. Information Gathering. 7. Process Modeling and Data Flow Diagramming. 8. Data Modeling. 9. Design Phase:Architecture Design, User Interface Design, Navigation Design, Data Storage Design, Program Design. 10. Implementation Phase.	المنهج المقرر
- Systmes Analysis and Design – Forth Edition By: Alan Dennis, Barbara Haley Wixom, and Roberta M. Roth, John Wiley & Sons, Inc., 2009.	***Text books***

Construction Compiler	اسم المادة
COMP3٠3	رمز المادة
اجباري قسم	نوع المادة
٣	عدد الوحدات
٢ نظري + ٢ عملي	عدد الساعات
This subject familiarizes students with languages and their rules as well as rules of their formulation. This course studies different phases of compiler construction. Student will be able to apply relatively practical settings, of all miner subjects in compiler construction, so this course requires familiarity with theory of Computation, data structure, as well as programming.	وصف المقرر
Syllabus 1- Introduction to Translators 2- Context Free Grammar & LL(1) Grammar 3- Designing lexical analyzer and symbol table 4- Top –down &&bottom up parsers 5- Predictive parser 6- Parsing with Error recovery 7- Shift-reduce parsers 8- Semantic Analysis & Type checking 9- Intermediate-code Generation 10- Code optimization 11- Machine-code Generation. 12- Run Time Environments	المنهج المقرر
- Compilers , principles , Techniques and tools by Aho,Lam, Sethi and Ullman, 2nd Ed. Addison – Wesely , 2007.	***Text books***

DataBases	**اسم المادة**
COMP304	**رمز المادة**
اجباري قسم	**نوع المادة**
3	**عدد الوحدات**
٢ نظري+٢ عملي	**عدد الساعات**
This course introduces the basic concepts of database systems management and guides students towards the concepts of its architecture design and practical application.	**وصف المقرر**
Syllabus Mainly, the course emphasizes on conceptual database design utilizing the Entity Relation Data Model and the Relational Database Design, it covers the following topics: 1. Database System Concepts. 2. Database Management System Definition, Components, Architectures, and Data Independence. 3. Normalization. 4. The Entity Relationship (ER) Data Model, Enhanced ER Modeling, Analysis and Design Techniques. 5. Conceptual Design with the ER Model, Modelling of Constraints. 6. Relational Database Model, Definition, Concepts and Constraints 7. Mapping from ER Diagrams to Relational Model, Relational Database Schemas, Integrity, Relational Algebra, Constraints and Keys, Relational Algebra Syntax And Semantics. 8. SQL Data Definition, Queries and Updates In SQL 9. Relational Model Denormalization, and Applicational Implementation. 10. Introduction to Data Warehouses, and Adaptive Provision of Database.	**المنهج المقرر**
- Hoffer, J., Venkataraman, R., & Topi, H. (2015). *Modern database management*: Prentice Hall Press.	***Text books***

Principles of Operating System	**اسم المادة**
COMP305	**رمز المادة**
اجباري قسم	**نوع المادة**
٣	**عدد الوحدات**
٢ نظري + ٢ عملي	**عدد الساعات**
Operating system is an important part of any computer system. Therefore, this course illustrates the concepts of operating systems and how they are designed and installed. It also explains how to describe the operational and practical behaviour and methods of scheduling and methods of synchronization between them. Further, it shows the perspective of memory and file management as well as identification of deadlock.	**وصف المقرر**
Syllabus 1- Introduction ,What is an operating system. 2- Batch systems Time-sharing system, Personal computer systems, Parallel systems, Real-time systems, Distributed systems. 3- Computer system structures Computer system operation Hardware protection, Operating system structures. 4- Operating system services System calls. Multithreading Threads Models. 5- Process concept Process scheduling Cooperating processes, Interprocess communication. 6- CPU scheduling, basic concepts scheduling criteria, scheduling algorithms. 7- Multilevel queue scheduling, multilevel feedback queues scheduling multiple process scheduling. 8- Process synchronization. The Critical-Section problem, monitors. 9- Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks. 10-Deadlock Prevention, Deadlock Avoidance, Deadlock Detection. 11-Memory management: Swapping, Contiguous Memory Allocation, Segmentation, Paging. 12-Virtual memory: Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames , Thrashing. 13- Disk Scheduling, Disk Management, Swap-Space Management. 14-File system interface: File Concept, Access Methods. 15- File-System Structure, File-System Implementation.	**المنهج المقرر**
Operating System Concepts, Abraham Silber Schatz, Peter Baer Galvin, and Greg Gagne, Ninth edition, 2013.	***Text books***

اسم المادة	*Computer networks*
رمز المادة	**COMP306**
نوع المادة	**اجباري قسم**
عدد الوحدات	**٣**
عدد الساعات	**٢ نظري + ٢ عملي**
وصف المقرر	An introduction to the design and analysis of computer communication networks. Topics include application layer protocols, Internet protocols, network interfaces, local and wide area networks, wireless networks, bridging and routing, and current topics.
المنهج المقرر	***Syllabus*** The course covers various aspects of computer networking, including : 1. Network architecture, layering, and protocols. 2. Introduction to network layer. Inside a router. 3. - IPv4 and IP Addressing. 4. - Internet control message protocol ICMP. 5. - Delivery and routing protocols. 6. - Internet routing architecture and Routing algorithms 7. - Principles of reliable transfer, TCP reliable transfer implementation.
Text books	1. TCP/IP Protocol Suite by Behrouzforouzan,Mc-Graw Hill ،4th edition , 2010. 2. Data Communication and Networking by Behrouzforouzan,Mc-Graw Hill, 4th edition 2007.

اسم المادة	*Artificial Intelligence*
رمز المادة	**COMP307**
نوع المادة	**اجباري قسم**
عدد الوحدات	**٣**
عدد الساعات	**٢ نظري + ٢ عملي**
وصف المقرر	Students will learn basic concepts of Artificial Intelligence, Student will be able to solve Problems through Search as well as Knowledge Representation and Reasoning, determine when an AI approach is appropriate for a given problem, identify the appropriate representation and reasoning mechanism, Student will be able to apply search algorithms and methods to representation knowledge and this course requires familiarity of Prolog language programming.
المنهج المقرر	***Syllabus*** 1- Introduction to Artificial Intelligence 2- Problem solving using Artificial Intelligence 3- Uninformed search algorithm 4- informed search algorithm 5- Proposition logic representation 6- Predicate logicrepresentation 7- production representation(forward and backward chaining) 8- network representation 9- semantic network 10-conceptual graph 11-frame and script
Text books	1. Artificial intelligence modern approach by russel&Norvig 2. Artificial intelligence structure and strategies, luger

Cryptography and Data Security	**اسم المادة**
COPM308	**رمز المادة**
اجباري قسم	**نوع المادة**
٣	**عدد الوحدات**
٢ نظري + ٢ عملي	**عدد الساعات**
Students Cryptography has become an essential tool for data security. It is used to provide data confidentiality, integrity, and availability. It supports the authentication of data and protection of privacy. However, cryptography is only one component of a security system. There are hardware, software engineering, social and political issues that also must be considered. This course provides a broad view of security with practical applications of cryptography to data security. Specific topics include classical and modern encryption techniques, steganography, and human factors.	**وصف المقرر**
Syllabus 1. Introduction and Overview of Cryptography 2. Classical Cryptosystems 3. Modern Cryptosystems 4. Number Theory Background 5. Data Encryption Standard 6. The Advanced Encryption Standard 7. Public Key Cryptography 8. Message Authentication and Hash Functions 9. Digital Signatures	**المنهج المقرر**
- Cryptography and Network Security: Principles and Practice (7th Edition), by W. Stallings, 2017.	***Text books***

Distributed systems	اسم المادة
COMP٤٠1	رمز المادة
اجباري قسم	نوع المادة
٣	عدد الوحدات
٢ نظري + ٢ عملي	عدد الساعات
Distributed systems are a set of computer systems that are related to a particular form. Therefore, this course explains the concepts of distributed systems and how they are designed and installed. It also explains the description of the architecture, communication, operation, methods of scheduling and methods of synchronization between them.	وصف المقرر
Syllabus 1- Definition, characteristics and goals of a distributed system 2- Types of distributed system , clusters and grid computing system, distributed information system 3- Architecture style, system architecture, centralized and decentralized architecture. 4- Processes, threads implementation, multithreaded server, virtulization,architecture of virtual machines, clients, servers, distributed servers, code migration. 5- Communications, layered protocols, types of communications. 6- Remote procedure calls, clients and server stubs, asynchronous RPC. 7- Message oriented communications, message queuing model, channels. 8- Stream oriented communications, quality of service, multicast communications. 9- Naming, names , identifiers ,structured naming. 10- The Implementation of a Name Space, The DNS Name Space. 11- Synchronization, Global Positioning System. 12- Clock Synchronization Algorithms, Network Time Protocol. 13- Clock Synchronization in Wireless Networks, LOGICAL CLOCKS, Vector Clocks 14- LOGICAL CLOCKS, Vector Clocks.	المنهج المقرر
- Distributed Systems Principles and Paradigms, Second edition, Andrew S.Tanenbaum Maarten Van Steen, 2007.	***Text books***

اسم المادة	*Computer Security*
رمز المادة	COMP٤٠4
نوع المادة	اجباري قسم
عدد الوحدات	2
عدد الساعات	١ نظري + ٢ عملي
وصف المقرر	This course is meant to offer Computer Science undergraduate students in their junior or senior year a broad overview of the field of computer security. Students will learn the basic concepts in computer security including software vulnerability analysis and defense, networking and security, applied cryptography, as well as ethical, legal, social and economic facets of security.
المنهج المقرر	***Syllabus*** 1- Introduction to Basic concepts: threats, vulnerabilities, controls; risk; confidentiality, integrity, availability; security policies, security mechanisms; assurance; prevention, detection, deterrence 2. Basic cryptographic terms. 3. Program security. 4. Malicious code. 5. Program flaws. 6. Software development controls. 7. Testing techniques. 8. Security in conventional operating systems. 9. Identification and authentication. 10. Access Controls. 11. Introduction to database security. 12.Introduction to Network security. 13. Management of security.
Text books	- Security in Computing (3rd edition), Charles P. Pfleeger and Shari L. Pfleeger.. Prentice-Hall. 2003. ISBN: 0-13-035548-8.

اسم المادة	*Digital Image Processing*
رمز المادة	COMP٤٠5
نوع المادة	اجباري قسم
عدد الوحدات	٣
عدد الساعات	٢ نظري + ٢ عملي
وصف المقرر	The aim of this course is to introduce to the students the basics of digital image processing. The students will gain overview about the available techniques and possibilities of this field. They will learn basic image transforms, segmentation algorithms and problems of object measurements. They will be able to perform the basic techniques and apply them in practice. The lecture serves as the base for all those who want to attend to the topic in more details.
المنهج المقرر	***Syllabus*** 1. Digital Image Fundamentals: Elements of Visual Perception. - Light and the Electromagnetic Spectrum. Image Sensing and Acquisition. ImageSampling and Quantization. Some Basic Relationships between Pixels. Linear and Nonlinear Operations. 2. Image Enhancement in the Spatial Domain: Basic Gray Level Transformations. Histogram Processing. Basics of Spatial Filtering. Smoothing Spatial Filters. Sharpening Spatial Filters. 3. Color Image Processing: Fundamentals. Color Models.Pseudocolor Image Processing. Basics of Full. Color Image Processing.Color Transformations.Smoothing and Sharpening.Color Segmentation. 4. Image Segmentation: Detection of Discontinuities.Edge Linking and Boundary Detection.Thresholding.Region-Based Segmentation. Segmentation by Morphological Watersheds. 5. Morphological Image Processing: Dilation and Erosion. Opening and Closing. Extensions to Gray-Scale Images.
Text books	1. Fundamentals of digital signal processing - Lonnie C. Ludeman. 2. Oppenheim, A.V., Schafer, R.W, "Discrete-Time Signal Processing", 2nd Edition, Prentice-Hall,1999.

اسم المادة	*Information Theory*
رمز المادة	**COMP251**
نوع المادة	**اختياري قسم**
عدد الوحدات	**٢**
عدد الساعات	**٢ نظري**
وصف المقرر	يمكن الطالب من الحصول على المعارف والحقائق بكيفية تمثيل البيانات داخل الملفات و التقنياتالأساسية المستخدمة في ضغط البيانات و ترميز البيانات التي تساعد في عملية ضغط البيانات وارسالها عبر قنوات الارسال.
المنهج المقرر	***Syllabus*** 1. Introduction and Preview. 2. Entropy, Information 3. Marginal Entropy, Joint Entropy, 4. Conditional Entropy Mutual Information. 5. Data Compression introduction. 6. Huffman codes. 7. Shannon-Fano-Elias coding. 8. Arithmetic coding. 9. Types of Channeh and Channel Capacity. 10. Examples of channel capacity. 11. Examples of Symmetric channels. 12. Properties of Symmetric channel . 13. Preview of the channel coding theorem. 14. Hamming codes.
Text books	1- Thomas M. Cover and Joy A. Thomas, Elements of Information Theory, wileym 2006. 2-David Salomon, Giovanni Motta and David Bryant,Handbook of Data Compression,Fifth Edition,Springer, 2010, www.it-ebooks.info.

Multimedia System	**اسم المادة**
COMP252	**رمز المادة**
اختياري قسم	**نوع المادة**
٣	**عدد الوحدات**
٢ نظري + ٢ عملي	**عدد الساعات**
The course aims at providing students with fundamental concepts and the technology associated with multimedia. The course covers contemporary, interactive multimedia technology systems, focusing on types, applications, and theories of operation. Basic technologies such as multimedia data representation, compression, retrieval and communication will be covered in an integrated manner. On the completion of the course, students should be able to understand the fundamental concepts and make critique to the technologies associated with various multimedia data types such as image, video, audio, graphics and animation.	**وصف المقرر**
Syllabus 1. Introduction: definition, Applications, Computer-Based Training and Teaching Aid, References, Entertainment, Simulation, Virtual Reality, Advantages of Multimedia. 2. The Basic Elements of Multimedia: Text , Graphic. 3. Graphics Categories: Animation, Video, Audio. 4. Categorization: Two types of Multimedia presentation (Linear Presentation, Non-linear Interactive, Hypermedia. 5. Technologies and Interfaces: Media Technologies (Text, Graphics, Images, Animation, Video, Audio). 6. Interaction Style and Modalities (Sight, Sound, Touch), Multimodal Transput (I/O) Technologies (Haptic, Audio, Visual, Motion). 7. Windowing and User Interfaces.	**المنهج المقرر**
1. Multimedia: The Complete Guide; Dorling Kindersley; 1996 2. Multimedia Technologies: Concepts, Methodologies, Tools, and Applications; Mahbubur Rahman; 2008 3. Multimedia Foundations: Core Concepts for Digital Design, Vic Costello, 2016.	***Text books***

Advanced Data Structure	**اسم المادة**
COMP3٥١	**رمز المادة**
اختياري قسم	**نوع المادة**
٣	**عدد الوحدات**
٢ نظري + ٢ عملي	**عدد الساعات**
This course covers the design, analysis, and implementation of data structures and algorithms to solve problems using an objectoriented programming language. Topics include searching and sorting algorithms, advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical problems.	**وصف المقرر**
Syllabus 1. Searching Algorithms (Sequential and Binary) 2. Sorting Algorithms (Bubble Sort, Selection Sort, Quick Sort, and Heap Sort) 3. Tree data Structures - Binary tree - Binary Search Tree - Balanced Binary Tree - Self-balancing AVL Tree - B-Tree 4. Graph data Structures - Graph terminology - Implementing graphs - Relations between graphs - Planarity - Traversals – systematically visiting all vertices - Shortest paths – Dijkstra's algorithm - Shortest paths – Floyd's algorithm - Minimal spanning trees - Travelling Salesmen and Vehicle Routing	**المنهج المقرر**
- Michael Mcmillan, Data Structures and Algorithm using C#, Cambridge University Press, 2007	***Text books***

Simulation and Modelling	اسم المادة
COMP352	رمز المادة
اختياري قسم	نوع المادة
٣	عدد الوحدات
٢ نظري + ٢ عملي	عدد الساعات
In this course the student understand the basic concept of system, models and simulation, Statistical distributions, how to generate random numbers. They study simulation languages, Distributed and parallel Simulation then applying this concept in a project.	وصف المقرر
Syllabus 1- Introduction. 2- System, system methodology. 3- Model, type of models. 4- Simulation, advantage and disadvantage of simulation, basic simulation steps, simulation methods. 5- Statistical distributions. 6- Random numbers generation. 7- Simulation languages. 8- Distributed and parallel Simulation. 9- Simulation languages. 10- Simulation applications.	المنهج المقرر
- Modeling and simulation using Excel, SIMAN, Arena and General Purpose Simulation System (GPSS WORLD) By Dr. Majedabdrhmanbary.	***Text books***

اسم المادة	*Advanced Computer Graphics*
رمز المادة	COMP35٣
نوع المادة	اختياري قسم
عدد الوحدات	٣
عدد الساعات	٢ نظري + ٢ عملي
وصف المقرر	In this unit, the students are introduced to the concepts of input devices. The concept of curves and surfaces. We also look into the concept of three dimension transformations and viewing. We look into the concept of hidden-surface and hidden-line removal, shading and colour models,modelling, illumination models, image synthesis, computer animation.
المنهج المقرر	***Syllabus*** 1- Introduction. 2- Interactive input devices. 3- Curves and surfaces. 4- Three Dimension transformations and viewing. 5- Hidden-line and hidden-surface removal. 6- Shading. 7- Color models. 8- Modeling, illumination models. 9- Image synthesis. 10- Computer animation.
Text books	2- Shirley, P. &Marschner, S. (2009). Fundamentals of Computer Graphics. CRC Press (3rd ed.). 3- Foley, J.D., van Dam, A., Feiner, S.K. & Hughes, J.F. (1990). Computer graphics: principles and practice. Addison-Wesley (2nd ed.). 4- Kessenich, J.M., Sellers, G. and Shreiner, D (2016). OpenGL Programming Guide: The Official Guide to Learning OpenGL, Version 4.5 with SPIR-V, [seventh edition and later]

Semantic Web Technology	**اسم المادة**
COMP٣54	**رمز المادة**
اختياري قسم	**نوع المادة**
٣	**عدد الوحدات**
٢ نظري + ٢ عملي	**عدد الساعات**
Introduces the core concepts of the Semantic Web that promises to dramatically improve the current World Wide Web (WWW) and its use. The Semantic Web technology aims at removing main obstacles which prevent Web users from better support because the meaning of Web content is not machine-accessible.	**وصف المقرر**
Syllabus 1. Semantic Web – Introduction and Vision 2. Structured Web Documents – XML, RDF 3. RDF (cont.), RDF-S 4. Web Ontology Language - OWL 5. Ontology Engineering (Protégé) 6. Ontology Engineering (Protégé OWL API) 7. Discovering Information – Querying (SPARQL) 8. Semantic Web Applications (E-learning, Web services) 9. Description Logic 10. Reasoning (Fact++); Rules (SWRL) 11. Building Semantic Web Applications (Apache Jena Framework) 12. Building Semantic Web Applications 13. State-of-the-art in Semantic Web community (Linked data and applications) 14. State-of-the-art in Semantic Web community (Web search and applications)	**المنهج المقرر**
- A Semantic Web Primer, third edition, MIT Press, 2012, Grigoris Antoniou, Paul Groth, Frank van Harmelen and Rinke Hoekstra.	***Text books***

اسم المادة	*Data Mining*
رمز المادة	COMP35٥
نوع المادة	اختياري قسم
عدد الوحدات	٢
عدد الساعات	٢ نظري
وصف المقرر	Data mining is study of algorithms for finding patterns in large data sets. The course will cover the fundamentals of data mining. It will explain the basic algorithms like data preprocessing, association rules, classification, clustering, sequence mining and visualization. It will also explain implementations in open source software. Finally, case studies on industrial problems will be demonstrated.
المنهج المقرر	***Syllabus*** 1. Introduction to Data Mining 2. Data preprocessing 3. Data mining knowledge representation (Visualization techniques) 4. Association rules,Classification (Decision trees, Covering rules) 5. Prediction (Statistical (Bayesian) classification) 6. Estimating classifier accuracy (holdout, cross-validation, leave-one-out) 7. Combining multiple models (bagging, boosting, stacking) 8. Text mining: extracting attributes (keywords), structural approaches (parsing, soft parsing). 9. Web mining: classifying web pages, extracting knowledge from the web 10. Data Mining software and applications
Text books	- Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques (Second Edition), Morgan Kaufmann, 2005.

Distributed DataBase	اسم المادة
COMP٤٥١	رمز المادة
اختياري قسم	نوع المادة
٣	عدد الوحدات
٢ نظري + ٢ عملي	عدد الساعات
This course is designed to give the reader an understanding of Distributed Database (DDB). DDB is a database in which not all storage devices are attached to a common processor. It may be stored in multiple computers, located in the same physical location; or may be dispersed over a network of interconnected computers. Unlike parallel systems, in which the processors are tightly coupled and constitute a single database system, a distributed database system consists of loosely coupled sites that share no physical components. In this course we are looking for the principles of DDB, promises and challenges, and discuss how can we take advantages of DDB in some practical applications.	وصف المقرر
Syllabus 1. Introduction 2. Transaction management 3. Atomicity of distributed transactions 4. Concurrency control for distributed transactions 5. Architecture aspects of distributed transactions 6. Fragmentation 7. Reliability in distributed database 8. Inconsistency in distributed database 9. Query optimisation for distributed database.	المنهج المقرر
1. Principles of distributed database systems, Third edition, M. Tamer Ozsu, Patrick Valduriez, 2009. 2. Distributed database system, Chhanda Ray, 2009. 3. Distributed database management system a practical approach, Saeed K. Rahimi and Frank S. Haug, 2010.	***Text books***

Internet Infrastructure	اسم المادة
COMP٤52	رمز المادة
اختياري قسم	نوع المادة
2	عدد الوحدات
١ نظري + ٢ عملي	عدد الساعات
This course presents the introductory concepts to wireless communication and cover state-of-the-art topics in wireless networking and mobile computing. The objective of the course is to introduce students to recent advances in mobile networking and sensing, with an emphasis on practical design aspects of mobile systems.	وصف المقرر
Syllabus 1. Network Fundamentals:Overview of OSI and TCP/IPmodel, Connecting devices, Network topologies 2. General concepts of interconnecting devices 3. The configuration of the interconnecting devices: Network Operating System of interconnecting devices, Configuration Files. 4. Switch device: Describe and verify switching concepts, MAC learning and aging, Frame switching, Frame flooding, MAC address table, Interpret Ethernet frame format, Configure, verify, and troubleshoot VLANs (normal/extended range) spanning multiple switches, Trunk ports 2.5.2. Add and remove VLANs on a trunk, DTP, VTP (v1&v2), and 802.1Q, Native VLAN, Configure, verify, and troubleshoot STP protocols, STP mode (PVST+ and RPVST+), STP root bridge selection. 5. Router device: Packet handling along the path through a network, Forwarding decision based on route lookup, Frame rewrite, Interpret the components of a routing table, Prefix, Network mask, Next hop, Routing protocol code, Administrative distance Metric, Gateway of last resort. 6. Routing types : Static routing, Configure Default route, Configure Network route, Configure Host route, Dynamic routing Distance vector and link state routing protocols Interior and exterior routing protocols, Configure dynamic routing, protocols	المنهج المقرر
1. CCNA ROUTING AND SWITCHING,BY CISCO COMPANY 2. MIKROTIK FOR ME BY MIKROTIK COMPANY	***Text books***

Wireless networks	اسم المادة
COMP٤٥٣	رمز المادة
اختياري قسم	نوع المادة
٢	عدد الوحدات
٢ نظري	عدد الساعات
This course presents the introductory concepts to wireless communication and cover state-of-the-art topics in wireless networking and mobile computing. The objective of the course is to introduce students to recent advances in mobile networking and sensing, with an emphasis on practical design aspects of mobile systems.	وصف المقرر
Syllabus 1. Introduction to wireless networks. 2. Main types of wireless networks: Unguided media wireless LAN. Celluler Telephone. Satellite telephony. 3. Wireless network elements. 4. IEEE 802.11, BlueTooth 5. Difficulties in wireless networks. 6. Multiplexing. 7. Modulation 8. Medium Access control. 9. Wireless routing protocols	المنهج المقرر
- Jochen H. Schiller, mobile communication, second edition , 2003.	***Text books***

Mobile Applications	اسم المادة
COMP٤5٤	رمز المادة
اختياري قسم	نوع المادة
٣	عدد الوحدات
٢ نظري + ٢ عملي	عدد الساعات
This course aim to understand Mobile Application Development. Mobile app development is the act or process by which a mobile app is developed for mobile devices, such as personal digital assistants, enterprise digital assistants or mobile phones.	وصف المقرر
Syllabus 1. Introduction 2. Factors in Developing Mobile Applications 3. Storing and Retrieving Data 4. Communications Via Network and the Web 5. Telephony 6. Notifications and Alarms 7. Graphics 8. Multimedia 9. Location 10. Putting It All Together (as time allows) 11. Security and Hacking (as time allows) 12. Platforms and Additional Issues (as time allows)	المنهج المقرر
1- Lee, Valentino, Heather Schneider, and Robbie Schell. Mobile applications: architecture, design, and development. Prentice Hall PTR, 2004. 2- Mukherjea, Sougata, ed. Mobile Application Development, Usability, and Security. IGI Global, 2016.	***Text books***

Web Security	اسم المادة
COMP٤٥٥	رمز المادة
اختياري قسم	نوع المادة
٢	عدد الوحدات
٢ نظري	عدد الساعات
This This course is intended for students who have no knowledge of web security and also its importance to secure e-commerce. Present an overview of the major categories of web site attacks their effects and possible countermeasures. Web vulnerabilities are growing on a year-to-year basis and designing secure web applications is challenging. This course introduces you to the field of web security: that is, how to build secure web applications.	وصف المقرر
Syllabus 1. Introduction. 2. Classes of Attacks. 3. OSI model and TCP/IP. 4. Security threats and their countermeasures 5. Concepts of Cryptography. 6. Services provided by Cryptography. 7. Client-side security 8. Server-side security 9. Secure channel. 10. Application layer Security. 11. SSL, SET 12. SecurityPrivateNetwork 13. Proxy and Firewall 14. Intrusion Detection System.	المنهج المقرر
2. Introduction to Network Security Theory and Practice, Jie Wang and Zachary A. Kissel, 2015. 3. Web Security, Privacy and Commerce, 2nd Edition by SimsonGarfinkel.	***Text books***

اسم المادة	*Cloud Computing*
رمز المادة	COMP45٦
نوع المادة	اختياري قسم
عدد الوحدات	٢
عدد الساعات	٢ نظري
وصف المقرر	This course aims to give students an overview of the field of Cloud Computing, and an in-depth study into its enabling technologies and main building blocks.
المنهج المقرر	***Syllabus*** 1- Introduction. 2- Understanding cloud computing technology innovations. 3- Fundamental concepts and models. 4- Cloud enabling technology for networks, datacenters, and virtualization. 5- Fundamental cloud security. 6- Cloud infrastructure mechanisms. 7- Specialized cloud mechanisms. 8- Cloud management mechanisms. 9- Cloud security mechanisms. 10- Fundamental cloud architecture. 11- Advanced cloud architecture. 12- Specialized cloud architecture. 13- Cloud delivery model considerations. 14- Cost metrics and pricing models. 15- Service quality metrics and SLAs.
Text books	1. Cloud Computing: Concepts, Technology & Architecture By Thomas Erl, Ricardo Puttini, Zaigham Mahmood. 2. Distributed and cloud computing from parallel processing to the Internet of things by Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra.

Embedded and Real-Time Systems	**اسم المادة**
COMP457	**رمز المادة**
اختياري قسم	**نوع المادة**
3	**عدد الوحدات**
٢ نظري + ٢ عملي	**عدد الساعات**
Real-time computing systems must react dynamically to the state changes of an environment, whose evolution depends on human behavior, a natural or artificial phenomenon or an industrial plant. Real-time applications span a large spectrum of activities; examples include production automation, embedded systems, telecommunication systems. In a real-time system, the timing of the output is as important as the logical correctness of the result produced timing constraints.	**وصف المقرر**
1. What is a Real-Time System? 2. What is an embedded system? 3. Characteristics of a RTS 4. Key concept: Timeliness, Predictability 5. RT Applications 6. Digital Control Systems 7. Digital Control Systems 8. Definitions: Jobs and Tasks 9. Definitions: Timing Related Parameters 10. Hard Real-Time Scheduling and Soft Real-Time Scheduling 11. Task dependencies 12. Reference model for real time sytem 13. Processors vs. Resources 14. Characterization of Application Systems 15. Temporal Parameters 16. Periodic Task Model 17. Resource Parameters 18. Interconnection Parameters, Functional Parameters 19. Characterization of the Underlying Systems 20. Schedulers 21. Precedence relations 22. Preemptive scheduling 23. RM , DM, EDF algorithm 24. Resource sharing and Resource access protocols	**المنهج المقرر**
- Real-Time Systems Jane W. S. Liu, Prentice Hall, 2000. - Scheduling in Real-Time Systems, Francis Cottet, LISI/ENSMA, Futuroscope, France,John Wile y & Sons Ltd,2002.	***Text books***

اسم المادة	*E-Commerce*
رمز المادة	COMP٤5٨
نوع المادة	اختياري قسم
عدد الوحدات	٢
عدد الساعات	٢ نظري
وصف المقرر	This course focuses on principles of e-commerce from a business perspective, providing an overview of business and technology topics, business models, and marketing strategies. Some of the major issues associated with e-commerce: security, privacy, intellectual property rights, authentication, and acceptable use policies. In addition some of E-Commerce applications will be explored.
المنهج المقرر	***Syllabus*** 1. Overview of electronic commerce: Overview, Definition, Advantages & Disadvantages of E Commerce. 2. E- Commerce and E- Business, Threats of E-Commerce, Main activities of e-commerce, goals of E-Commerce, Limitations of E-Commerce. 3. Prospects for E-Commerce, Pre-requisites for E-Commerce. E-Commerce applications, Infrastructure Requirement for E-Commerce. 4. Relationship between E-Commerce and Networking, Different Types of Networking for E-Commerce: internet, intranet, extranet. 5. Business Models of E-Commerce: Model Based onTransaction Party (B2B,B2C, B2G,C2C, C2B, C2G, G2B, G2C, G2G). 6. Business Models of E-Commerce: Model Based on Transaction Type (Traditional Commerce, Pure E-Commerce, Partial E-Commerce). 7. E-Commerce and economic efficiency, Impact of E-Commerce on business, Categorise of E-Service. 8. E-Commerce supply chain Management, Electronic Data Interchange (EDI): Meaning, Benefits, Concepts. 9. Wireless Application Protocol: Definition, Web Security. 10. E-Marketing: Traditional Marketing, Elements of E-Marketing, Benefits. 11. Electronic contracts, Electronic signature, Electronic Bank, Online Auctions, E-Payment Mechanism, E-Government, and E-Learning.
Text books	1. E-commerce 2014 business, technology, society. 10th EDITION. By Kenneth C. Laudon, 2014. 2. E-Commerce Fundamentals and Applications by Henry Chan and Raymond Lee, 2001.

اسم المادة	*Computer Vision*
رمز المادة	COMP٤٥٩
نوع المادة	اختياري قسم
عدد الوحدات	٣
عدد الساعات	٢ نظري + ٢ عملي
وصف المقرر	Students will learn basic concepts of computer vision as well as hands on experience to solve real-life vision problems. Student will be able to apply relatively simple methods to analyze images in practical settings, and this course requires familiarity with image processing, linear algebra, calculus, basic probability, as well as programming.
المنهج المقرر	***Syllabus*** 1. Introduction to computer vision 2. Edge detection 3. Image segmentation 4. Region (2D shape) analysis 5. Invariant features & interest points (Corners, HOG, SIFT, etc.) 6. Image recognition (Object Recognition) 7. Face Detection and Recognition 8. 3-D sensing and camera calibration 9. Stereo imaging 10. Selected topics: face recognition, neural networks learning
Text books	1- Computer Vision: Algorithms and Applications, by Richard Szeliski, 2010. 2- Computer Vision, A Modern Approach, by Forsyth and Ponce, 2nd ed., 2011.

Web Programming	اسم المادة
COMP٤٦٠	رمز المادة
اختياري قسم	نوع المادة
٣	عدد الوحدات
٢ نظري + ٢ عملي	عدد الساعات
This course follows a problem-based approach which requires you to design and create a website of ever-increasing sophistication as the course progresses while creating design documentation, reflecting on the process, and sharing and communicating with others on the course.	وصف المقرر
Syllabus 1. Introduction to www 2. UI Design 3. Cascading Style Sheet 4. Introduction to Javascript 5. Java programming essentials for Internet 6. JDBC (Java Database Connectivity) 7. Java Applets and Servlets 8. Java Server Pages technology 9. .NET Architecture and C#	المنهج المقرر
1- J2EE: The complete Reference by James Keogh. 2- Java EE and HTML5 Enterprise Application Development (Oracle Press) by John Brock (Author), Arun Gupta (Author), GeertjanWielenga (Author) 3- Struts: The Complete Reference, 2nd Edition by James Holmes 4- ASP.NET 4 Unleashed by Stephen Walther (Author), Kevin Scott Hoffman (Author), Nate Dudek (Author) 5- Microsoft Visual C# 2013 Step by Step by John Sharp 6- Head First Servlets and JSP: Passing the Sun Certified Web Component Developer Exam by Bryan Basham (Author), Kathy Sierra (Author), Bert Bates. 7- Java EE 7: The Big Picture by Dr. Danny Coward (Author). 8- Professional ASP.NET 4.5 in C# and VB by Jason N. Gaylord (Author), 9- Christian Wenz (Author), Pranav Rastogi (Author), Todd Miranda (Author), Scott Hanselman (Author), Scott Hunter (Foreword).	***Text books***

اسم المادة	*Machine Learning*
رمز المادة	COMP٤61
نوع المادة	اختياري قسم
عدد الوحدات	٣
عدد الساعات	٢ نظري + ٢ عملي
وصف المقرر	Students will learn basic and intermediate concepts of machine learning. The students should have some knowledge about artificial intelligence. Then he will be able to identify the inputs and the outputs of machine learning techniques. The course involves teaching students some basic methods. Students will learn how to evaluate the performance and measure the significance of algorithms. He will be familiar with implementations, transformations, extensions and applications.
المنهج المقرر	***Syllabus*** 1- An Introduction and Simple Machine Learning Task 2- Input: Concepts, instances, and attributes 3- Output: Knowledge representation 4- The basic methods 5- Artificial Neural Networks 6- Credibility: Evaluating what's been learned 7- Performance Evaluation 8- Implementations: Real machine learning schemes 9- Transformations: Engineering the input and output 10- Extensions and applications
Text books	1- An introduction to machine learning, Miroslav K. 2015. Springer International Publishing Switzerland. 2- Data Mining: Practical Machine Learning Tools and Techniques, Second Edition (Morgan Kaufmann Series in Data Management Systems). Ian H. Witten and Eibe F. 2005. Morgan Kaufmann Publishers Inc., San Francisco, CA, USA. 3- Pro Machine Learning Algorithms: A Hands-On Approach to Implementing Algorithms in Python and R (1st ed.). V Kishore A. 2018Apress, Berkely, CA, USA.

اسم المادة	*Game design*
رمز المادة	COMP46٢
نوع المادة	اختياري قسم
عدد الوحدات	٣
عدد الساعات	٢ نظري + ٢ عملي
وصف المقرر	Game design creates goals, rules and challenges to define a board game, card game, sport, video game, war game or simulation that produces desirable interactions among its participants and, possibly, spectators. Academically, game design is part of game studies, while game theory studies strategic decision making (primarily in non-game situations).
المنهج المقرر	***Syllabus*** 1. Introduction 2. What Is Game Programming Really Like? 3. What's in a Game? 4. Coding Tidbits and Style 5. Building Your Game 6. Game Initialization and Shutdown 7. Game Actors and Component Architecture 8. Controlling the Main Loop 9. Loading and Caching Game Data 10. Programming Input Devices 11. User Interface Programming 12. Game Event Management 13. Scripting with Lua 14. Game Audio 15. 3D Graphics Basics 16. 3D Vertex and Pixel Shaders 17. 3D Scenes.
Text books	1. Game coding complete, fourth edition, by Mike "MrMike" McShaffry and David "Rez Graham, 2013. 2. Game development with unity, Michelle Menard, Course Technology, 3. XNA game studio, Jonathan S. Harbour - XNA Game Studio 3.0 Unleashed, 1st Edition, ISBN-13: 978-0672330223, ISBN-10: 9780672330223.

اسم المادة	*SoftwareApplication*
رمز المادة	CCSM١٠5
نوع المادة	اجباري كلية
عدد الوحدات	٢
عدد الساعات	٢ عملي
وصف المقرر	This course provides students with the opportunity to learn the basics of a computer operating system and also allows learning wide range of computer application programs and is likely to be an early course taken by the students. In addition, students practice using command keys and other material for ease of reading and learn to use Microsoft Word, Excel and PowerPoint to create presentations, spreadsheets and text documents. Moreover, it provides students with the opportunity to improve their internet literacy by learning the basics of internet and web-based applications which is required in today's modern technology-dependent environments.
المنهج المقرر	***Syllabus*** 1. Introduction to Application Software 2. Basics of Window 7 – Part 1 3. Basics of Window 7 – Part 2 4. Basics of Window 7 – Part 3 5. Basics of Microsoft Word 2010 – Part 1 6. Basics of Microsoft Word 2010 – Part 2 7. Basics of Microsoft Word 2010 – Part 3 8. Basics of Microsoft PowerPoint 2010 – Part 1 9. Basics of Microsoft PowerPoint 2010 – Part 2 10. Basics of Microsoft Excel 2010 – Part 1 11. Basics of Microsoft Excel 2010 – Part 2 12. Basics of Internet and Web-based Applications
Text books	- International Computer Driving Licence (ICDL) Official Course.

Information Technology	اسم المادة
CCSM206	رمز المادة
اجباري كلية	نوع المادة
٣	عدد الوحدات
2+ ٢ عملي نظري	عدد الساعات
Information Technology (IT) gives the student an understanding of some of the main concepts of IT at a general level. The student is required to understand the make-up of personal computer in terms of hardware and software and to understand some of the concepts of IT such as networks are used within computing and be aware of the uses of computer-based software applications in everyday, also to let the student become acquainted with the latest developments in the computer field.	وصف المقرر
Syllabus 1. General concepts – Hardware, Software, types of computer, central processing unit, memory, and I/O devices. 2. Software – Type of software, operating system, application software, and graphical interface. 3. Computer languages – introduction to programming high level language, C++, Java, Object oriented language 4. Data baser management systems – analysis and design data base systems, query languages. 5. Computer networking – LAN, WAN, the internet, and wireless network. 6. Design and analysis of algorithms 7. Multimedia computer system – Text, graphics, audio, video, and animation. 8. Virtual reality systems – introduction, 3D environment, the current VR technologies.	المنهج المقرر
- Information Technology by Richard Fox, Chapman and Hall/CRC, September 2015	***Text books***

Introduction to Intelligent Techniques	اسم المادة
CCSM351	رمز المادة
اختياري كلية	نوع المادة
2	عدد الوحدات
2 نظري	عدد الساعات
A student obtains a theoretical understanding of the subject and the skill of solving simple problems coming from the design of intelligent systems and data analysis. This subject also familiarizes students with an overview of the fields of Artificial Intelligence and Concurrency. Student will be able to apply practical application of subject, so this course requires familiarity with Programming, Artificial Intelligence, Probability Theory and Statistics, Mathematical Analysis, Linear Algebra.	وصف المقرر
Syllabus 1. Introduction the fields of AI and Concurrency. 2. Rough sets 3. Fuzzy systems 4. basic fuzzy set relations 5. fuzzy control basics 6. Classical Petri nets 7. Non---classical Petri nets 8. Computer systems supporting the net representation of knowledge 9. The modeling of approximate reasoning. 10. 10-Petri nets and production rule systems	المنهج المقرر
- Artificial Intelligence Structures and Strategies for Complex Problem Solving, George F. Luger , 6th Ed., Addison –Wesely, 2016.	***Text books***

اسم المادة	*Computer Graphics*
رمز المادة	**CCSM350**
نوع المادة	**اختياري كلية**
عدد الوحدات	**٢**
عدد الساعات	**٢ نظري**
وصف المقرر	In this unit, the students are introduced to the basics concepts of computer graphics. The concept of computer graphics simply means identifying their areas of the screen that are to be illuminated and those that should not be. We also look into the concept of drawing line and circle algorithms. We explain the concept of two dimension transformations. We look into the concept of clipping and windowing.
المنهج المقرر	***Syllabus*** 1- Basics of computer graphics. 2- Graphic devices. 3- Line drawing algorithms. 4- Circle drawing algorithms. 5- Two dimensional transformations. 6- Two dimensional clipping algorithms. 7- Windowing algorithm. 8- Solid area scan conversation.
Text books	1. Principles of Interactive Computer Graphics – By Newman &Sproull. 2. C Graphics & Projects – By B M Havaldar. 3. Computer Graphics – By Hearn & Baker 4- Computer Graphics for Scientists and Engineers – By Asthana and Sinha

Introduction to web	اسم المادة
CCSM١52	رمز المادة
اختياري كلية	نوع المادة
٢	عدد الوحدات
٢ نظري	عدد الساعات
The main objective of this course is to give students a broad understanding of the Internet and WWW. Protocols and tools will be introduced, explained, and discussed. The course aims to provide students with experience in using and understanding this technique.	وصف المقرر
Syllabus 1- Web Basics (Web Overview, Web Sites, Hypertext Links,URLs) 2- Introduction to the WWW (Overview and Evolution) 3- WWW Architecture and Consortium (W3C) 4- How the World Wide Web works 5- How the World Wide Web is different from the Internet 6- HTTP and HTTPS 7- HTTP Messages 8- Web Clients 9- Basic Browser Functions 10- Browser Cache 11- Plugins, Extensions and User-Controllable Features 12- Web Servers 13- Representing Web Data 14- Client-Side Scripting versus Server-Side Scripting 15- Client-Side Programming	المنهج المقرر
1. WEB TECHNOLOGIES: A Computer Science Perspective, by Jeffrey C. Jackson. 2. - Internet and World Wide Web: How To Program, by Paul Deitel, Harvey Deitel, Abbey Deitel.	***Text books***