معدلة في أكتوبر 2011

قسم علوم الحاسوب

الخطة التدريسية ابتداءا من العام الجامعي 2009 / 2010 م

The curriculum of the department of Computer Science (CS) is designed to impart the necessary theoretical and practical knowledge in the area of computer's software and hardware. The duration of the course is for four years (eight-semesters). The student is required to study a total of 142 credit hours. In the last year the student is required to take a project work in which he must study, analyze and /or design a certain problem in the field of computer science and submit a report. The distribution of the courses semester-wise is as follows:

طريقة احتساب الدرجات للمقررات التي تغيرت مسمياتها (بالنسبة للطلاب المسجلين قبل العام 2011-2012):

✔ مقدمة في الحاسبات = مقدمة في الحاسبات (1) أو مقدمة في الحاسبات (1)، أيهما أكبر **(تُحْتَسبْ للطالب أكبر الدرجتين).**

✔ برمجة حاسوب (1) = لغة برمجة.

✔ برمجة حاسوب (2) = برمجة مهيكلة.

✔ درجة رياضيات (3) و رياضيات (4) تفكتر (يتم إعادة حسابها) من 150، ما قبل الفصل الدراسي الثاني 2011/2010

س.م = ساعات معتمدة

المستوى الأول

الفصل الدراسي الأول:

س.م	عملي	تمارين	نظري	المقرر		
2			2	Arabic Language (1)	لغة عربية (1)	1
2			2	Islamic Culture	ثقافة إسلامية	2
2			2	English Language (1)	لغة إنجليزية (1)	3
3	2		2	General Physics	فيزياء عامة	4
3		2	2	Mathematics (1)	رياضيات (1)	5
3	2		2	Introduction to Computers	مقدمة في الحاسبات	6
3	2		2	Computer Programming (1)	برمجة حاسوب (1)	7
18						

الفصل الدراسي الثاني:

س.م	عملي	تمارين	نظري	المقرر		
2			2	Arabic Language (2)	لغة عربية (2)	1
3	2		2	Computer Programming (2)	برمجة حاسوب (2)	2
2			2	English Language (2)	لغة إنجليزية (2)	3
3	2		2	Electrical & Electronic Circuits	دوائر كهربية و الكترونية	4
3		2	2	Mathematics (2)	رياضيات (2)	5
2			2	Fundamentals of Management	مبادئ الإدارة	6
3		2	2	Probability and Statistics	إحتمالات وإحصاء	7
18						

المستوى الثاني

الفصل الدراسي الأول:

س.م	عملي	تمارين	نظري	المقرر		
2			2	English Language (3)	لغة إنجليزية (3)	1
3	2		2	Data Structures (1)	هياكل بيانات (1)	2
3		2	2	Mathematics (3)	رياضيات (3)	3
3	2		2	Object Oriented Programming	برمجة شيئية	4
3		2	2	Discrete Mathematics	رياضيات متقطعة	5
4	2		3	Digital Logic Design	تصميم رقمي منطقي	6
2			2	Fundamentals of Accounting	مبادئ المحاسبة	7
20						

الفصل الدراسي الثاني:

س.م	عملي	تمارين	نظري	المقرر		
2			2	English Language (4)	لغة إنجليزية (4)	1
3	2		2	Data Structures (2)	هياكل بيانات (2)	2
3		2	2	Mathematics (4)	رياضيات (4)	3
3	2		2	File Organization & Processing	تنظيم ومعالجة الملفات	4
3			3	Numerical Analysis	تحليل عددي	5
3	2		2	Assembly Language	لغة التجميع	6
3	2		2	Computer Architecture & Organization	بنية وتنظيم الحاسبات	7
20						

المستوى الثالث

الفصل الدراسي الأول:

س.م	عملي	نظري	المقرر		
3		3	Data Communication	تراسل البيانات	1
3	2	2	Database Concepts	مفاهيم قواعد البيانات	2
3		3	Analysis & Design of Algorithms	تصميم وتحليل الخوارزميات	3
3		3	Analysis & Design of Information Systems	تحليل وتصميم نظم المعلومات	4
3		3	Theory of Computation	نظرية الحسابات	5
3	2	2	Operating Systems (1)	نظم التشغيل (1)	6
18					

الفصل الدراسي الثاني:

س.م	عملي	نظري	المقرر		
3		3	Computer Networks	شبكات الحاسوب	1
3	2	2	Database Systems	نظم قواعد البيانات	2
3	2	2	Visual Programming	البرمجة المرئية	3
3	2	2	Cryptography & Network Security	التشفير وحماية الشبكات	4
3	2	2	Operating Systems (2)	نظم التشغيل (2)	5
3	2	2	Systems Programming	برمجة النظم	6
18					

المستوى الرابع

الفصل الدراسي الأول:

	المقرر		نظري	عملي	س.م
1	هندسة برمجيات	Software Engineering	3		3
2	الذكاء الاصطناعي	Artificial Intelligence	2	2	3
3	مفاهيم لغات الحاسوب	Concepts of Programming Languages	3		3
4	مترجمات	Compilers	2	2	3
5	مشروع تخرج (1)	Project (1)	3		3
					15

الفصل الدراسي الثاني:

	المقرر		نظري	عملي	س.م
1	الوسائط المتعددة	Multimedia	3		3
2	المعالجة على التوازي	Parallel Processing	3		3
3	الرسم بالحاسوب	Computer Graphics	2	2	3
4	مقرر اختياري	Elective Course	3		3
5	مشروع تخرج (2)	Project (2)	3		3
					15

المقررات الاختيارية:

	المقرر		نظري	عملي	س.م
1	معالجة الصور	Image Processing	3		3
2	الشبكات العصبية	Neural Networks	3		3
3	الخوارزميات الجينية	Genetic Algorithms	3		3
4	تكنولوجيا الإنترنت وتطبيقاته	Internet Technology & Applications	3		3
5	تشفير متقدم	Advanced Cryptography	3		3
6	**أي مواد أخرى يقترحها القسم.**				

المحتوى العلمي لمقررات مرحلة البكالوريوس – قسم علوم الحاسوب

المستوى الأول

Introduction to Computers

Introduction to computers and information systems, Types of computers. Computer hardware and software components, Binary Values and Number Systems, Data Representation, Gates and Circuits, Computing Components, Low-Level Programming Languages and Pseudo code, Problem Solving and Algorithms, Abstract Data Types and Subprograms.

General Physics

Mechanics: Physics and measurements, motion in one dimension, vectors, motion in two dimensions, laws of motion, circular motion and its applications, work and energy, potential energy and conservation of energy, linear momentum and collision, rotation of a rigid body, rolling motion, law of gravity. **Waves:** oscillatory motion, wave motion, sound waves. **Optics:** Superposition of waves, interference, diffraction and polarization of magnetic fields and Snell's law, electromagnetic waves.

Mathematics (1)

Pre-calculus review: Sets, Real-valued functions, Trigonometry, Exponentials and logarithms, Conic sections. Limits and Continuity. Differentiation: Techniques of differentiation, Applications of differentiation. Integration: Techniques of integration, Applications of integration.

Computer Programming (1)

Introduction to Programming in C, First Steps in Programming, Making Decisions, Loops, Arrays, Applications with Strings and Text, Pointers.

Computer Programming (2)

Structured program development: problem solving decision structure, repetition structures. Top-down and stepwise refinement. Subprograms: Procedures and functions. Structured data types: one-dimension arrays, sets, records, files: text files, random handling files. Dynamic data structures (pointers). Recursion.

د.فواز علي عقلان الأكحلي	د.عبدالجبار طارش التميمي	د.بدرية محمد عبدالواسع
أ.م. بقسم علوم الحاسوب	رئيس قسم علوم الحاسوب	رئيس وحدة الجودة

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Electrical & Electronic Circuits

Electrical sources, electrical circuit elements, Ohm's law, Kirshoff's laws, solution of AC circuits, superposition theorem, substitution theorem, Thevenin's and Norton's theorems, compensation theorem, four-pole networks, electric power, maximum power transfer theorem, diodes, transistors, field effect transistors, operational amplifiers and their basic circuits and applications.

Mathematics (2)

Indeterminate forms. Taylor's formula and improper integrals. Infinite series. Fourier series and Fourier integral. Parametric curves and vectors in the plane. Vectors, curves and surfaces in space. Binomial theorem. Partial fractions. Partial differentiation.

Probability and Statistics

Sample space, probability axioms, combinational techniques, conditional probability, independence and Bayes theorem. Random variables, distribution functions, moments and generating function. Some probability distributions. Joint distribution, the Chebychev inequality and the law of large numbers. The central limit theorem and sampling distribution.
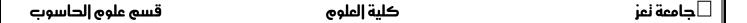
المستوى الثاني

Data Structures (1)

Data structures types and representations. Array, linked list, stack, queue, and doubly linked list data structures. Abstract data types (ADT). Sorting and searching algorithms. These structures are implemented in C++.

Data Structures (2)

Recursive and iterative methods. Tree, binary tree, binary search tree, heap, priority queue, hash table and graph data structures. These structures are implemented using object oriented programming in C++.

Mathematics (3)

Matrices and operations. Homogenous and non-homogenous linear equations. Determinants. Vector spaces and subspaces. Eigen values and eigenvectors.

د.فواز علي عقلان الأكحلي	د.عبدالجبار طارش التميمي	د.بدرية محمد عبدالواسع
أ.م. بقسم علوم الحاسوب	رئيس قسم علوم الحاسوب	رئيس وحدة الجودة

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Object Oriented Programming

Data abstraction, encapsulation, classes, objects, templates, operator overloading, function overloading, inheritance, multiple inheritance, polymorphism, virtual functions, exception handling, and streams. The above concepts are implemented in C++.

Discrete Mathematics

Sets, sequences, algorithms and pseudocode, induction and recursion, relations and functions, Graphs, lattices, number systems and codes, Boolean algebra, Formal logic, trees and languages, semi groups and groups.

Digital Logic Design

Basic logic concepts: Logic states, number systems, Boolean algebra, basic logical operations, gates and truth tables. Combinational logic: Minimization techniques, multiplexers and de-multiplexers, encoders, decoders, adders and subtractors, comparators, programmable logic arrays and memories, design with MSI, logic families, tri-state devices. Sequential logic: Flip flops, mono-stable multi-vibrators, latches and registers. , Counters.

Computer Architecture & Organization

Computer basic units organization and design: memory, control, arithmetic and logic unit, input/output. Computer instructions and addressing modes, timing and control, execution cycle of instructions. Input, output and interrupt. Arithmetic processor algorithms. Hardwired versus microprogramming control organization.

Fundamentals of Management

History of Management, planning, fundamentals of planning, making decisions, strategic planning, plans and planning tools. Organizing and managing human resources. Influencing, leadership, controlling. Production management and control. Quality management. Management of service industries.

Mathematics (4)

Differential equations and its applications. Laplace transform, z-transform and there applications.

File Organization & Processing

Overview of Files: File design, file manipulation, blocking and buffering: single and double buffering. Types of storage devices: magnetic tape and disks. Space and time calculation. Sequential file, relative

file, indexed sequential file, multiple key file, and direct access file. External sort/merge algorithms. File system-disks scheduling.

Numerical Analysis

Technical terms and importance of error, algorithm matrices and linear system of equations, solution of algebraic and transcendental equations, interpolation and curve fitting, numerical differential & integral, solution of differential equation.

Assembly Language

Assembly instructions and addressing: data transfer instructions, arithmetic instructions, logical instructions, conditional and unconditional branch instructions, loop instructions, procedures and procedure calls, macro instructions.

Fundamentals of Accounting

Basics of accounting, assets, liabilities, ownership, balance sheet. Income statements, cash flow. Cost accounting. Institutional, taxation, managerial accounting.
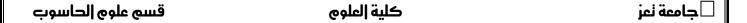
المستوى الثالث

Data Communication

Data transmission concepts. Protocols and standards. Network modes, layered tasks. Physical layer. Analog and digital data. Analog and digital signals. Transmission impairments. Data encoding. Digital and analog transmissions. Transmission media. Multiplexing. Data link layer. Error detection and correction. Data link control and protocols. Multiple access.

Database Concepts

The main objective of this course is to provide students with the background to design, implement, and use database management systems. Topics Include: Evolution of database management systems, Relational Data Model and Relational Algebra, Structured Query Language, Entity Relationship Modeling Design, ERM to RM Conversion, Tables Normalization, Forms/Reports/Menus Implementation Upon successful completion of this course, students will have the skills to analyze business requirements and produce a viable model and implementation of a database to meet such requirements.

Analysis & Design of Algorithms

Algorithm concept: Analysis and complexity. Design methods, divide and conquer, binary search, merge sort, quick sort, selection, matrix multiplication, the greedy method. Dynamic programming: shortest paths, optimal search trees. Backtracking. NP-hard and NP-complete problems.

Analysis & Design of Information Systems

The aim of this course is to cover the topics related to the upper phases of the Information Systems Development Life Cycle, which are the following: Planning of IS, the detailed analysis of IS, and the Conceptual design of IS. Methodologies, techniques, activities, tasks, deliverables and practical experiences related to the execution of these phases will be covered in the course.

Computer Networks

LAN, Ethernet. Wireless LANs. Connecting devices. WANs: Frame Relay, ATM. Network layer. Internetworking. Addressing. Classfull and Classless addresses. Network layer protocols: IPv4, IPv6, ICMP, ICMPv6, ARP. Routing protocols. Transport layer. UDP and TCP. Introduction to Application layer.

Database Systems

The main objective of this course is to provide students with an in-depth understanding of the design and implementation of database systems and the administration features of any DBMS. Topics Include: Review of Relational model, E-R Diagramming, Normalization, SQL, Review of Relational Algebra, Query Processing and Optimization, Transaction Processing, Concurrency Control and Recovery, Database Security and Authorization, Database Architectures, Distributed Databases: Architecture, Distributed transaction processing, Object Oriented Databases, Data Warehousing: Heterogeneous component systems, data scrubbing, DW Design. On-Line Analytical Processing (OLAP). Upon successful completion of this course, students will have advanced skills to effectively develop, implement and manage medium to large-scale database management systems.

Visual Programming

Graphical user interface (GUI), review and concepts, anatomy of a windows program. Available developing tools. Keyboard and mouse input, menus creating, adding menus to programs. Dialog boxes: buttons, texts, list boxes, grids and spreadsheets. Graphics, files and file handling. Multiple document interfaces and views (MDI). Exception handling and debugging. OLE.

Cryptography & Network Security

Classical encryption techniques; Modern black ciphers and the data encryption standards ; Block cipher cryptanalysis and usage; Modern stream ciphers; Number theory; Public key cryptography ; Key certificates and management; Message authentication and hash functions ; Hash algorithms; Digital

signature and authentication protocols; Electronic mail security ; IP security; Web security. Firewalls. Introduction to digital steganography and watermarking techniques.

Operating Systems (1)

Types of operating systems. Operating Systems structures: system components and services, virtual machines. Process management: CPU scheduling: Scheduling concepts, performance criteria, scheduling algorithm. Memory organization and management for single user and multi-user system. Secondary storage management, Disk scheduling, virtual memory.

Operating Systems (2)

File systems: File concept, access methods, directory systems, file protection. Processes synchronization: Process Concept, the producer/consumer problem, the critical section problem, semaphores, deadlock, threads, language constructs, inter-process communications. Distributed operating systems: distributed systems structures, distributed file systems, distributed coordination, network structures. Protection and security.

Theory of Computation

Church's thesis: Grammars, the M-recursive functions, and Turing computability of the M-recursive functions. The incompatibility: The halting problem, Turing innumerability, Turing acceptability, and Turing decidability, unsolvable problems about Turing machines and M-recursive functions. Computational complexity: Time-bounded Turing machines. Rate of growth of functions. NP-Completeness. The complexity hierarchy. The prepositional calculus: Syntax, Truth-assignment, Validity and satisfiability. Equivalence and normal forms compactness.

Artificial Intelligence

Knowledge Representations: Predicate Calculus, Structured Representations, Network Representations. State Space Search: trees and graphs, heuristic search, model based reasoning, case-based reasoning, reasoning with uncertain or incomplete knowledge. Overview of AI Languages, Overview of AI Application Areas.

Systems Programming

Functions of system software components - design of hardware drivers, loaders and linkers, compilers, assemblers, interpreters and utilities - case study of real system programming.

المستوى الرابع

Software Engineering

Overview of software engineering, software requirement: requirement engineering processes, system models, software prototyping. Design: architecture design, distributed system architecture, object oriented design, user interface design.

Concepts of Programming Languages

Describing syntax and semantics. Identifiers: names, binding, type checking, and scopes. Data types, subprograms and their implementation, concurrency, programming paradigms such as declarative programming, object oriented programming and component programming, parallel and distributed programming.

Computer Graphics

Introduction to Computer Graphics. Overview of graphics systems. Line drawing algorithms. Circle drawing algorithms. Ellipse drawing algorithms. Area filling algorithms. Polygon filling algorithms. Line clipping algorithms. Polygon clipping algorithms. Two dimensional transforms (translation – rotation – scaling – general transforms – composite transforms). Three dimensional object representation and Projections. Three dimensional modeling and transformations (translation – rotation – scaling – sheer – reflection – composite). Three dimensional viewing and Camera Model.

Compilers

Syntactical specifications of languages. Lexical analysis. Parsing: top-down parsing, bottom-up parsing, LL-parsers, LR-parsers. Semantic analysis. Intermediate code generation. Error detection and error handling.

Multimedia

Introduction to Multimedia systems. Digital Audio. Digital Video. Lossy and lossless data compression. Predictive Coding techniques. Transform coding techniques. Scalar and vector quantization. Entropy Encoding. Huffman coding. Arithmetic Coding. Adaptive techniques. Dictionary based coding (LZ77 – LZ78 - LZW). JPEG compression. Motion estimation and compensation in video. MPEG compression. Wavelet coding. Introduction to multimedia Database. Network considerations for multimedia transmission.

Internet Technology and Applications

Internet TCP/IP suit. Internet domains. Addressing. Internet protocols. Internet hardware components. Internet accessing. Learning how to design of a simple home page using HTML and CSS. The use of script language such as JavaScript VB Script. The ADO and the XML. The ASP.NET AJAX and Gadgets. The new up to date internet technologies.

Parallel Processing

Interconnection networks: parallel computing and networks, direct and indirect networks, message switching layer, deadlock and live lock and starvation, routing algorithms, collective communication support. Parallel algorithms: BRAM model, basic techniques (balanced tree algorithm, divide and conquer, prefix computations, pointer jumping, partitioning), list and trees (list ranking, symmetry breaking, Euler tour techniques), searching, merging, and sorting algorithms.

Graduation Project

This course will continue for two semesters. In the first semester, a group of students will select one of the projects proposed by the department, and analyze the underlying problem. In the second semester, the design and implementation of the project will be conducted.