The Syllabus of Computer Sciences Department
2012-2013

المناهج الدراسية لقسم علوم الحاسوب

University of technology
Computer Sciences Department
www.uotechnology.edu.iq/dep-cs

المناهج الدراسية لفرع البرامجيات
للعام الدراسي 2012-2013

University of Technology
Computer Sciences Department

Software Branch

2012 - 2013

First Year Syllabus — منهاج المرحلة الاولى

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
4	1	2	3	Structured Programming	البرمجة المهيكلة	1
2	1	-	2	Mathematics	الرياضيات	2
2	1	-	2	Fundamental of Programming Technique	اساسيات تقنيات البرمجة	3
2	1	-	2	Discrete Structures	الهياكل المتقطعة	4
2	1	-	2	Computer Organization& Information Technology	تركيب الحاسوب وتكنولوجيا المعلومات	5
3	1	2	2	Logic Design	التصميم المنطقي	6
pass	-	-	2	English Language	اللغة الانكليزية	7
15	6	4	15	Total		

Total No. of Unit for One Semester: **(16)**Units — مجموعة الوحدات للفصل الدراسي الواحد: (15) وحدة
Total No. of Unit for Year: **(32)** Units — مجموعة الوحدات لسنة دراسية: (30) وحدة

Second Year Syllabus — منهاج المرحلة الثانية

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Object Oriented Programming	البرمجة الشيئية	1
3	1	2	2	Data Structures and Algorithms	هياكل البيانات والخوارزميات	2
3	1	2	2	Advance Mathematics &Numeric Analysis	الرياضيات المتقدمة والتحليل العددي	3
3	1	2	2	System Analysis and Databases Design	تحليل نظم و تصميم قواعد البيانات	4
3	1	2	2	Micro-Processors and Assembly Programming	المعالجات الميكروية و البرمجة بلغة التجميع	5
3	1	2	2	Software Engineering	هندسة البرمجيات	6
2	1	-	2	Computation Theory	النظرية الاحتسابية	7
1	-	-	1	Human Rights and Democracy	حقوق الانسان والديمقراطية	8
21	7	12	15	Total		

Total No. of Unit for One Semester: **(21)**Units — مجموعة الوحدات للفصل الدراسي الواحد: (21) وحدة
Total No. of Unit for Year: **(42)** Units — مجموعة الوحدات لسنة دراسية: (42) وحدة

University of Technology
Computer Sciences Department

Software Branch

2012 - 2013

Third Year Syllabus

منهاج المرحلة الثالثة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Computer Graphics	رسوم الحاسوب	1
3	-	2	2	Compilers	المترجمات	2
3	1	2	2	Advanced Databases	قواعد البيانات متقدمة	3
2	1	-	2	Computer Architecture	معمارية الحاسوب	4
3	1	2	2	Artificial Intelligent	الذكاء الاصطناعي	5
2	1	-	2	Operation Research	بحوث عمليات	6
3	1	2	2	Computer Networks	شبكات الحاسوب	7
3	1	2	2	Algorithms & Complexity	الخوارزميات وتعقيداتها	8
22	7	12	16	Total		

Total No. of Unit for One Semester: **(22)**Units
Total No. of Unit for Year: **(44)** Units

مجموعة الوحدات للفصل الدراسي الواحد: (**22**) وحدة
مجموعة الوحدات لسنة دراسية: (**44**) وحدة

Forth Year Syllabus

منهاج المرحلة الرابعة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
2	1	-	2	Computer and Data Security	امنية الحاسبات والبيانات	1
3	1	2	2	Advance Windows Programming	برمجة نوافذ متقدمة	2
3	1	2	2	Image Processing	معالجة صور	3
3	1	2	2	Operating System	نظم التشغيل	4
3	1	2	2	Intelligence Applications	تطبيقات ذكية	5
3	1	2	2	Web programming	برمجة المواقع	6
2	1	-	2	Modeling and Simulation	النمذجة والمحاكاة	7
3	-	4	1	Project	المشروع	8
22	7	14	15	Total		

Total No. of Unit for One Semester: **(22)**Units
Total No. of Unit for Year: **(44)** Units

مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة
مجموعة الوحدات لسنة دراسية: (44) وحدة

University of Technology
Computer Sciences Department

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2012 - 2013

First Year Syllabus **منهاج المرحلة الاولى**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
4	1	2	3	Structured Programming	البرمجة المهيكلة	1
2	1	-	2	Mathematics	الرياضيات	2
2	1	-	2	Fundamental of Programming Technique	اساسيات تقنيات البرمجة	3
2	1	-	2	Discrete Structures	الهياكل المتقطعة	4
2	1	-	2	Computer Organization& Information Technology	تركيب الحاسوب وتكنولوجيا المعلومات	5
3	1	2	2	Logic Design	التصميم المنطقي	6
pass	-	-	2	English Language	اللغة الانكليزية	7
15	6	4	15	Total		

Total No. of Unit for One Semester: **(15)**Units مجموعة الوحدات للفصل الدراسي الواحد: (15) وحدة
Total No. of Unit for Year: **(30)** Units مجموعة الوحدات لسنة دراسية: (30) وحدة

1- Structured Programming (*with C++ Programming Language*):

- Introduction,
- Procedural Programming Principles,
- Algorithm ,
- Algorithm properties ,
  Examples,
- Flowcharts,
  Flowchart Figure,
  Examples
- C++ Language Basics (Character set, Identifiers, Getting Started with C++, Variables Declaration, Variables, Constants, Arithmetic Operations,
- The "math.h" Library, Unary Minus, Increment and /decrement Operators, Operational Assignment Operators, Relational Operators, Logical Operators, Bitwise Operator),
- Selection Statements (Selection Statements, The Single If Statement Structure, The Single If Statement Structure (Blocks), The If/else Statement Structure, Nested If and If/else Statements, The Switch Selection Statement (Selector),
- Conditional Statement), Iteration Statements (Selection Statements, While Repetition Structure, Do/While Statement, For Statement, More about For Statement, Nested Loops, Break and Continue Control Statements),
- Functions (Function, Passing Parameters (Passing by Value, Passing by Reference)), Arrays (Array of One Dimension (Declaration of Arrays, Initializing Array Elements, Accessing Array Elements, Read / Write / Process Array Elements), Array of Two Dimension (Declaration of 2D-Arrays, Initializing 2D-Array Elements, Read / Write / Process Array Elements)),

- String (Read / Write / Process Array Elements, Member Function of String, stdlib Library),
-
- Structures (The Three Ways for Declare the Structure, Array of Structures).

References:

Mastering c++ by sorhan sami & oqeli saleh 2002

2- Mathematics:

Functions, Transcendental Function, Sequence and Series, Differentiation and Applications, Integration and Applications, Multiple Integrals, Polar Plane, Complex Numbers, Matrices, Vector Analysis.

References:

Thomas calculus , 1989

3- Discrete Structures

Set theory -sets & subsets - how to specify sets -, sequences -Operations on sets-, Algebra of sets & its proves, sets of numbers- Finite sets, Mathematical induction & recursion, Matrices, Logic and propositions- Equivalency, Tautology& Contradiction, Relations- Computer representation of relations & Digraph, Manipulation of relations, Properties of relations, Composition of relations (Functions-types of functions, Graphs-definition-graphs & multigraphs- subgraph – degree of graph), Walk –length of walk- trail- path-cycle- the bridges of konnisberg, Traversable multigraphs- Euler theorem- special graph-bipartite graph matrices & graph, Labeled graphs – trees- rooted tree- ordered rooted tree-polish notation, Spanning tree- directed graph- matrix of digraph, Minimal path, Finite state machines, Language & pattern recognition machines, Optimistic approach to construct FSM, Finite automata, Finite automata (Contd).

References:

1. Discrete mathematics by Seymour Lipschutz
2. Discrete mathematical structures for computer science by Bernard Kolman & Robert C. Busby 2004
3.

4- Fundamental of Programming Technique

- Programming Language
- Features of High level Language
- Main Component of HLL
- 1- Variable & Constant (representation of Integer, real (fixed &floating point)_, characters.
- 2- Basic Arithmetic &logic Operation
- 3- I/O interface

- 4- Control Stricture (Sequences, Conditional, Loops)
- 5- Basic data Stricture (String, Array, Pointers and Internal Representation of Scalar & Vector Data
- 6- Functions or subroutines and there calling Mechanism
- - Notion of an Algorithm and Flowchart
- - Problem Solving using top –Down design
- - Steps of developing an algorithm
-
- - Developing algorithmic solution from a mathematical specification of the problem.
- - Introduction of Recursion.

Reference

1- **Concurrent programming: fundamental techniques for real time and parallel software design,** Tom Axford, 1989.
2- Concepts Techniques and Models of Computer Programming, by peter ,&Seif Haride, 2002.
3- Java Programming for beginner, Joseph Russell, 2004.

5- Computer Organization& Information Technology

Computer definition & history of computer. Importance and advantages of computers.

Applications with computer systems. Computer system classification (hardware, software).

Hardware: The structure of computer system Input units , Output units Central Processing Units (CPU) ,CPU definition. CPU components (ALU, Rs, CU).

- CPU operations. Full example of CPU operation.

Main memory

- Primary storage, Instructions format with memory.
- Secondary storage.
- Types of main memory (RAM, ROM, …).
- Type of Secondary Storage

Computer classification (analog, digital, hybrid).

- Software
- Types of software (System SW, Application SW)
- Programming language & types of them (high level, mid level).
- Translation programs Compiler. Interpreters. Assemblers. Linkers. Debugging.
- Managing organization data & information

Traditional File Environment and its Problems database :the modern approach

- Centralized and distributed database
- Data hierarchy (record, field). Files & Database. Database management system

- (DBMS),its components and its models
- Database representation.
- Telecommunications & networks (network type, transition media, cable & wireless) , Signals (analog, digital). Telecommunication system components.
- Internet & Intranet.

Reference

1- "Introduction to information technology", Turban&Rainer&Potter, 2001.
2- Hutchinson .S .E . , Sawyer .S .C . , with Contribution by Coulthard .G .J ., ”
3- Computers, Communications , and Information”, Revised Edition, Mc-Graw
4- bcdl Module1 Reference Manual Concepts of information Technology IT,by Dr. M.Al. Kolaly,2005.
5- Introduction to Information System by James O. Brien,2001
6- Raymond McLeod,Jr and George P,Schell-2004

6- Logic Design:

Number System and Codes, Logic Gates, Boolean Algebra, Minimization Methods (K-Map, Q-M), Combination Logic Circuits, Adders, Sub-tractors, Comparators, Code Converters, Multiplexers, Sequential Logic Circuits, Flip-Flops, S-R FF, D FF, J-K FF, T FF, Registers, Counters, State Diagram and FSA, ROM and RAM.

References:

Digital fundamentals by Floyd, 2003

7- English Language

Toofl lectures for first stage students in the department of computer sciences, UOT.

Part One: Structure and written expression

1. Nouns, Pronoun, part of sentence, verbs, prepositions, articles, noun class, adjectives class, adverb classes, prepositional phrases

Part Two: Reading

1. Reading of detail, reading of reference and vocabulary, reading of main idea, reading of inference

Part Three: Listening

1. Short conversation, longer conversions, talks and lectures.

Part Four: writing

1. Strategies, topics.

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3	1	2	2	Data Structures and Algorithms	هياكل البيانات والخوارزميات	2
3	1	2	2	Advance Mathematics &Numeric Analysis	الرياضيات المتقدمة والتحليل العددي	3
3	1	2	2	System Analysis and Databases Design	تحليل نظم و تصميم قواعد البيانات	4
3	1	2	2	Micro-Processors and Assembly Programming	المعالجات الميكروية و البرمجة بلغة التجميع	5
3	1	2	2	Software Engineering	هندسة البرمجيات	6
2	1	-	2	Computation Theory	النظرية الاحتسابية	7
1	-	-	1	Democracy& Human Rights	الديمقراطية وحقوق الانسان	7
21	7	12	15	Total		

Total No. of Unit for One Semester: **(21)**Units
Total No. of Unit for Year: **(42)** Units

مجموعة الوحدات للفصل الدراسي الواحد: (21) وحدة
مجموعة الوحدات لسنة دراسية: (42) وحدة

1-<u>Object Oriented Programming and Visual C++</u>

Overview for functions and parameter transmission in C++ , Introduction of OOP and its main features , Defining a Simple Class with Inline Member Functions, Constructors and destructors functions, Friends functions, Constant Members, Static Members, Default Arguments and Implicit Member Argument, Function and operators Overloading, Inheritance and Derived Classes, Virtual Functions and Multiple Inheritance, Function Template Definition and Function Template Instantiation, Class Template Definition and Class Template Instantiation, Introduction to Visual Studio. NET C++, Starting Visual C++ MDE, Starting Developer studio to implement a simple program, Concepts and tools for Windows Application, Microsoft Foundation Class Library Fundamentals, Explore the Microsoft Foundation Class (MFC) Library and the Visual C++ IDE (Integrated Development Environment), Create the standard MFC

Application Architectures, use the Graphical Output features of MFC, Explore Message Maps, Message Handlers, and Command Routing, and add standard User Interface Elements to an MFC Application, Create Modal and Modeless Dialog Boxes for user interaction, implement Exception Handling, and use MFC Debugging Support and Visual C++ Debugging Tools, Add Data Access Services with MFC, build and use MFC-based ActiveX Controls, develop Internet applications with MFC, add Persistence using MFC Serialization Support, create multithreaded MFC Applications, and implement regular and extension MFC DLLs.

References:

1- "Mastering C++", Prof. Oqeili Saleh and others, Dar Al-Shorok, Amman-Jordan, 2004.

2- "Object Oriented Programming Language with C++", Bjarne Stroustrup, Addison-Wesley Publication, 2003.

2- Data Structures and Algorithms:

Introduction to Data Structures, Memory representation for 1D and 2D arrays, Linear list, Linear list types, Stack: (Stack Operations, Applications of stack), Queue: (Queue Operations, Applications of queue), Circular Queue: (CQueue Operations, Applications of CQueue), Linked List, Linked-Stack, Linked-Queue, Linked-CQueue, Recursion, Graph, Trees: (Types of Tree, Binary tree, Binary tree scan, Represent Regulars expression using trees, convert tree to binary tree, Binary Search Tree), Sorting: (Sorting Algorithms, Types of Sorting algorithms, Bubble Sort, Insertion Sort, Quick Sort), Searching: (Searching Algorithm, Sequential Search, Binary Search).

References:

1- Data structures and Algorithms with Object- Oriented design Patterns in C++ by: Bruno R. Preiss, B.A.Sc., M.A.Sc.Ph.D., P.Eng. Associate Professor, Department of electronic and computer engineering, university of waterloo.
2- Data Structures and algorithm analysis in C, By: Mark Allen Weiss.
3- Data Structures and algorithms in Java PDF file.
4- Data Structures using C and C++, Yedidyah language, Moshe J. augenstein, Aaeon M. Tenenbaum, Brooklyn College.

3- Advance Mathematics & Numeric Analysis

Partial Differentiation

Function with two independent variables or more...,

Partial differentiation for first and higher order of derivative.

Chain rule.
Directional derivative.
Total derivative.

First order differential equations
Definition.
Formation of differential equation.
Solution of differential equation by:-
Direct integration.
Separating the variables.
Homogeneous equation.
Exact equation.
Integrating factor
Linear equations.
Bernoulli's equation.
Applications of first order differential equations

Second & higher order differential equations
Special types of second order equations.
Linear second order differential equations with constant coefficients.
Solution of second order homogeneous linear differential equations with constant coefficients.

Solution of second order non-homogeneous linear differential equations with constant coefficients by:-
Undetermined coefficients
Variation of parameters.
Applications of second order differential equations

Laplace Transform (L.T)
Mathematical definition of Laplace transforms.
Laplace transform for standard important function.
Properties of L.T:-
Linearity.
Shifting.
Multiplication by t^n.
Division by t.
Laplace Transform of Derivatives.
Laplace Transform of Periodic functions.
Unit step function.
Mathematical definition of inverse Laplace transform.
Inverse Laplace transform for standard important function.
Properties of inverse Laplace transform:-
Linearity.

Shifting.
Inverse Laplace Transform of Derivatives.
Inverse Laplace Transform of integral.
Partial fraction for finding inverse Laplace Transform.
Long division for finding inverse Laplace Transform.
Laplace Transform applications:
Solution of ordinary differential equations.
The Gamma function.

Partial differential equations
Formation of Partial differential equations.
Types of Partial differential equations.
Solution of Partial differential equations.
Formation of Partial differential equations.
Solution of first order Partial differential equations.
Method of variable separable.
Initial and boundary conditions.
Solution of heat equation.
Solution of wave equation.
Solution of laplace equation.

References:

1- Thomas, G. Calculus and Analytic Geometry, 5th Edition, Addison Wesly, 1999.
2- Numerical Methods Using Matlab, Prentice Hall.
3- Programming and numerical analysis., Dr M. M. AlKassab 1989.
4- التحليل العددي وبرمجة طرقه على الحاسبة الالكترونية ,عبد المطلب 1999.

4- System Analysis and Databases Design:

Introduction to database, (DBMS), Data abstraction, Analysis DB system ,Data models, Data independence, Database management & administrator, Entity relation model, Mapping constraints, Entity relation diagram, Representation of strong & weak entity, Generalization & aggregation, Design of an E-R database scheme, Mapping cardinalities, Data model-relational model, Example SQL and AQL, Hierarchical model, Example DL/1 and IQL, Network model, Data and file organization, Sequential & index file, Hash index & inverted files.

References:

1-Database Management Systems 2nd Edition, by Raghu Ramakrishnan
2- Database, design, application development, and administration 2nd edition, 2004

5- Micro-Processors and Assembly Programming:

CPU Architecture, Register Transfer, Memory, Peripheral Control Chips, Data Transfer, Fetch and Execute Cycles, Address and Data and Control Busses, Brief Introduction to Machine Code, Instruction Sets (Form, Othogonality, Number of Addresses), and Decoding. Assembly Language Programming: Addressing Modes of the 808, Data Registers, Flags, The Status Register, and Implementing Control Structures in Assembly Language, Structured Assembly Language Programming using Procedures, Arithmetic and Logic Instructions Stack (Concepts and Applications), String Processing, Tools for Preparing and Debugging and Translating Programs. MS-DOS Operating System Structure: MS-DOS and BIOS Disk and Keyboard System Architecture. Advanced Features of Processors: Segments and Segment Registers, Interrupts and Interrupt Service Routines, I/O Port Addressing, Instruction Pipelining, Cache Memory.

References:

1- Abel P., "IBM PC Assembly Language and Programming", 4th Edition, Prentice Hall, 1998..
2- Thorne M., "Computer Organization and Assembly Language Programming", 2nd Edition, Benjamin/Cummings, 1990.

6- Software Engineering:

Introduction to SW engineering, Computer software, What is software engineering, The evolving role of software, Software characteristics, Software engineering principles, The Characteristic of software engineer, Software application, Software systems, Software development, A crisis on the horizon, The attribute of good software, Software lifecycle. Software Engineering- Layered technology, Software process models, The waterfall model, The prototype model , The RAD model, Evolutionary software process models, The incremental model, The spiral model, The win spiral model, Component based development, Introduction to Software process and project metrics, Measures , Metrics and Indicators, Metrics in the process and project domains, Process metrics, Project metrics, Software measurement, size oriented metrics, function oriented metrics, computing function point, Software Quality Metrics, Defect removal efficiency ,Integration metrics with software process, Statistical process control, Metrics for small organization, Establishing a software metrics program, Introduction to Software project planning, Estimation reliability factors, Project planning objective, Software Scope, Estimation of resources, Software process estimation option, Decomposition technique, Estimation models, The structure of estimation model, The COCOMO Model, The software equation, Automatated estimation tools, Introduction to Risk Analysis and Management, Reactive versus proactive risk strategies, Software Risks
Risk projection, Risk refinement , Project scheduling and tracking, basic concept, Scheduling, Error tracking, Software quality, Quality concepts, Quality control, Statistical software quality, Software reliability ,Introduction to analysis concepts and principles, requirement analysis, Software requirement analysis phases, Software

requirements elicitation, Facilitated action specification technique, Quality function deployment, Use case, Analysis principles, Object Oriented Analysis, Object Oriented Design, Software prototyping, Specification principles, Introduction to Software testing.

References:

1. Software Engineering by Roger Press Man 2001
2. Introduction to Software Engineering by Shari Lawrence &Joan M. Atlee, 2006
3. Software Engineering, by , Addison Wesly, 1999.

7- Computation Theory:

Regular Expression, Finite Automata, DFA and NFA, Equivalence of NFA and DFA, Equivalence of NFA and DFA with E-moves, Introduction to Crammers, Phrase Structure Grammar, Context sensitive Grammar, Context Free grammar, Chomsky Normal Form, Greibach Normal Form, Tree, The empty string in context free grammar ambiguity, Regular grammar, Left linear grammar, Right linear grammar, Kleen theorem, Two way finite automata with output (mealy machine, moor machine), The equivalence of mealy and moor machine, Push down automata, Top down –bottom up derivation, Turing machine.

References:

1. H.R.Lewis And G.H Papadimitiou,"Elements Of The Theory Of Computation", Prentig-Hall, 1981.
2. R.W.Floyd And R.Beigel,"The Languae Of Machine:An Introduction To Computability And Formal Languages"Computer Science Press, Network, 1994.
3. M.Sipser."Introduction To The Theory Of Computation" ,Boston Pws Pub ,1996.

8- Human rights and Democracy.

- مفهوم حقوق الإنسان،حقوق الإنسان في الشرائع السماوية،مصادر حقوق الإنسان،ضمانات حقوق الإنسان، مستقبل حقوق الإنسان.
- مفهوم الديمقراطية، أشكال الديمقراطية- الديمقراطية المباشرة- الديمقراطية شبه المباشرة-الديمقراطية النيابية- المجلس النيابي، الية النظام التمثيلي(الانتخاب)- مفهوم الانتخاب- هيئة الناخبين- تنظيم عملية الانتخاب- نظم الانتخاب.

المصادر

1- حقوق الانسان والطفل والديمقراطية
د ماهر صالح علاوي الجبوري وآخرون
2- محاضرات في الديمقراطية- د فيصل شطناوي

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3	1	2	2	Computer Graphics	رسوم الحاسوب	1
3	-	2	2	Compilers	المترجمات	2
3	1	2	2	Advanced Databases	قواعد البيانات متقدمة	3
2	1	-	2	Computer Architecture	معمارية الحاسوب	4
3	1	2	2	Artificial Intelligent	الذكاء الاصطناعي	5
2	1	-	2	Operation Research	بحوث عمليات	6
3	1	2	2	Computer networks	شبكات الحاسوب	7
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22	7	12	16	Total		

Total No. of Unit for One Semester: **(22)**Units مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة
Total No. of Unit for Year: **(44)** Units مجموعة الوحدات لسنة دراسية: (44) وحدة

1- Computer Graphics:

- Introduction
  - Display Devices: Cathode Ray Tube (CRT) , Liquid Crystal Display (LCD)
  - Frame Buffer
  - Coordinate System
- Basic Shapes Drawing (Line, Circle)
- Two Dimension Transformations(Translation , Scaling, Rotation Reflection)
- Clipping and Windowing
- Three Dimension Transformations (Translation , Scaling, Rotation Reflection)
- Projection (Orthographic Projection ,Perspective Projection)
- Direct X

Initialization
- Loading and Background
- Scrolling the Background
- Drawing Sprites
- Collision Detection between Sprites

- Curves

  Curve fitting

References:

1- J. D. Foley, Avan Dametal, "Introduction to Computer Graphic", Addison-Wesley, 1993.
2- D. Hearn and M.P. Baker, "Computer Graphics ", 2nd. Ed., Prentice-Hall, 1994

2- Compilers:

Programming Language, Introduction to Compiler, Type of Errors, One Pass Compiler, Syntax Definition, Context Free Grammar, Parsing Tree & leftmost and rightmost derivations, Transition Graph, Lexical analysis, Syntax of Analysis, Problems of Compiler, First and Follow, Top down Parsing, Predictive Parsing Method, Bottom up Parsing, Operation Precedence Parser, Simple Left to Right Parser, Canonical LR Parser, Look Ahead LR, Semantic Analysis, Intermediate Code Generation, Code Optimization, Examples of Code Optimization, Code Generation, Build Simple Compiler.

References:

1. Principles of Compiler Design ,Alfred V. Aho, Jeffry D. Ulman.
2. Basics of Compiler design ,Torben Mogenes 2000-2008.

3- Advanced Databases:

- Structure of Distributed database, Feature of DDB versus Centralized DB, Advantage and disadvantage of DDB, Distributed database management system.
- Design of Distributed database, DDB architecture, designing the conceptual scheme, designing the physical DB, Designing fragmentation, designing the allocation of fragments.
- Data distribution: processing locating, Availability and reliability of DDB, workload distribution, storage costs and availability.
- Top-down and Bottom –up approaches for design of data distribution, horizontal, vertical and mixed fragmentation.
- Data Replication and allocation, measure of costs and benefits.
- Distributed query processing: simple join processing, join strategies that exploit parallelism, semjoin strategy.
- Recovery in distributed system, system structure, commint protocols, Concurrency Control, Time stamping, Deadlock Handling .
- Data mining functionalities, concept, class description, characterization and discrimination.
- Association Analysis, classification and predication, cluster analysis, outlier analysis, evolution analysis, classification according to the kind of technique utilities, classification according to the application adapted.
- Data warehouse and OLAP technology for data mining,
- The construction of data warehouse, data warehouse architectures ,differences between operational DB and data warehouse, separate data warehouse, multidimensional data model
- The design of data warehouse :top- down view, the data source view, the business query view, the process of data warehouse design.

- Data preprocessing , data cleaning, data integration and transformation, data reduction

References

1- Database system concept, fifth edition, Abraham Silberschatz and Merry F. Koth, 2006.
2- Distributed DB , Stefane Ceri, 2002.
3- Data mining Concepts and Technique, Jiawer Man, Micheline ,2001.

4- Computer Architecture:

Introduction to computer architecture and CPU architecture, Instruction set and format, Addressing modes, Program control (interrupt and subroutine call), Microprogramming Design of CPU Control Unit and Micro programmed vs., ardwired Control, RISC and CISC, I/O organization and Peripheral Control Strategies, Input / output interfaces, Asynchronous data transfer, Programmed I/O, Memory Management, types and hierarchy, Main memory and memory address map, Direct Memory Access, Input / output processor (IOP) and Channels, Associative Memory and Content-Addressable Memories, Cache memory, Parallel processing, Pipeline (general consideration), Arithmetic pipeline, Instruction pipeline, Difficulties in Instruction pipeline, And theme solutions, Vector processing, And array processors, Interprocessor communication, Cache coherence.

References:

1- M.M Mano "Computer System Architecture " third Edition, Prentice Hall, 1993.
2- David A. patterson And John L.Hennessy, "Computer Organization And Design " Morgan Kaufmann, 1998.

5- Artificial Intelligent:

Introduction to Programming in Logic, Prolog Language Structure, Prolog Language Components, Facts, Simple Rules, Built in Functions in Prolog Language, Recursion in Prolog (Tail Recursion), Non Tail Recursion, Fail Structure, List Processing, String Processing, Database Structure and Properties, Files in Prolog and Applications with Database, Introduction to Artificial Intelligence, Knowledge Representation, Logical Representation, Graphical Representation, Problem State Space Characteristics, Problem Solving, Search Technique(Blind), Heuristic Search, The 8_Puzzle Problem, Control Strategy(Structure), Forward Chaining for Problem Solving, Backward Chaining for Problem Solving, Hybrid Method (Rule Cycle)., introduction to expert system, routing problem, pattern recognition system.

References:

1. Artificial Intelligence, by Elian Rich, Prentice Hall 1991.
2. Artificial Intelligence, by G. F. luger 2002
3. Artificial Intelligence, by Russel & P. nerving , 2003
4. Artificial Intelligence, by V rkas & I. pl. Vlaahavas ,2008

6- Operation Research:

Probability(The concept of probability,- Discrete probability distribution, Continuous probability distribution), Operation Research(- Operation Research Definition, Linear programming formulation,-Graphical solution, Simplex method, Duality and sensitivity analysis, Transportation model, Networking analysis, Games theory, Queuing Theory, Simulation).

References:

1. Operation Research: An Introduction, Hamdy A. Taha.

7- Computer Networks:

Data Communication,Physical Topology,Basic Network Technology,LAN Devices,Collision and Collision Domains in Shared Layer Environments Network Devices,Network Layer Addressing, Network Layer Field & Datagram IP address Class, Subnet NW, Private Addresses,Transmission of Digital Data Interfaces and Modems, Transmission Media,Unguided Media, Satellite Communication, Error Detection and Correction ,Data Link Control Multiplexing, De Multiplexing, Data Link Protocols, ARP, FTP, TELNET, DNS, UDP, TCP, NFS and RPC,SMTP, TFTP, HTTP, WAIS, Gopher, SNMP, WWW Browser Architecture,Methods for Assigning IP Address, Advance ARP, DHCP, Dynamic Addressing,Routable and non Routable Protocols, RIP Features.

References:

1- "Computer Networks", 3rd Edition, A. Tannenbaum, Prentice-Hall, 1996.
2- "Data Communications, Computer Networks and OSI", 4th Edition, F. Halsall, Addison-Wesley, 1995.

8- Algorithms & Complexity

Introduction.

-Some Problems (Knapsack,4-color mapping, Traveling Salesman, Shortest Path ,Subset Sum, Scheduling, Closest Pair of Point …).

-Time &Space Complexity .

-Ω,Θ and O notations.

-Classes of Problems.

-Greedy Algorithms.

-Divide – and – Conquer Algorithms.

-Dynamic Programming.
-Network Flow.
-Intractability.
-Approximation Algorithms.
-Local Search.
-Randomized Algorithms.

References:

"**Algorithm Design**" by Jon Kleinberg &Eva Tardos, Addison Wesley (Pearson Inc.),2008

Elective Subjects for Third Year **المواضيع الاختيارية للمرحله الثالثة**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Advance Software Engineering	هندسة البرامجيات المتقدمة	1
2	1	-	2	Operation Research	بحوث عمليات	2
3	-	-	3	Advance Information Technology	تكنولوجيا المعلومات المتقدم	3
3	-	2	2	Mathematics Applied in Computer	تطبيقات رياضية في الحواسيب	4

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Forth Year Syllabus **منهاج المرحلة الرابعة**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
2	1	-	2	Computer and Data Security	امنية الحاسبات والبيانات	1
3	1	2	2	Advance Windows Programming	برمجة نوافذ متقدمة	2
3	1	2	2	Image processing	معالجة صور	3
3	1	2	2	Operating System	نظم التشغيل	4
3	1	2	2	Intelligence Applications	تطبيقات ذكية	5
3	1	2	2	Web programming	برمجة المواقع	6
2	1	-	2	Modeling and Simulation	النمذجة والمحاكاة	7
3	-	4	1	Project	المشروع	8
22	7	14	15			

Total No. of Unit for One Semester: **(22)**Units
Total No. of Unit for Year: **(44)** Units

مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة
مجموعة الوحدات لسنة دراسية: (**44**) وحدة

1- Computer and Data Security:

1. Introduction of Data security:-terminology, Steganography, substitution and transposition cipher, Simple XOR, One time Pads, Computer Algorithms.

2. Protocol Building Blocks:- Introduction to protocols, communication using symmetric cryptography, one way functions, one way hash functions, communication using public key cryptography, digital signature, digital signature with encryption random and pseudo random sequence generation

3. Basic Protocols:- Key Exchange, Authentication, Multiple key Public key cryptography, secret splitting, secret sharing, cryptographic protection of data base.

4. Key Length:- Symmetric key length, public key key length, comparing Symmetric and public key key length, public key key management

5. Algorithm types and Modes:- electronic Code Book Mode, Block replay, cipher block chaining mode, stream cipher, self synchronize stream cipher, cipher-feedback mode, counter mode, other block cipher mode, choosing a cipher mode, interleaving , block cipher vs. stream ciphers

6. Using Algorithms:- choosing an algorithm, public key cryptography vs. symmetric cryptography, encrypting communication channels, encrypting data for storage, hard ware encryption v. software encryption, compression, encoding and

encryption, detecting encryption, Hiding cipher text in cipher text, destroying information.

7. Data encryption standards:- background, description of DES, security of DES.
8. Pseudo random sequence generator and stream:- linear congruential generators, linear feedback shift registers, stream cipher using LFSRs, A5.
9. Public Key Algorithms:- Background, knapsack algorithm, RSA, Pohilig Hellman, Rabin, ElGamal, McEliece, Elliptic Curve Cryptosystems
10. Public key Digital Signature Algorithm :- Digital Signature Algorithm (DSA), DSA variants, GOST

References:

1- Cryptography and Network Security, William Stalling , 2003

2- Advance Windows Programming:

Introduction, The Main Difference between DOS and Windows version, Windows Concept and Technology, The Windows' window, Visual Interface Component, Windows Class, Messages, Windows Resources, Windows Function, The Coordinate System, The Element of Windows Application Program, The WM-PAINT and WM-DESTROY messages, Creating Menus, Message Box, Dialog Box, Scroll Bars, Adding Icons, Cursors, and Bitmap.

References:

1. "Windows NT4 Programming from the ground up", Her4bert Schildt,Osborne McGraw-Hill, 2004.
2. "Windows 98 Programming from the ground up"Her4bert Schildt,Osborne McGraw-Hill. 2001.
3. "Principle of Windows programming in Borland C++" ,Schildt,Osborne McGraw-Hill. 2001.
4. .

3- Multimedia Systems

- Introduction to the nature of text, image, audio, video, graphic and animation files.
- capturing the various media.
- creating, editing and storing the various media.
- digitization and compression and the role they play in multimedia.
- Compression algorithms
- authoring tools for packaging multimedia systems.

- web-based multimedia and the special problems involved in delivering media over the WWW.
- Learn about effective graphical user interfaces.
- A variety of common software packages to complete the above objectives.

References

1- Long Guan, Sun-Yuan, Kung, Jan Larsen , Multimedia Image and Video Processing,CRC Press, 2000.

4- Operating System:

- Operating system overview
- Operating system History and types:- Main frame systems, Desktop systems, Multiprocessor systems, Distributed systems, Clustered systems, Real time systems, Handheld systems
- Computing environment
- Computer system structure
- Hardware protection
- operating system structure
- operating system components
- operating system services
- processes
- process concepts
- operation on processes
- cooperating process
- threads
- CPU scheduling(concepts, Scheduling Criteria, Scheduling Algorithms, First Come First Served and Shortest Job First, Priority Scheduling algorithm and Round Robin Algorithm, Multi level queue scheduling, multiprocessor scheduling, real time scheduling
- Introduction to Deadlocks handling
- threads
- Introduction to process synchronization
- Memory Management
- Storage management
- Protection and Security

References

"Operating System Concepts" by Silberschatz, Galvin and Gagne, 2003.

5 Intelligence Applications:

Expert Systems Using and Applications, Forward Chaining, Backward Chaining, Systems Based on Simple Search, Using Heuristics in Games, Search With Heuristics Embedded in Rules, Controlling the Reasoning Strategy, Systems Depend Under

Uncertainty, Systems That Explain Their Actions, Using WHY Facility in Explanation Processor, Using HOW Facility in Explanation Processor, Natural Language Understanding, NLP Informal Method, NLP Formal Method, An Introduction to Adaptive Algorithms, An Introduction to Neural Network, Perceptron Neural Net, Back Propagation Neural Net, Hopfield Neural Net, Bidirectional Associative Memory Neural Net, Case Study in NN, An Introduction to Genetic Algorithms, GA in Travelling Sales Man Problem Solving, GA in the 8_Puzzle Problem Solving, GA in the Transitions Problem Solving, An Introduction to Genetic Programming.

References:

1. Daniel H. Marcellus, Expert Systems Programming in Turbo Prolog, Prentice Hall (New Jersey) 1992.
2. 1.George F. Luger,Artificial Intelligence (structures and strategies for complex problem solving), Pearson Education Asia (Singapore), 2002.
3. 2. Laurene Fausett, Fundamantals of neural Networks: Architecture, Algorithms, and Applications, 1994.
4. David E. Goldberg, Genetic Algorithms in Search optimization, and Machine Learning, 1993.

6- Web Programming (*Optional*):

Web Based Application, Introduction, The world wide web, The internet and web, The history and growth of the web, The purpose of the web, The web concepts, Hypertext, web page, web site, web page address, web browsing,The web site generation, first generation web site, second generation web site, third generation web site, The classifying the web sites, environment, the general approach, range of complexity, Programming Technologies, Client side, HTML, scripting language, Java script, VB script, ActiveX, Helper Applications, plug-ins, dynamic HTML, XML, Server side, CG, ASP, PHP, Databases, Contents, web image, web audio, web video, other binary format, Adobe Acrobat file, Color, web programming with ASP,ASP Principles, ASP Objects, Response Object, buffer, cache control, charset, content type, expires, expires absolute, is client connected, addheader, clear, end, flush, redirect, Request Object, querystring, request, cooke, servervaribles, totalbytes, Session Object, contents, staticobject, codepage, sessionid, content.remove, content.removeall, session-onend, session-onstart, Application Object, contents, staticobject, content.remove, content.removeall, lock, unlock, application-onend, application-onstart, Server Object, scripttimeout, execute, HTML encode, mappath, URLencode, ASP-Error Object, ASP-File System Object, bulidpath, copyfile, copyfolder, createtextfile, deletefile, deletefolder, folderexistes, driverexistes, fileexists, ASP Applications, dynamic web site, online examination, simple search directory, simple Email system, simple chatting system.

References:

1- Web Based Application.
2- Web Programming with ASP.

7- Modeling and Simulation (*Optional*):

- System and environment:
- - concept of model and model building, model classification and representation, use of simulation as a tool, steps in simulation study.
- Continuous-time and Discrete-time systems:
- - Laplace transform, transfer functions, state-space models, order of systems, z-transform, feedback systems, stability, observability, controllability. Statistical Models in Simulation: Common discrete and continuous distributions, Poisson process, empirical distributions
- Random Numbers: Properties of random numbers, generation of pseudo random numbers, techniques of random number generation, tests for randomness, random variant generation using inverse transformation, direct transformation, convolution method, acceptance-rejection
- Design and Analysis of simulation experiments:
- -Data collection, identifying distributions with data, parameter estimation, goodness of fit tests, selecting input models without data, multivariate an time series input models, verification and validation of models, static and dynamic simulation output analysis, steady-state simulation, terminating simulation, confidence interval estimation, Output analysis for steady state simulation, variance reduction techniques
- Queuing Models:
- -Characteristics of queuing systems, notation, transient and steady-state behaviour, performance, network of queues
- Large Scale systems:
- Model reduction, hierarchical control, decentralized control,
- structural properties of large scale systems

References

1. Narsingh Deo, System Simulation with Digital Computer, Prentice Hall of India, 1999
2. Averill Law, Simulation Modelling and Analysis (3rd ed.), Tata McGraw-Hill, 2007.

8- Project.

Description for Research Project

University of Technology
Computer Sciences Department
Software Branch

2012 - 2013

Research project is an study proposed by teacher (supervisor) and developed by student (fourth class only), this study aim to train the student on it is specialization of scientific (the scientific branch in computer sciences).

Time for Research Project

The Student given full academic year for accomplishes his study.

Exam for Research Project

Research project will be evaluated by a supervisor and Committee of Experts.

Format for Research Projects

Research projects are written up in standardized format. Be formal & objective in English language, & cite all sources. The format includes the following sections:

Title

Title would normally include the major variables of student study. For example:

"A protection system for an Internet site"

Abstract

Begin with a brief Abstract of the study, which summarizes the entire study into one paragraph. The reader should be able to tell from Abstract what theory and hypothesis were, who you studied and how, what your findings were, and what they meant for the theory.

Introduction

The introduction includes a brief (~2-3 page) review of current theory & research in the area of your topic. In presenting this material, paraphrase it into your own words, but always cite the source of the information. Referencing must be complete & correct, or you are plagiarizing, which is a serious academic offence. End with an introduction to your study, including your hypothesis.

Method

1. Materials/Instruments , Describe any instruments employed to measure the variables of your study. (e.g. questionnaires, tests, etc.)

2. Procedure , The Procedure section reviews exactly how you did your study, & should include enough detail that anyone could repeat your procedure. Include your methodology (e.g. whether you did an experiment, or observation, etc.); a review of how you carried out the study; & any data analysis that you did.

Results

Include your results, summarized & presented in a way that is easy to follow & to understand. If possible, these results should be presented both in a table (which would include descriptive & inferential statistics) & in a written description of the results. The results section should not include conclusions or interpretations; these would be in the Discussion section.

Discussion

Use the discussion to relate your results to the theory you described in the introduction. The "why" of your results are discussed here, & what they mean in terms of theory & research. Add a discussion of the limitations of your study.

References

All references in the introduction are included in the reference section at the end of the research report, in alphabetical order.

Appendix

Any information that is relevant to the study, but not needed within the body of the paper, should be included at the end of the report. These appendices would include further details of the research instructions, materials, results, psychological measures, etc., if needed. Your instructor may also wish you to attach the raw data of your project.

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Elective Subjects for Forth Year **المواضيع الاختيارية للمرحله الرابعة**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	3D Graphics and Vision	الرسوم ثلاثية الابعاد والرؤية	1
2	1	-	2	Web programming	برمجة المواقع	2
3	-	2	2	Multi media and Java Programming	الوسائط المتعددة والبرمجة بلغة جافا	3
2	1	-	2	Modeling and Simulation	النمذجة والمحاكاة	4
2	1	-	2	Data Compression	ضغط البيانات	5

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First Year Syllabus **منهج المرحلة الأولى**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
4	1	2	3	Structured Programming	البرمجة المهيكلة(++C)	1
2	1	-	2	Mathematics	الرياضيات	2
2	1	-	2	Discrete Structures	الهياكل المتقطعة	3
3	1	2	2	Logic Design	التصميم المنطقي	4
2	1	-	2	Principles of Information Technology	مبادئ تكنولوجيا المعلومات	5
2	1	-	2	Principles of Information Systems	مبادئ نظم المعلومات	6
Pass	-		2	English Language	لغة انكليزية	7
15	6	4	15	Total		

Total No. of Unit for One Semester: **(15)**Units مجموعة الوحدات للفصل الدراسي الواحد: (15) وحدة

Total No. of Unit for Year: **(30)** Units مجموعة الوحدات لسنة دراسية: (30) وحدة

Second Year Syllabus **منهج المرحلة الثانية**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Object Oriented Programming and Visual C++	البرمجة الشيئية ولغة VC++	1
3	1	2	2	Data Structures and Algorithms	هياكل البيانات والخوارزميات	2
3	1	2	2	Mathematics and Numeric Analysis	الرياضيات والتحليل العددي	3
3	1	2	2	Databases	قواعد البيانات	4
2	1	-	2	Information Systems Analysis and Design	تحليل وتصميم نظم المعلومات	5
3	1	2	2	Software Engineering	هندسة برامجيات	6
2	1	-	2	Computation Theory	النظرية الاحتسابية	7
1	-	-	1	Human Rights and Democracy	حقوق الإنسان والديمقراطية	8
20	7	10	15	Total		

Total No. of Unit for One Semester: **(20)**Units مجموعة الوحدات للفصل الدراسي الواحد: (20) وحدة

Total No. of Unit for Year: **(40)** Units مجموعة الوحدات لسنة دراسية: (40) وحدة

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Third Year Syllabus **منهج المرحلة الثالثة**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Computer Graphics	رسوم الحاسبة	1
3	-	2	2	Compilers	المترجمات	2
3	1	2	2	Distributed Databases	قواعد البيانات الموزعة	3
3	1	2	2	Computer Architecture and Microprocessing	معمارية الحاسبة و المعالجة المايكروية	4
3	1	2	2	Artificial Intelligent	الذكاء الاصطناعي	5
3	1	2	2	Computer Networks	شبكات الحاسبة	6
3	1	2	2	Project Management	ادارة مشاريع	7
2	1	-	2	Operation Research	بحوث عمليات	8
23	7	14	16	Total		

Total No. of Unit for One Semester: **(23)**Units مجموعة الوحدات للفصل الدراسي الواحد: (23) وحدة

Total No. of Unit for Year: **(46)** Units مجموعة الوحدات لسنة دراسية: (46) وحدة

F Year Syllabus **منهج المرحلة الرابعة**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
2	1	-	2	Management Information Systems	نظم ادارة المعلومات	1
3	1	2	2	Advanced Databases	قواعد بيانات متقدمة	2
3	1	2	2	Intelligent Systems	الانظمة الذكية	3
2	1	-	2	Computer and Data Security	امنية الحاسبات والبيانات	4
3	1	2	2	Operating System	نظم التشغيل	5
3	1	2	2	Web Programming and Ecommerce	برمجة مواقع والتجارة الالكترونية	6
3	1	2	2	Multimedia Systems	انظمة الوسائط المتعددة	7
3	-	3	1	Project	مشروع	8
22	7	14	15	Total		

Total No. of Unit for One Semester: **(22)**Units مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة

Total No. of Unit for Year: **(44)** Units مجموعة الوحدات لسنة دراسية: (44) وحدة

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First Year Syllabus **منهج المرحلة الأولى**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
4	1	2	3	Structured Programming	البرمجة المهيكلة(++C)	1
2	1	-	2	Mathematics	الرياضيات	2
2	1	-	2	Discrete Structures	الهياكل المتقطعة	3
3	1	2	2	Logic Design	التصميم المنطقي	4
2	1	-	2	Principles of Information Technology	مبادئ تكنولوجيا المعلومات	5
2	1	-	2	Principles of Information Systems	مبادئ نظم المعلومات	6
Pass	-		2	English Language	لغة انكليزية	7
15	6	4	15	Total		

Total No. of Unit for One Semester: **(15)**Units مجموعة الوحدات للفصل الدراسي الواحد: (15) وحدة

Total No. of Unit for Year: **(30)** Units مجموعة الوحدات لسنة دراسية: (30) وحدة

1.Structured Programming

Introduction, Procedural Programming Principles, Algorithm ,Algorithm properties Examples,
Flowcharts, Flowchart Figure, Examples. C++ Language Basics (Character set, Identifiers, Getting Started with C++, Variables Declaration, Variables, Constants, Arithmetic Operations, The “math.h” Library, Unary Minus, Increment and /decrement Operators, Operational Assignment Operators, Relational Operators, Logical Operators, Bitwise Operator), Selection Statements (Selection Statements, The Single If Statement Structure, The Single If Statement Structure (Blocks), The If/else Statement Structure, Nested If and If/else Statements, The Switch Selection Statement (Selector), Conditional Statement), Iteration Statements (Selection Statements, While Repetition Structure, Do/While Statement, For Statement, More about For Statement, Nested Loops, Break and Continue Control Statements), Functions (Function, Passing Parameters (Passing by Value, Passing by Reference)), Arrays (Array of One Dimension (Declaration of Arrays, Initializing Array Elements, Accessing Array Elements, Read / Write / Process Array Elements), Array of Two Dimension (Declaration of 2D-Arrays, Initializing 2D-Array Elements, Read / Write / Process Array Elements)). String (Read / Write / Process Array

Elements, Member Function of String, stdlib Library). Structures (The Three Ways for Declare the Structure, Array of Structures).

References

- Mastering c++ by sorhan sami & oqeli saleh 2002.

2.Mathematics

Matrix, Type of matrix, Additional and multiplication, Determent Transpose, symmetric, Rank of matrix, Method of finding inverse of matrix . Crammer's rule Functions, Type of functions . intervals , Absolute vale , Polynomials , Roots , Graphic of functions, Limits Type of limits, One side & two sided limits, Limits at infinity , Sandwich theorem Continuous functions. Derivative , Mathematical definition of derivative , Rules of derivative , Implicit derivative , Higher derivative , Velocity and acceleration , Chain rule & parameter equations , Derivative of (trigonometric , inverse trigonometric ,logarithm , exponential , hyperbolic , inverse of hyperbolic functions) , Application of derivative (curve sketching , minimum and maximum problems) . Series , Integrals , Infinite integral , Definite integral , Multiple integrals , 9 methods for finding integrals , Application of integrals area under the curve ,area between tow curves .

References:

- Thomas calculus ,1989

3.Discrete Structure

Set theory –sets & subsets – how to specify sets -, sequences –Operations on sets-, Algebra of sets & its proves, sets of numbers- Finite sets, Mathematical induction & recursion, Logic and propositions- Equivalency, Tautology& Contradiction, Relations- Computer representation of relations & Digraph, Manipulation of relations, Properties of relations, Composition of relations (Functions-types of functions, Graphs-definition-graphs & multigraphs- subgraph – degree of graph), Walk –length of walk- trail- path-cycle- the bridges of konnisberg, Traversable multigraphs- Euler theorem- special graph-bipartite graph matrices & graph, Labeled graphs – trees- rooted tree- ordered rooted tree-polish notation, Spanning tree- directed graph- matrix of digraph, Finite state machines, Language & pattern recognition machines, Optimistic approach to construct FSM, Finite automata, Finite automata (Contd).

References:

Discrete mathematics by Seymour Lipschutz

Discrete mathematical structures for computer science by Bernard Kolman & Robert C. Busby.

4- Logic Design:

Number System and Codes, Logic Gates, Boolean Algebra, Minimization Methods (K-Map, Q-M),
Combination Logic Circuits, Adders, Sub-tractors, Comparators, Code Converters, Multiplexers,
Sequential Logic Circuits, Flip-Flops, S-R FF, D FF, J-K FF, T FF, Registers, Counters, State Diagram and FSA, ROM and RAM.

References:

Digital fundamentals by Floyd, 2003

5.Principles of Information Technology

Introduction to information technology, Introduction to computer architecture computer hardware(Computer hardware: central processing unit and its components, Memory and its components), Computer software: (Application software, Programming languages types, Input technologies, Output technologies) Managing organizational data and information: introduction, Traditional file environment problems), Data base: the modern approach centralized database, distributed database, Data base management system, its components, Telecommunications and networks: introduction, Telecommunications system and its processes, Communications media and channels, Networks: introduction, Local area networks, wide area network, Network communications software, applications Internet, intranets: introduction: the evolution of the Internet, The operation of the internet: services provided by the Internet, Intranets: introduction, what the difference the internet and intranet, security.

References:

- "Introduction to information technology", Turban&Rainer&Potter, 2001.
- "Introduction to information systems", James.OBrien, 1997.

6. Principles of Information Systems

Information systems overview, Information system hardware, Information system software, Database management, Telecommunication, Electronic commerce and the internet, Organizational information system, Emerging Information System, Information System Development, Information system processes, Information system development approaches, Information system management, Managing Information system as an organizational resources, Making business case for a system, Organizing the information system function

Reference

Jessup L., Valcich J., " Information Systems Foundations", Que E&T, 1999

7- English language

Toofl lectures for first stage students in the department of computer sciences, UOT.

Part One: Structure and written expression

1. Nouns, Pronoun, part of sentence, verbs, prepositions, articles, noun class, adjectives class, adverb classes, prepositional phrases

Part Two: Reading

1. Reading of detail, reading of reference and vocabulary, reading of main idea, reading of inference

Part Three: Listening

1. Short conversation, longer conversions, talks and lectures.

Part Four: writing

1. Strategies, topics.

University of Technology

Computer Sciences Department

Information System Branch

2012-2013

Second Year Syllabus **منهج المرحلة الثانية**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Object Oriented Programming and Visual C++	البرمجة الشيئية ولغة VC++	1
3	1	2	2	Data Structures and Algorithms	هياكل البيانات والخوارزميات	2
3	1	2	2	Mathematics and Numeric Analysis	الرياضيات والتحليل العددي	3
3	1	2	2	Databases	قواعد البيانات	4
2	1	-	2	Information Systems Analysis and Design	تحليل وتصميم نظم المعلومات	5
3	1	2	2	Software Engineering	هندسة برامجيات	6
2	1	-	2	Computation Theory	النظرية الاحتسابية	7
1	-	-	1	Human Rights and Democracy	حقوق الإنسان والديمقراطية	8
20	7	10	15	Total		

Total No. of Unit for One Semester: **(20)**Units مجموعة الوحدات للفصل الدراسي الواحد: (20) وحدة

Total No. of Unit for Year: **(40)** Units مجموعة الوحدات لسنة دراسية: (40) وحدة

1.Object Oriented Programming and Visual C++

Introduction to OOP and its main features (Encapsulation and Data hiding, Inheritance and Reusing)Class Declaration, Construction and Destruction Functions, Default Argument, implicit member Argument, Friend functions and friend Classes. Functions and operators overloading, Constant members, Scope Operator, Member Initialization List, Constant Members, Static Members, Member Pointers, References Members, Class Object Members, Object Arrays. Inheritance and Derived Classes, Class Hierarchy Notation, Constructors and Destructors, Protected Class Members, Private, Public, and Protected Base Classes, Multiple Inheritance. Templates, Function Template Definition, Function Template Instantiation, Example: Binary Search, Class Template Definition, Class Template Instantiation, Class Template Members. Virtual Functions, Polymorphism, type of Polymorphism.

References:

1- “Mastering C++”, Prof. Oqeili Saleh and others, Dar Al-Shorok, Amman-Jordan, 2004.

2- "Object Oriented Programming Language with C++", Bjarne Stroustrup, Addison-Wesley Publication, 2003.

2.Data Structures and Algorithms:

Introduction to Data Structures, Memory representation for 1D and 2D arrays, Linear list, Linear list types, files, Stack: (Stack Operations, Applications of stack), Queue: (Queue Operations, Applications of queue), Circular Queue: (CQueue Operations, Applications of CQueue), Linked List, Linked-Stack, Linked-Queue, Linked-CQueue, Recursion, Graph, Trees: (Types of Tree, Binary tree, Binary tree scan, convert tree to binary tree, Binary Search Tree), Sorting: (Sorting Algorithms, Types of Sorting algorithms, Bubble Sort, Insertion Sort, Quick Sort), Searching: (Searching Algorithm, Sequential Search, Binary Search).

References:

- Data structures and Algorithms with Object- Oriented design Patterns in C++ by: Bruno R. Preiss, B.A.Sc., M.A.Sc.Ph.D., P.Eng. Associate Professor, Department of electronic and computer engineering, university of waterloo.
- Data Structures and algorithm analysis in C, By: Mark Allen Weiss.
- Data Structures and algorithms in Java PDF file.
- Data Structures using C and C++, Yedidyah language, Moshe J. augenstein, Aaeon M. Tenenbaum, Brooklyn College.

3.Advanced Mathematics and Numerical Analysis

Partial Differentiation, Function with two independent variables or more...,Partial differentiation for first and higher order of derivative. Chain rule, Directional derivative , Total derivative . **Differential Equations** First order differential equations, Definition. Solution of differential equation by:-Direct integration. Separating the variables. Homogeneous equation. Exact equation. Integrating factor ,Linear equations. Bernoulli's equation. Second order differential equations. Special types of second order equations. Linear second order differential equations with constant coefficients. Solution of second order homogeneous linear differential equations with constant coefficients. Solution of second order non-homogeneous linear differential equations with constant coefficients by:-Undetermined coefficients.Variation of parameters. **Fourier series** Definition. Periodic functions. Fourier series for Odd and even function. Half range Fourier sine and cosine series. **Partial differential equations ,**Formation of Partial differential quations. Solution of first order Partial differential equations (by using characteristic equation). Method of variable separable.Initial and boundary conditions. Solution of wave equation.Solution of heat equation. **Laplace Transform** (L.T) Mathematical definition of

Laplace transforms. Laplace transform for standard important function. Properties of L.T:-
Linearity. Shifting. Multiplication by t^n. Division by t. Laplace Transform of Derivatives. Laplace Transform of Periodic functions. Unit step function. Mathematical definition of inverse Laplace transform. Inverse Laplace transform for standard important function. Properties of inverse Laplace transform:-Linearity. Shifting. Inverse Laplace Transform of Derivatives. Inverse Laplace Transform of integral. Partial fraction for finding inverse Laplace Transform. Long division for finding inverse Laplace Transform. Laplace Transform applications: Solution of ordinary differential equations. **Numerical Analysis** Solution of Non-Linear Equations. Newton-Raphson Method for Approximating. Interpolation. Lagrange Approximation. Numerical Differentiation and Integration. Approximate Integration. Integration Equal Spaces. The Trapezoidal Rule. Simpson's Rule. Simpson's (3/8) Rule. Solutions of Ordinary Differential Equation. Numerical Differentiation. Euler Method. The Step by Step Methods. Modified Euler Method (Euler Trapezoidal Method). Runge Kutta Method. Runge- Kutta-Merson Method . System of Linear Equation. Cramer's Rule. Solution of Linear Equations by using Inverse Matrices. Gauss Elimination Method. Gauss Siedle Methods. Least Squares Approximations. division for finding inverse Laplace Transform. Laplace Transform applications: Solution of ordinary differential equations. The Gamma function. Partial differential equations . Formation of Partial differential equations. Types of Partial differential equations. Solution of Partial differential equations. Formation of Partial differential equations. Solution of first order Partial differential equations. Method of variable separable. Initial and boundary conditions. Solution of heat equation. Solution of wave equation. Solution of laplace equation

References:

- Thomas, G. Calculus and Analytic Geometry, 5th Edition, Addison Wesly, 1999.
- Numerical Methods Using Matlab, Prentice Hall.
- Programming and numerical analysis, Dr.M.M Alkassab, 1989.
- التحليل العددي وبرمجة طرقه على الحاسبة الالكترونية، عبد المطلب 1999

4- **Database syllabus - second class**

What is database (Introduction, purpose of database , DBMS , differences between a file processing system and DBMS and file system disadvantage) . Database abstraction, database models (Hierarchical and Network model). Entity relationship model (ER-Model) :entity and entity set, attributes, relationship and relationship set, mapping constraints, week entities and keys). Relational model : Tables, Records , Fields , Keys and tables joining . Database administrator and database design : Schema . Indexing : primary and secondary index , index update , hash index . Normalization . System architecture : centralized and distributed database. Transaction processing. Database security : access control and encryption.

5. Information Systems Analysis and Design

Overview (System Concepts), Introduction to Information Systems (Information System Definition, Information General Model, Information System Computer Hardware, Information System Software, Information System and Data Management, Information System Telecommunications, Information System People), The Role of System Analysis (Sake Holders, System Analysts, Skills of Successful System Analysis, The Analysis Responsibilities, Variations on the System Analysts Title, The System Analysts as a Facilitator), The System Development Life Cycle (Definition, Phase1(Primary Investigation and Planning, Problem Recognition, Feasibility Study), Phase2 (Analysis Concept, Information Gathering Techniques (Interviewers, Questionnaires, Written Materials, Samples, Observations), Data Analysis Methods (Data Flows, Flow Charts, Decision Tables)), Phase3 (Initial Design, Prototyping, Detailed Design (Output Design, Input Design, Database Design, Coding Systems)), Phase4 (Implementation), Phase5 (Maintenance), Case Study (IS Development), Information, Decision, Management, Information System Types (Transaction Processing System, Management Information System, Decision Support System, Expert Systems, Executive Information System), Online Analytical Processing (OLAP), Geographic Information System (GIS)).

References:

- "Introduction to Information System", O'Bram.
- "Systems Analysis and Design", Elias M. Awad.

6- Software Engineering:

Introduction to SW engineering, Computer software, What is software engineering, The evolving role of software, Software characteristics, Software engineering principles, The Characteristic of software engineer, Software applications, Software systems, Software development, A crisis on the horizon, The attribute of good software, Software lifecycle. Software Engineering-A Layered technology, Software process models, The waterfall model, The prototype model , The RAD model, Evolutionary software process models, The incremental model, The spiral model, Component based development, Introduction to Software process and project metrics, Measures , Metrics and Indicators, Metrics in the process and project domains, Process metrics, Project metrics, Software measurement, size oriented metrics, function oriented metrics, computing function point, Software Quality Metrics, Defect removal efficiency ,Integration metrics with software process, Statistical process control, Metrics for small organization, Establishing a software metrics

program, Introduction to Software project planning, Estimation reliability factors, Project planning objective, Software Scope, Estimation of resources, Software project estimation options, Decomposition techniques, Estimation models, The structure of estimation models, The COCOMO Model, The software equation model, Automated estimation tools, introduction to risk analysis and management, reactive versus proactive risk strategies, software risks, risk projection, risk refinement, project scheduling and tracking, basic concepts, scheduling principles, software quality, quality concepts, Statistical software quality, software reliability, Introduction to analysis concepts and principles, requirement analysis, Software requirement analysis phases, Software requirements elicitation, Facilitated action specification technique, Quality function deployment, Use case, Analysis principles, Software prototyping, Specification principles.

References:

1. Software Engineering by Roger Press Man 2001
2. Introduction to Software Engineering by Shari Lawrence &Joan M. Atlee, 2006
3. Software Engineering, by , Addison Wesly, 1999.

7.Computation Theory

Regular Expression, Finite Automata, DFA and NFA, Equivalence of NFA and DFA, Equivalence of NFA and DFA with E-moves, Introduction to Crammers, Phrase Structure Grammar, Context sensitive Grammar, Context Free grammar, Chomsky Normal Form, Greibach Normal Form, Tree, The empty string in context free grammar ambiguity, Regular grammar, Left linear grammar, Right linear grammar, Kleen theorem, Two way finite automata with output (mealy machine, moor machine), The equivalence of mealy and moor machine, Push down automata, Top down –bottom up derivation, Turing machine.

References:

- H.R.Lewis And G.H Papadimitiou,"Elements Of The Theory Of Computation", Prentig-Hall, 1981.
- R.W.Floyd And R.Beigel,"The Languae Of Machine:An Introduction To Computability And Formal Languages"Computer Science Press, Network, 1994.
- M.Sipser."Introduction To The Theory Of Computation" ,Boston Pws Pub ,1996.

8- حقوق الانسان والديمقراطية:

- مفهوم حقوق الإنسان،حقوق الإنسان في الشرائع السماوية،مصادر حقوق الإنسان،ضمانات حقوق الإنسان، مستقبل حقوق الإنسان.

- مفهوم الديمقراطية، أشكال الديمقراطية- الديمقراطية المباشرة- الديمقراطية شبه المباشرة-الديمقراطية النيابية- المجلس النيابي، الية النظام التمثيلي(الانتخاب)- مفهوم الانتخاب- هيئة الناخبين- تنظيم عملية الانتخاب- نظم الانتخاب.

المصادر

1- حقوق الانسان والطفل والديمقراطية

د ماهر صالح علاوي الجبوري وآخرون

2- محاضرات في الديمقراطية- د فيصل شطناوي

University of Technology

Computer Sciences Department

Information System Branch

2012-2013

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	**Computer Graphics**	رسوم الحاسبة	1
3	-	2	2	**Compilers**	المترجمات	2
3	1	2	2	**Distributed Databases**	قواعد البيانات الموزعة	3
3	1	2	2	**Computer Architecture and Microprocessing**	معمارية الحاسبة و المعالجة المايكروية	4
3	1	2	2	**Artificial Intelligent**	الذكاء الاصطناعي	5
3	1	2	2	**Computer Networks**	شبكات الحاسبة	6
3	1	2	2	**Project Management**	ادارة مشاريع	7
2	1	-	2	**Operation Research**	بحوث عمليات	8
23	7	14	16	**Total**		

Total No. of Unit for One Semester: **(23)**Units مجموعة الوحدات للفصل الدراسي الواحد: (23) وحدة

Total No. of Unit for Year: **(46)** Units مجموعة الوحدات لسنة دراسية: (46) وحدة

1-Computer Graphics

Display Devices: Cathode Ray Tube (CRT) , Liquid Crystal Display (LCD) ,Frame Buffer Coordinate System, Basic Shapes Drawing (Line, Circle),Two Dimension Transformations, Translation , Scaling, Rotation Reflection, Shearing, Three Dimension Transformations ,Translation , Scaling, Rotation, Reflection, Shearing, Curves

References*:*

- J. D. Foley, Avan Dametal, "Introduction to Computer Graphic", Addison-Wesley, 1993.
- D. Hearn and M.P. Baker, "Computer Graphics ", 2nd. Ed., Prentice-Hall, 1994

2-Compilers

Programming Language, Introduction to Compiler, Type of Errors, One Pass Compiler, Syntax Definition, Context Free Grammar, Parsing Tree & leftmost and rightmost derivations, Transition Graph, Lexical analysis, Syntax of Analysis, Problems of Compiler, First and Follow, Top down Parsing, Predictive Parsing Method, Bottom up

Parsing, Operation Precedence Parser, Simple Left to Right Parser, Canonical LR Parser, Look Ahead LR, Semantic Analysis, Intermediate Code Generation, Code Optimization, Examples of Code Optimization, Code Generation.

References:

- Principles of Compiler Design ,Alfred V. Aho, Jeffry D. Ulman

3-Distributed Databases

Structure of Distributed Database, Trade-offs in Distributed Database, Advantages of data distribution, Data sharing and distributed control, Reliability and Availability, speed up query processing, disadvantages of data distribution, software development cost, examples and exercises, Design of distributed database, Data Replication, Availability, Increased parallelism, Increased overhead on update, Data fragmentation, Horizontal fragmentation, vertical fragmentation, Mixed fragmentation, Examples and exercises, Transparency and Autonomy, Naming of data items, Fragmentation of data items, Location fragments and replicas, Examples, Recovery in Distributed systems, system structure, Robustness, commit protocols, concurrency controls, time stamping, Deadlock Handling, Examples and exercises

References:

- Hersry K. Korth, Database System Concepts, 1991.
- Kroenke, Database Concept 2005.
- Silbersch, Database System Concepts, 2006.

4-Computer Architecture and Microprocessing

Introduction to computer architecture and CPU architecture, Instruction set and format, Addressing modes, Program control (interrupt and subroutine call), Microprogramming Design of CPU Control Unit and Micro programmed vs., ardwired Control, RISC and CISC, I/O organization and Peripheral Control Strategies, Input / output interfaces, Asynchronous data transfer, Programmed I/O, Memory Management, types and hierarchy, Main memory and memory address map, Direct Memory Access, Input / output processor (IOP) and Channels, Associative Memory and Content-Addressable Memories, Cache memory, Parallel processing, Pipeline (general consideration),

Arithmetic pipeline, Instruction pipeline, Difficulties in Instruction pipeline, And theme solutions, Vector processing, And array processors, Interprocessor communication, Cache coherence.

References:

- M.M Mano "Computer System Architecture " third Edition, Prentice Hall, 1993.
- David A. patterson And John L.Hennessy, "Computer Organization And Design " Morgan Kaufmann, 1998.

5-Artificial Intelligent

Introduction to Programming in Logic, Prolog Language Structure, Prolog Language Components, Facts, Simple Rules, Built in Functions in Prolog Language, Recursion in Prolog (Tail Recursion), Non Tail Recursion, Fail Structure, List Processing, String Processing, Database Structure and Properties, Files in Prolog and Applications with Database, Introduction to Artificial Intelligence, Knowledge Representation, Logical Representation (propositional calculus & predicate logic) , non logical Representation (production rules, semantic net & frames), Problem State Space Characteristics, Problem Solving, Search Technique, Blind search (depth & breadth), Heuristic Search (hill climbing, best first search, A algorithm, A* algorithm minmax and alpha-beta), The 8_Puzzle Problem, Tic tac toe problem, tour of Hanoi, Control Strategy (Forward Chaining, Backward Chaining), Hybrid Method (Rule Cycle), expert system fundamentals.

References:

- Elian Rich, Artificial Intelligence, Prentice Hall 1991.

6-Computer Networks

Data Communication . Physical Topology. Basic Network Technology . LAN Devices . Collision and Collision Domains in Shared Layer Environments . Network Devices . Network Layer . Addressing . Network Layer Field & Datagram. IP address Class, Subnet NW, Private Addresses,
Transmission of Digital Data Interfaces and Modems, Transmission Media . Unguided Media. Satellite Communication . Error Detection and Correction . Data Link Control Multiplexing, De Multiplexing, Data Link Protocols, ARP, FTP, TELNET, DNS, UDP,

TCP, NFS and RPC, SMTP, TFTP, HTTP, WAIS, Gopher, SNMP . WWW . Browser Architecture . Methods for Assigning IP Address, Advance ARP, DHCP, Dynamic Addressing . Routable and non Routable Protocols, RIP Features.

References:

- "Computer Networks", 3rd Edition, A. Tannenbaum, Prentice-Hall, 1996.
- "Data Communications, Computer Networks and OSI", 4th Edition, F. Halsall, Addison-Wesley, 1995.
- "Computer Communications and Networks", J. R. Freer, USL Press, 1996.

7-Project Management

Introduction, Defining a Project:-Sequence of Activities, Unique Activities, Complex Activities, Connected Activities, One Goal, Project Management and Project Selection, **Organization**: Structure and Culture, **Project Classifications**:-Classification by Project Characteristics, Classification by Project Type. **Project Parameters**: Scope, Quality, Cost , Time, Resources, Estimating Project Times and Costs, **Developing a Project Plan**:- Planning Identify Project Activities, Estimate Activity Duration, Contents, Determine Resource Requirements, Construct/Analyze the Project Network, Prepare the Project Proposal, Launching, Managing **Risk**:- Risk Management, Identifying Risk, Risk Categories, Assessing Risk, Qualitative Assessment, Dynamic Risk Assessment, Planning Risk Response, Risk Monitoring and Control, **Scheduling Resources and Costs**:- Estimating Duration, Resource Requirements, and Cost, Estimating Duration, Resource Loading versus Task Duration, Variation in Task Duration, Reducing Project Duration, Progress and Performance Measurement and Evaluation, Monitor Project Progress Versus Plan, Project Audit and Closure, Establish Progress Reporting System, **Managing Project Teams**:-Leadership, Being an Effective Project Manager, Recruit and Organize the Project Team, Establish Team Operating Rules. **Variations to Project Management Approaches:-** Traditional Project Management Approaches, Linear Project Management Approaches, Incremental Project Management Approaches, Adaptive Project Management Approaches, Iterative Project Management Approach, Adaptive Project Management Approach, Extreme Project Management Approach, INSPIRE Project Management Approach, Variations within the Traditional Project, Management Approach

References

Pearlson K. E., Saunders C. S., ”Managing and Using Information Systems”, John Wiley & Sons, 2006.

8- Operation Research:

Operation Research(- Operation Research Definition, Linear programming formulation,- Graphical solution, Simplex method, Duality and sensitivity analysis, Transportation model, Networking analysis, Games theory, Queuing Theory).

References

Operation Research: An Introduction, Hamdy A. Taha.

University of Technology

Computer Sciences Department

Information System Branch

2012-2013

Fourth Year Syllabus **منهج المرحلة الرابعة**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
2	1	-	2	Management Information Systems	نظم ادارة المعلومات	1
3	1	2	2	Advanced Databases	قواعد بيانات متقدمة	2
3	1	2	2	Intelligent Systems	الانظمة الذكية	3
2	1	-	2	Computer and Data Security	امنية الحاسبات والبيانات	4
3	1	2	2	Operating System	نظم التشغيل	5
3	1	2	2	Web Programming and Ecommerce	برمجة مواقع والتجارة الالكترونية	6
3	1	2	2	Multimedia Systems	انظمة الوسائط المتعددة	7
3	-	3	1	Project	مشروع	8
22	7	14	15	Total		

Total No. of Unit for One Semester: **(22)**Units مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة

Total No. of Unit for Year: **(44)** Units مجموعة الوحدات لسنة دراسية: (44) وحدة

Management Information Systems

Definition of MIS, MIS as an Evolving Concept, Subsystem of MIS, Operating Element of Information System, MIS Support for Decision Making, MIS Structure based on Management Activity, MIS Structure based on Organization Function, Synthesis of MIS Structure, Some Issues of MIS Structure, H/W _ S/W and Communication Technology for Information System, Storage and Retrieval of Data, Physical version Logical Models of Data.

References

- Kenneth C. Laudon, Jane P. Laudon, "Management Information systems, new approach to organization technology" 2000.

University of Technology

Computer Sciences Department

Information System Branch

2012-2013

Advanced Databases

Introduction :- What is data warehouse, Difference between operations of data base systems and data warehouse, Why have a separate data warehouse, **Multidimensional data model**:- Tables and spread sheets of data cubes, Data cube, Multidimensional data model, Hierarchies concepts, **On line analysis types:**-OLAP, MOLAP, ROLAP, OLAP, **Data warehouse architecture**:- Steps of design and construction of data warehouse, Tier data warehouse architecture, Advantages of data warehouse, **Data warehouse implementation** :- Meta data repository, Data warehouse back end tools and unities, Data warehouse usage, **Data preprocessing to construct data warehouse, Why preprocess the data**, Clean data, Data integration and transformation, Data reduction , **From data warehouse to Data Mining, Data Mining** :- Data mining Definition, Data mining functionalities, Data mining classification, Citation rules, Classification, Prediction, clustering

References

- Jiawei Han, Micheline Kamber, "Data Mining Concept and Techniques",2001.
- Peter Cabena, Bablo Hadjinian, Jeap Verhees, Alessando Zanasi," Discovering Data Mining from Concepts to Implmentation",1998.

Intelligent Systems

Rule Base Expert System (Design and Architecture), Chemical Synthesis system, Pattern Recognition System (Text Recognition), Model Based Expert System: (Design ,Architecture and Characteristic), Classification system: Back word chaining, For word chaining, Prediction system (Weather forecasting system), Case Based Expert system (Design ,Architecture and Characteristic), Natural language processing (Formal method), Natural language processing (In Formal method), Systems Designs under uncertainty, Probability method, Approximation method, Systems that depends (Explain) their actions, How facility, Why Facility, Shell Facility, Artificial Neural Networks (Principles , characteristic , Design and Taxonomy), Single layer NN (Perception and Adaline), Multilayer NN (Back propagation), Supervised NN (Hopfield), Unsupervised NN (self organization (BAM + Kohenen)), Genetic Algorithm (Principles , General forms and operations), Bits transition problem, 8 – puzzle example, TSP example, Random Search Fundamentals , General Algorithms and methods, Text Mining, Text summarization

References

- Daniel H. Marcellus, Expert Systems Programming in Turbo Prolog, Prentice Hall (New Jersey) 1992.
- George F. Luger, Artificial Intelligence (structures and strategies for complex problem solving), Pearson Education Asia (Singapore), 2002.
- Laurene Fausett, Fundamentals of neural Networks: Architecture, Algorithms, and Applications, 1994.
- David E. Goldberg, Genetic Algorithms in Search optimization, and Machine Learning, 1993.

Computer and Data Security:

Introduction of Data security:-terminology, Steganography, substitution and transposition cipher, Simple XOR, One time Pads, Computer Algorithms. Protocol Building Blocks:- Introduction to protocols, communication using symmetric cryptography, one way functions, one way hash functions, communication using public key cryptography, digital signature, digital signature with encryption random and pseudo random sequence generation. Basic Protocols:- Key Exchange, Authentication, Multiple key Public key cryptography, secret splitting, secret sharing, cryptographic protection of data base. Key Length:- Symmetric key length, public key key length, comparing Symmetric and public key key length, public key key management. Algorithm types and Modes:- electronic Code Book Mode, Block replay, cipher block chaining mode, stream cipher, self synchronize stream cipher, cipher-feedback mode, counter mode, other block cipher mode, choosing a cipher mode, interleaving , block cipher vs. stream ciphers, Using Algorithms:- choosing an algorithm, public key cryptography vs. symmetric cryptography, encrypting communication channels, encrypting data for storage, hard ware encryption v. software encryption, compression, encoding and encryption, detecting encryption, Hiding cipher text in cipher text, destroying information. Data encryption standards:- background, description of DES, security of DES. Pseudo random sequence generator and stream:- linear congruential generators, linear feedback shift registers, stream cipher using LFSRs, A5. Public Key Algorithms:- Background, knapsack algorithm, RSA, Pohilig Hellman, Rabin, ElGamal, McEliece, Elliptic Curve

Cryptosystems. Public key Digital Signature Algorithm :- Digital Signature Algorithm (DSA), DSA variants, GOST

References:

- Cryptography and Network Security, William Stalling , 2003

Operating system

Operating system overview, Operating system History and types:- Main frame systems, Desktop systems, Multiprocessor systems, Distributed systems, Clustered systems, Real time systems, Handheld systems, Hardware protection, operating system structure, operating system components, operating system services, processes, process concepts, cooperating process, threads, CPU scheduling(concepts, Scheduling Criteria, Scheduling Algorithms, First Come First Served and Shortest Job First, Priority Scheduling algorithm and Round Robin Algorithm, Multi level queue scheduling, multiprocessor scheduling, real time scheduling, Deadlock, Introduction to Deadlocks handling, threads, Introduction to process synchronization, Memory Management, Storage management.

References

"Operating System Concepts" by Silberschatz, Galvin and Gagne, 2010.

Web Programming and E-Commerce

- E-commerce

Introduction to Web, Introduction to the Internet, The World Wide Web, The Internet and Web, The History and Growth of the Web, The Purpose of the Web, The Web Concepts, The Web Site Generations, Classifying the Web Sites, Programming Technologies E- commerce, E-commerce fundamentals , E- commerce type B2B, B2C, B2G, C2C , , E- commerce Benefits ,E- commerce Limitations, E-Commerce content and framework, E- commerce – consumer buying behaviour model, E- commerce capability ,non-cash and online payments , smart cards ,credit card payments , E-checking, E-checking process, Electronic bill , presentment and payment , E-commerce application ,E-commerce security .

- Web programming

web programming with ASP, IIS, ASP Objects, Response Object, write , clear, end, flush, redirect, Request Object, query string, request, form, post, get , mappath, URLencode, ASP-File System Object, copyfile, copyfolder, createtextfile, deletefile,

deletefolder, folderexistes, driverexistes, fileexists, ASP Applications, dynamic web site, online examination, simple search directory, connection asp with database , ADO ,insert record , delete record , update database , simple search directory , simple E-commerce system.

References:

Web Based Application.

Web Programming with ASP.

Multimedia Systems

Introduction to the nature of text, image, audio, video, graphic and animation files, Capturing the various media, Creating, editing and storing the various media, Digitization and compression and the role they play in multimedia, Compression algorithms, Authoring tools for packaging multimedia systems, Web-based multimedia and the special problems involved in delivering media over the WWW, Learn about effective graphical user interfaces, A variety of common software packages to complete the above objectives.

References

Ling Guan, Sun-Yuan Kung, Jan Larsen, "MULTIMEDIA IMAGE and VIDEO PROCESSING", CRC Press, 2001

Project.

Description for Research Project

Research project is an study proposed by teacher (supervisor) and developed by student (fourth class only), this study aim to train the student on it is specialization of scientific (the scientific branch in computer sciences).

Time for Research Project

The Student given full academic year for accomplishes his study.

Exam for Research Project

Research project will be evaluated by a supervisor and Committee of Experts.

Format for Research Projects

Research projects are written up in standardized format. Be formal & objective in English language, & cite all sources. The format includes the following sections:

Title

Title would normally include the major variables of student study. For example:

"A protection system for an Internet site"

Abstract

Begin with a brief Abstract of the study, which summarizes the entire study into one paragraph. The reader should be able to tell from Abstract what theory and hypothesis were, who you studied and how, what your findings were, and what they meant for the theory.

Introduction

The introduction includes a brief (~2-3 page) review of current theory & research in the area of your topic. In presenting this material, paraphrase it into your own words, but always cite the source of the information. Referencing must be complete & correct, or you are plagiarizing, which is a serious academic offence. End with an introduction to your study, including your hypothesis.

Method

1. Materials/Instruments , Describe any instruments employed to measure the variables of your study. (e.g. questionnaires, tests, etc.)
2. Procedure , The Procedure section reviews exactly how you did your study, & should include enough detail that anyone could repeat your procedure. Include

your methodology (e.g. whether you did an experiment, or observation, etc.); a review of how you carried out the study; & any data analysis that you did.

Results

Include your results, summarized & presented in a way that is easy to follow & to understand. If possible, these results should be presented both in a table (which would include descriptive & inferential statistics) & in a written description of the results. The results section should not include conclusions or interpretations; these would be in the Discussion section.

Discussion

Use the discussion to relate your results to the theory you described in the introduction. The "why" of your results are discussed here, & what they mean in terms of theory & research. Add a discussion of the limitations of your study.

References

All references in the introduction are included in the reference section at the end of the research report, in alphabetical order.

Appendix

Any information that is relevant to the study, but not needed within the body of the paper, should be included at the end of the report. These appendices would include further details of the research instructions, materials, results, psychological measures, etc., if needed. Your instructor may also wish you to attach the raw data of your project.

المناهج الدراسية لفرع الذكاء
للعام الدراسي 2012-2013

University of Technology
Computer Sciences Department
Artificial Intelligence Branch

2012 - 2013

مناهج فرع الذكاء الاصطناعي

First Year Syllabus — منهج المرحلة الاولى

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
4	1	2	3	Structured Programming	البرمجة المهيكلة	1
2	1	-	2	Mathematics	الرياضيات	2
2	1	-	2	Discrete Structures	الهياكل المتقطعة	3
3	1	2	2	Computer Organization and Logic Design	تركيب الحاسوب و التصميم المنطقي	4
3	1	2	2	Principles of Artificial Intelligence	مبادئ الذكاء الاصطناعي	5
2	1	-	2	Introduction to statistics theory	مقدمة الى نظرية الاحصاء	6
Pass	-	-	2	English Language	اللغة الانكليزية	7
16	6	6	15	Total		

Total No. of Unit for One Semester: **(16)**Units
Total No. of Unit for Year: **(32)** Units

مجموعة الوحدات للفصل الدراسي الواحد: (16) وحدة
مجموعة الوحدات لسنة دراسية: (32) وحدة

Second Year Syllabus — منهج المرحلة الثانية

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Object Oriented Programming	البرمجة الشيئية	1
3	1	2	2	Data Structures and Algorithms	هياكل البيانات والخوارزميات	2
2	1	-	2	Fuzzy logic	المنطق المضبب	3
3	1	2	2	AI strategies and algorithms	إستراتيجيات وخوارزميات الذكاء الإصطناعي	4
3	1	2	2	Micro-Processors and Assembly Programming	المعالجات الميكروية و البرمجة بلغة التجميع	5
3	1	2	2	Advanced Mathematics and numerical analysis	الرياضيات المتقدمة والتحليل العددي	6
2	1	-	2	Computation Theory	النظرية الاحتسابية	7
1	-	-	1	Human Rights and Democracy	حقوق الإنسان والديمقراطية	8
20	7	10	15	Total		

Total No. of Unit for One Semester: **(20)**Units
Total No. of Unit for Year: **(40)** Units

مجموعة الوحدات للفصل الدراسي الواحد: (20) وحدة
مجموعة الوحدات لسنة دراسية: (40) وحدة

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منهج المرحلة الثالثة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Computer Graphics	رسوم الحاسوب	1
3	1	2	2	Compilers	المترجمات	2
3	1	2	2	Data warehouse	مخازن3 البيانات	3
2	1	-	2	Computer Architecture	معمارية الحاسوب	4
3	1	2	2	Natural Language Processing	معالجة اللغة الطبيعية	5
3	1	2	2	Expert Systems	النظم الخبيرة	6
3	1	2	2	Machine learning	تعلم الماكنة	7
2	1	-	2	Operations Researches	بحوث عمليات	8
22	8	12	16	Total		

Total No. of Unit for One Semester: **(22)**Units
Total No. of Unit for Year: **(44)** Units

مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة
مجموعة الوحدات لسنة دراسية: (44) وحدة

Forth Year Syllabus

منهج المرحلة الرابعة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
2	1	-	2	Planning & Robotics	التخطيط والإنسان الآلي	1
3	1	2	2	Communications and Computer Networks	الاتصالات وشبكات الحاسوب	2
2	1	-	2	Computer and Data Security	امنية الحاسوب والبيانات (أختياري)	3
3	1	2	2	Operating Systems	نظم التشغيل	4
3	1	2	2	Advanced Intelligent Systems	أنظمة ذكية متقدمة	5
3	1	2	2	Web programming	برمجة مواقع الانترنت (أختياري)	6
3	-	2	2	Machine Vision	الرؤيا بالماكنة	7
3	-	4	1	Project	مشروع	8
22	6	14	15	Total		

Total No. of Unit for One Semester: **(22)**Units
Total No. of Unit for Year: **(44)** Units

مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة
مجموعة الوحدات لسنة دراسية: (44) وحدة

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First Year Syllabus **منهج المرحلة الاولى**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
4	1	2	3	Structured Programming	البرمجة المهيكلة	1
2	1	-	2	Mathematics	الرياضيات	2
2	1	-	2	Discrete Structures	الهياكل المتقطعة	3
3	1	2	2	Computer Organization and Logic Design	تركيب الحاسوب و التصميم المنطقي	4
3	1	2	2	Principles of Artificial Intelligence	مبادئ الذكاء الاصطناعي	5
2	1	-	2	Introduction to the statistics theory	مقدمة الى نظرية الاحصاء	6
Pass	-	-	2	English Language	اللغة الانكليزية	7
16	6	6	15	Total		

Total No. of Unit for One Semester: **(16)**Units مجموعة الوحدات للفصل الدراسي الواحد: (16) وحدة
Total No. of Unit for Year: **(32)** Units مجموعة الوحدات لسنة دراسية: (32) وحدة

1- Structured Programming (*with C++ Programming Language*):

Introduction, Procedural Programming Principles, Algorithm , Algorithm properties , Examples, Flowcharts, Flowchart Figure, Examples ,C++ Language Basics (Character set, Identifiers, Getting Started with C++, Variables Declaration, Variables, Constants, Arithmetic Operations,The "math.h" Library, Unary Minus, Increment and /decrement Operators, Operational Assignment Operators, Relational Operators, Logical Operators, Bitwise Operator), Selection Statements (Selection Statements, The Single If Statement Structure, The Single If Statement Structure (Blocks), The If/else Statement Structure, Nested If and If/else Statements, The Switch Selection Statement (Selector), Conditional Statement), Iteration Statements (Selection Statements, While Repetition Structure, Do/While Statement, For Statement, More about For Statement, Nested Loops, Break and Continue Control Statements), Functions (Function, Passing Parameters (Passing by Value, Passing by Reference)), Arrays (Array of One Dimension (Declaration of Arrays, Initializing Array Elements, Accessing Array Elements, Read / Write / Process Array Elements), Array of Two Dimension (Declaration of 2D-Arrays, Initializing 2D-Array Elements, Read / Write / Process Array Elements)), String (Read / Write / Process Array Elements, Member Function of String, stdlib Library), Structures (The Three Ways for Declare the Structure, Array of Structures).

References:

Mastering c++ by sorhan sami & oqeli saleh 2002

2- Mathematics:

Functions, Transcendental Functions, Sequence and Series, Differentiation and Applications, Integration and Applications, Multiple Integrals, Polar Plane, Complex Numbers, Matrices, Vector Analysis.

References:

Thomas calculus ,1989

3- Discrete Structures

Set theory -sets & subsets - how to specify sets -, sequences -Operations on sets-, Algebra of sets & its proves, sets of numbers- Finite sets, Mathematical induction & recursion, Matrices, Logic and propositions- Equivalency, Tautology& Contradiction, Relations- Computer representation of relations & Digraph, Manipulation of relations, Properties of relations, Composition of relations (Functions-types of functions, Graphs-definition-graphs & multigraphs- subgraph – degree of graph), Walk –length of walk- trail- path- cycle- the bridges of konnisberg, Traversable multigraphs- Euler theorem- special graph- bipartite graph matrices & graph, Labeled graphs – trees- rooted tree- ordered rooted tree- polish notation, Spanning tree- directed graph- matrix of digraph, Minimal path, Finite state machines, Language & pattern recognition machines, Optimistic approach to construct FSM, Finite automata, Finite automata (Contd).

References:

1. Discrete mathematics by Seymour Lipschutz
2. Discrete mathematical structures for computer science by Bernard Kolman & Robert C. Busby 2004

4- Computer Organization and Logic Design:

Digital systems conversion, Digital system arithmetic, Complement scheme, Subtraction with complement, Logic gates, Addition digital system, The basic postulation, Prove the theorem, Simplification by map, Combinational circuits, Sequential circuits, Flip-flops, Multilevel logic implementation, Encoder and decoder, Multiplexer and de-multiplexer, Msl and vlsc, Computer definition, Computer generation, Computer architecture, CPU operation, Fetch cycle, Execution cycle, Memory representation, Memory types, Primary storage, Secondary storage, Computer classification, Language classification, Translators program, Operating systems, Networking, Internet.

References:

1. Computer System Architecture, M. Morris Mano, Third Edition, 1993.
2. Digital Fundamental, Floyd, Eight Edition, 2003.
3. Principle Of Computer Architecture, Murdocca. M. J., Heuring .V.P., Prentice-Hall, Inc.
4. Computer Communications and Information, Hutchinson .S.E., Sawyer .S.C. ,with Contribution by Coulthard G.J. .

5- Principles of Artificial Intelligence :

Propositional logic, Predicate Logic,First-Order- Predicate,Production rules, Problem Characteristics, Search Strategies (Problem state space and search space

,Problem Solving ,Blind Search , Search Space Problems, Monkey &Banana , 8-puzzle , 2-jug) , Forward & Backward , Matching , Prolog (Terms, List, String)

References:

1. Artificial Intelligence structures and strategies for complex problem solving by "George F. Luger".
2. Elin Rich, "Artificial Intelligence",1991.
3. Matt Carter , "Mind and Computers" "An Introduction to the Philosophy of Artificial Intelligence " , Edinbwgh University press , 2007.
4. Max Bramer, " Logic Programming with prolog ", Spring ,2005.
5. زينب الزرقاء وايمن عودة ، الذكاء الصنعي في لغة prolog شعاع للنشر والعلوم ، سورية ، حلب ، 2005.
6. الدكتور ف. سكر الذكاء الاصطناعي من خلال لغة prolog شعاع للنشر والعلوم ، سورية ، حلب ، 1998.

6- Introduction to the statistics theory

Set theory, Binary operations on set , Permutation, Combination , Sample space, events, random variable , Addition theorem, multiplication theorem, Conditional probability , Bays theorem, Independent of events , Birnolli trails , Introduction to the theory of statistics ,Descriptive statistics, Measure of central tendency , Measure of dispersion , Binominal distribution , Exponential distribution , Normal (Gaussian) distribution , Correlation of Coefficient , The Chi-square test, the Goodness – of –Fit test, test of homogeneity, Regression , Regression analysis.

References:

1. Statistics: theories and applications, Joseph Inungo, 2006.
2. Probability and statistics, theory and applications, Gunnar Blom, 1989.

7- English Language

Toofl lectures for first stage students in the department of computer sciences, UOT.

Part One: Structure and written expression

1. Nouns, Pronoun, part of sentence, verbs, prepositions, articles, noun class, adjectives class, adverb classes, prepositional phrases

Part Two: Reading

1. Reading of detail, reading of reference and vocabulary, reading of main idea, reading of inference

Part Three: Listening

1. Short conversation, longer conversions, talks and lectures.

Part Four: writing

1. Strategies, topics.

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منهج المرحلة الثانية

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Object Oriented Programming	البرمجة الشيئية	1
3	1	2	2	Data Structures and Algorithms	هياكل البيانات والخوارزميات	2
2	1	-	2	Fuzzy logic	المنطق المضبب	3
3	1	2	2	AI strategies and algorithms	إستراتيجيات وخوارزميات الذكاء الإصطناعي	4
3	1	2	2	Micro-Processors and Assembly Programming	المعالجات الميكروية و البرمجة بلغة التجميع	5
3	1	2	2	Advanced Mathematics and numerical analysis	الرياضيات المتقدمة والتحليل العددي	6
2	1	-	2	Computation Theory	النظرية الاحتسابية	7
1	-	-	1	Human Rights and Democracy	حقوق الانسان والديمقراطية	8
20	7	10	15	Total		

مجموعة الوحدات للفصل الدراسي الواحد: (20) وحدة

Total No. of Unit for One Semester: **(20)**Units

مجموعة الوحدات لسنة دراسية: (40) وحدة

Total No. of Unit for Year: **(40)** Units

1- Object Oriented Programming and Visual C++

Overview for functions and parameter transmission in C++ , Introduction of OOP and its main features , Defining a Simple Class with Inline Member Functions, Constructors and destructors functions, Friends functions, Constant Members, Static Members, Default Arguments and Implicit Member Argument, Function and operators Overloading, Inheritance and Derived Classes, Virtual Functions and Multiple Inheritance, Function Template Definition and Function Template Instantiation, Class Template Definition and Class Template Instantiation, Introduction to Visual Studio. NET C++, Starting Visual C++ MDE, Starting Developer studio to implement a simple program, Concepts and tools for Windows Application, Microsoft Foundation Class Library Fundamentals, Explore the Microsoft Foundation Class (MFC) Library and the Visual C++ IDE (Integrated Development Environment), Create the standard MFC Application Architectures, use the Graphical Output features of MFC, Explore Message Maps, Message Handlers, and Command Routing, and add standard User Interface Elements to an MFC Application, Create Modal and Modeless Dialog Boxes for user interaction, implement Exception Handling, and use MFC Debugging Support and Visual C++ Debugging Tools, Add Data Access Services with MFC, build and use MFC-based ActiveX Controls, develop Internet applications with MFC, add Persistence using MFC Serialization Support, create multithreaded MFC Applications, and implement regular and extension MFC DLLs.

References:

1. "Mastering C++", Prof. Oqeili Saleh and others, Dar Al-Shorok, Amman-Jordan, 2004.

2. "Object Oriented Programming Language with C++", Bjarne Stroustrup, Addison-Wesley Publication, 2003.

2- Data Structures and Algorithms:

Introduction to Data Structures, Memory representation for 1D and 2D arrays, Linear list, Linear list types, Stack: (Stack Operations, Applications of stack), Queue: (Queue Operations, Applications of queue), Circular Queue: (CQueue Operations, Applications of CQueue), Linked List, Linked-Stack, Linked-Queue, Linked-CQueue, Recursion, Graph, Trees: (Types of Tree, Binary tree, Binary tree scan, Represent Regulars expression using trees, convert tree to binary tree, Binary Search Tree), Sorting: (Sorting Algorithms, Types of Sorting algorithms, Bubble Sort, Insertion Sort, Quick Sort), Searching: (Searching Algorithm, Sequential Search, Binary Search).

References:

1- Data structures and Algorithms with Object- Oriented design Patterns in C++ by: Bruno R. Preiss, B.A.Sc., M.A.Sc.Ph.D., P.Eng. Associate Professor, Department of electronic and computer engineering, university of waterloo.
2- Data Structures and algorithm analysis in C, By: Mark Allen Weiss.
3- Data Structures and algorithms in Java PDF file.
4- Data Structures using C and C++, Yedidyah language, Moshe J. augenstein, Aaeon M.
Tenenbaum, Brooklyn College.

3- Fuzzy Logic

Fuzzy sets, the operations of fuzzy sets, fuzzy relationsand compositions, fuzzy graph and relation, fuzzy number, fuzzy functions, probability and uncertainty, fuzzy logic, fuzzy inference, fuzzy control and fuzzy expert systems, real applications.

References:

1. First course on fuzzy theory and application ", Kwang H. Le , spring 2005.
2. Introduction to fuzzy logic , and fuzzy control system ,Gauanrony Chen ,Trung Tat Pham,© 2001 by CRC press LLC.

4- Artificial Intelligence Strategies and algorithms:

More complex Search Space (More Problems Solving Approach Used) , Heuristic Search (Heuristic Functions , Hill Climbing , Best-First – Search , A – Algorithm , A* - Algorithm , -Heuristic Search Examples , - 8-puzzle , Salesman Problem , 2-Jug , Monkey & Banana , Tic-Tac- Toe , Minimax , Alpha – Beta , -Problem Reduction (and \ or) , Constraint satisfactions , Mean- Ends analysis) , Knowledge Representation (Semantic Net , Conceptual Graph ,Frame) , Theorem Proving Using

Resolution (Predicate Logic , Clause Form) , Statistical Reasoning (Probability , Bayser Network ,Dempster – Shafer – Theory).

References:

1. Elin Rich, "Artificial Intelligence",1991.
2. Luger E.George,"Artificial Intelligence structure and strategies ", 2005.
3 Stwart Russel and Peter Norvig , "Artificial Intelligent ,A modern approach ,2003.

4 Amit Konar, " Artificial Intelligence and soft computing , Behavior and cognitive modeling of the Human Brain ", CRC press ,1991.
5- Dimitris Varkas and Ioannis Pl. Vlashavos, " Artificial Intelligence for Advanced problem solving technique", published in the USA by Information science reference (an imprint of "IGI" Global),2008.

5- Micro-Processors and Assembly Programming:

CPU Architecture, Register Transfer, Memory, Peripheral Control Chips, Data Transfer, Fetch and Execute Cycles, Address and Data and Control Busses, Brief Introduction to Machine Code, Instruction Sets (Form, Othogonality, Number of Addresses), and Decoding. Assembly Language Programming: Addressing Modes of the 808, Data Registers, Flags, The Status Register, and Implementing Control Structures in Assembly Language, Structured Assembly Language Programming using Procedures, Arithmetic and Logic Instructions Stack (Concepts and Applications), String Processing, Tools for Preparing and Debugging and Translating Programs. MS-DOS Operating System Structure: MS-DOS and BIOS Disk and Keyboard System Architecture. Advanced Features of Processors: Segments and Segment Registers, Interrupts and Interrupt Service Routines, I/O Port Addressing, Instruction Pipelining, Cache Memory.

References:

1- Abel P., "IBM PC Assembly Language and Programming", 4th Edition, Prentice Hall, 1998..
2- Thorne M., "Computer Organization and Assembly Language Programming", 2nd Edition, Benjamin/Cummings, 1990.

6- Advanced Mathematic and Numeric Analysis:

Partial differentiation, (partial differentiation for first and higher order of derivative, chain rule, directional derivative),first order equations, (solution of differential equation by direct integration, separating the variables, homogeneous equation,….),Second and higher order differential equations, linear second order differential equation with constant) ,Lap Transform (Laplace transform for standard important function, multiplication by tn,division by t, Inverse Laplace transform of derivatives, Partial differential equations (formation of partial differential equations, types of partial differential equations,….),Fourier series (periodic functions, Fourier series for odd and even function, half range Fourier sin and cosine series, change of interval),Numerical analysis (solving sets of equation, elimination and iterative

methods, interpolating polynomials, Lagrange polynomial),solving non-liner equation, numerical differentiation and numerical integration, numerical solution of ordinary differential equations, curve-fitting and approximations.

References:

1- Thomas, G. Calculus and Analytic Geometry, 5th Edition, Addison Wesly, 1999.
2- Numerical Methods Using Matlab, Prentice Hall.

7- Computation Theory:

Regular Expression, Finite Automata, DFA and NFA, Equivalence of NFA and DFA, Equivalence of NFA and DFA with E-moves, Introduction to Crammers, Phrase Structure Grammar, Context sensitive Grammar, Context Free grammar, Chomsky Normal Form, Greibach Normal Form, Tree, The empty string in context free grammar ambiguity, Regular grammar, Left linear grammar, Right linear grammar, Kleen theorem, Two way finite automata with output (mealy machine, moor machine), The equivalence of mealy and moor machine, Push down automata, Top down –bottom up derivation, Turing machine.

References:

1. H.R.Lewis And G.H Papadimitiou,"Elements Of The Theory Of Computation", Prentig-Hall, 1981.
2. R.W.Floyd And R.Beigel,"The Languae Of Machine:An Introduction To Computability And Formal Languages"Computer Science Press, Network, 1994.
3. M.Sipser."Introduction To The Theory Of Computation" ,Boston Pws Pub ,1996.

8- حقوق الانسان والديمقراطية:

- مفهوم حقوق الإنسان،حقوق الإنسان في الشرائع السماوية،مصادر حقوق الإنسان،ضمانات حقوق الإنسان، مستقبل حقوق الإنسان.
- مفهوم الديمقراطية، أشكال الديمقراطية- الديمقراطية المباشرة- الديمقراطية شبه المباشرة-الديمقراطية النيابية- المجلس النيابي، الية النظام التمثيلي(الانتخاب)- مفهوم الانتخاب- هيئة الناخبين- تنظيم عملية الانتخاب- نظم الانتخاب.

المصادر

1- حقوق الانسان والطفل والديمقراطية
د ماهر صالح علاوي الجبوري وآخرون
2- محاضرات في الديمقراطية- د فيصل شطناوي

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Third Year Syllabus **منهج المرحلة الثالثة**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Computer Graphics	رسوم الحاسوب	1
3	1	2	2	Compilers	المترجمات	2
3	1	2	2	Data warehouse	مخازن البيانات	3
2	1	-	2	Computer Architecture	معمارية الحاسوب	4
3	1	2	2	Natural Language Processing	معالجة اللغة الطبيعية	5
3	1	2	2	Expert Systems	النظم الخبيرة	6
3	1	2	2	Machine learning	تعلم الماكنة	7
2	1	-	2	Operations Researches	بحوث عمليات	8
22	8	12	16	Total		

Total No. of Unit for One Semester: **(22)**Units مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة
Total No. of Unit for Year: **(44)** Units مجموعة الوحدات لسنة دراسية: (44) وحدة

1- Computer Graphics:

Introduction (Display devices , Cathode Ray Tube (CRT) , Liquid Crystal Display (LCD) ,frame Buffer,Coordinate System), Basic Shaping Drawing (Line ,Circle) , Two Dimension Transformation (translation ,Scaling ,Rotation ,Reflection) , Clipping , Three Dimension Transformations (Translation , Scaling ,Rotation ,Reflection) , Projection (Orthographic projection ,Perspective Projection) , Directx (Initializing ,Loading the Background ,Drawing Sprites) ,Graphic Representation of robot parts (Forward kinematics, Calculate where the robot end effecter (e.g.,hand) will be if all joint variables are known , E.g.,(x,y,z) coordinate of end effecter, Inverse kinematics,Calculate joint variables if we wantthe end effect or to be located at particular place ,e.g,(x,y,z) coordinate.

References:

1. computer graphics mathematics, first steps , P. A. Egerton and W.S. Hall, 1998.
2. Visual basic game programming for teens, Jonathan S. Harboor, 2005.

2- Compilers:

Programming Language, Introduction to Compiler, Type of Errors, One Pass Compiler, Syntax Definition, Context Free Grammar, Parsing Tree & leftmost and rightmost derivations, Transition Graph, Lexical analysis, Syntax of Analysis, Problems of Compiler, First and Follow, Top down Parsing, Predictive Parsing Method, Bottom up Parsing, Operation Precedence Parser, Simple Left to Right Parser, Canonical LR Parser, Look Ahead LR, Semantic Analysis, Intermediate Code Generation, Code Optimization, Examples of Code Optimization, Code Generation, Build Simple Compiler.

References:

3. Principles of Compiler Design ,Alfred V. Aho, Jeffry D. Ulman.

3- Data warehouse:

Introduction (What is data ware house , Differences btw. Operation database , system and data warehouse, Why have a separate data warehouse) , Multidimensional data model (Tables and spread sheets to data cubes , data cubes , Multidimensional data model , Hierarchies Concept), On line analyses types (OLAP ,MOLAP , ROLAP ,HOLAP) , Data warehouse Architecture (Step of design and construction of data warehouse , Tier data warehouse , Advantage of data warehouse) , Data warehouse implementation (Meta data repository , data ware house back end tools and utilities , data warehouse usage) , Data preprocessing to constructed data warehouse (Why preprocess the data , Clean data , Data integration and transformation , Data reduction , Form data ware house to DM) , Data Mining (Data mining definition , Data mining functionalities , Data mining to association rules , Classification , Predication , clustering)

References:

1. Data mining concepts and techniques, Jiawei Han , Micheline Kamber , 20001.
2. Discovering data mining ,from concept to implementation, Peter Cabena, Pablo Hadjinian, Jeap Verhees and Alessandro Tanasi, 1998.

4- Computer Architecture:

1. The Computer System: (System Buses: Computer Components, Computer Function, Interconnection Structures, Bus Interconnection, PCI.), (Internal Memory: Computer Memory System Overview, Semiconductor Main Memory, Cache Memory, Advanced DRAM Organization), (Input/Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels and Producers, The External Interface), Operating System Overview.
2. The Central Processing Unit (CPU): (Computer Arithmetic: The Arithmetic and Logic Unit(ALU), Integer Arithmetic, Floating-Point Representation, Floating-Point Arithmetic), (Instruction Sets: Characteristics and Function, Machine Instruction Characteristics, Types of Operands, Types Operations, Addressing Modes and Formats, Register Organization, The Instruction Cycle, Instruction Pipelining), Assembly Language, (The Control Unit: Micro-Operations, Control of the CPU, Hardwired Implementation, Microporgram Controller, Microinstructions, Sequencing, Microinstruction Execution), (Reduce Instruction Set Computer: An Introduction).

References:

1- M. Mano, Computer System Architecture, 3rd Edition, Prentice-Hall India.
2- W.Stallings, Computer Organization and Architecture, 4th Edition, Prentice Hall India.
3- Harry, Jordan, Computer Systems Design and Architecture, Edition, Addison Wesley.
4- J.D. Carpinelli, Computer Systems Organization and Architecture, Addison Wesley.
5- J.P. Hayes, Computer Architecture and Organization, McGraw Hill.

6- M.M. Mano and Charles, Logic and Computer Design Fundamentals, 2nd Edition Updated, Pearson Education Asia.

5- Natural Language Processing (NLP):

Introduction to NLP: (Definition of NLP, NLP Goal, The advantage of NLP, Example of Intelligent Robot), Understanding: (What is Understanding?, What makes understanding hard?, The complexity of the target representation, Type of mapping, Level of interactive among components), Types of Languages & Grammars: (Type 0: Phrase Structure Grammar (PSG), Type 1: Context Sensitive Grammar (CSG), Type 2: Context Free Grammar (CFG), Type 3: The Dictionary & the Morphology,
Regular Grammar (RG), Written Text Processing (Formal Method), Lexical analysis, Syntax analysis: (Rules of Grammar, Parse Tree and Transition Network Parser), Semantic analysis, Syntax Analysis (Formal Method): Rules of English Grammar, Example of PROLOG program of English Grammar solved in: Append Mechanism.Syntax Analysis, Formal Method, Append Mechanism with Singular & Plural Consideration. Syntax Analysis (Formal Method): Difference Pair Idea, Semantic Analysis (Formal Method): Augmented Transition Network (ATN).
Analyzing the semantic structure of a sentence: (object case, Agent case, Co-agent case, Beneficiary case, Location case, Time case, Instrument case, Source and destination cases …), C: The Case Analysis Parser. Written Text Processing (Informal Method), Extracting meaning from keywords, Example of PROLOG program (DOCSYS) for a manual of a company. Machine Translation (MT): (Definition of MT and its usage, Computer-Aided Human Translation (CAHT), Language Similarities & Differences), Machine Translation Methods: (Direct Translation Method, Transfer Metaphor Model, The Interlingua Idea: Using Meaning), Translation Dictionary: (Types of dictionary, Dictionary structure), Spoken language Processing: (Speech definition, Problem areas in speech recognition system, Text-Dependent & text Independent SR, Continuous & Isolated SR), SR System model, From talk to text: Dual purpose speech (medical report), From talk to text: (Dual purpose speech (schedule appointment), Multiple pronunciations lexicons (Using Hidden Markov Model (HMM), Speech Recognition Grammar: Using XML Data Structure, Application on SR system: (Understanding speech without recognizing words)), Application on SR system, Speech Compression (Lossless compression, Lossy compression), Application on SR system: Distributed speech recognition system, The relationship between NL & SR, Compares between Written text processing & Speech processing, Natural Language Generation: Example and Program.

References:

1. Elian Rich, “Artificial Intelligence”,1989.
2. William A. Stubblefield & Luger E.George,”Artificial Intelligence and the Design of Expert Systems”, 1998.
3. Daniel Jurafsky and James H. Martin “Speech and language processing : Introduction to natural language processing , computational linguistics and speech recognition” second edition 2006.
4. Daniel H. Marcellus “ Artificial Intelligence and the design of expert systems” 1998

6- Expert Systems :

Introduction to Expert System (- Expert System Components , - Expert System Architecture , Expert System Life cycle), Rule Based Expert Systems (Design and Architecture) (Chemical Synthesis System, Forward Chaining,- Backward Chaining , Pattern Recognition System , Text Recognition) , System that depend under uncertainty(Probability method, Approximation method, Fuzzy net method), Systems that Explain their Actions(How Facility, Why Facility, Shell Facility, Method Based Expert Systems(Design, Architecture and characteristics),Classification Systems(Backward Chaining , Forward Chaining, Prediction System(Weather Forecasting System), Case Based Expert System (Design, Architecture and Expert System),Heuristic Rule (principles and Used) (Embedded Systems based on heuristic rule, Student Advisor system,- Traffic light system).

References:

1. Daniel H. Marcellus, Expert Systems Programming in Turbo Prolog, Prentice Hall (New Jersey) 1992.
2. George F. Luger,Artificial Intelligence (structures and strategies for complex problem solving), 2005.

3- Daniel Borrajo , " Current Topics in Artificial Intelligence ", Springer ,2007.

4- Joseph C. Giarratano and Gray D. Riley, "Expert systems, principles and programming ", Thomson, 2005.

7- Machine Learning

Introduction (Definition of learning system , Goals and Application of machine learning , Aspect of developing a learning system: training data, concept representation , function approximation) , Inductive classification

- The concept learning talk(Concept learning as search through a hypothesis space, General – to – specific ordering of hypothesis, Finding maximally specific hypothesis , Version space and the candidate elimination algorithm, Learning conjunctive concepts, The importance of inductive bais), Decision Tree Learning (Representing Concepts as decision tree (Recursive inductive of decision tree, Picking the best splitting attribute: entropy and information gain,Search for simple trees and computational complexity, Occam's razor,Over filtering, noising data, and pruning), Instance – Based – Learning (Constructing explicit generalization versus comparing the past specific example, K- Nearest- neighbor algorithm,Case – based learning), Neural Networks(Artificial neuron concepts, NN Architecture, Supervised &Unsupervised , Activation Functions, learning Rules, Hebbian Learning rule , Basic Delta Rule,ANN taxonomy, Hopfield NN, Back Propagation NN, BAM,- Adeline, Kohonen NN, (ART), Auto& Hetero Associative, Genetic Algorithms (GA concepts,GA Operators, GA Parameters, GA Fitness Function, Genetic Programming, GA Application, Support Vector Machine(Maximum margin linear separation, Quadractic programming solution to find maximum margin separator).

References:

1- Fundamentals of Neural Networks: Architecture, Algorithms, and application. By Laurene Fausett
2- Neural Networks. By Phil Picton
3- Neural Networks. Fundamentals, Application, Examples. By Werner Kinnebrock
4- Neural network for identification, prediction and control. By D. T. Pham and X. Liu.
5- Genetic Algorithms. By Gross berg
6- Introduction to neural system. by- Zurada
7- Elian Rich, "Artificial Intelligence",1989.
8- William A. Stubblefield & Luger E.George,"Artificial Intelligence and the Design of Expert Systems", 1998.

8- Operations Researches:

Probability(The concept of probability,- Discrete probability distribution, Continuous probability distribution), Operation Research(- Operation Research Definition, Linear programming formulation,-Graphical solution, Simplex method, Duality and sensitivity analysis, Transportation model, Networking analysis, Games theory, Queuing Theory, Simulation).

References:

1. Operation Research: An Introduction, Hamdy A. Taha.

Elective Subjects for Third Year **المواضيع الاختيارية للمرحله الثالثة**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Moulding and Simulation	النمذجة والمحاكاة	1
2	1	-	2	Predicted and Decision Making	التنبؤ واتخاذ القرار	2

University of Technology
Computer Sciences Department

Artificial Intelligence Branch

2012 - 2013

Forth Year Syllabus **منهج المرحلة الرابعة**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
2	1	-	2	Planning & Robotics	التخطيط والانسان الالي	1
3	1	2	2	Communications and Computer Networks	الاتصالات وشبكات الحاسوب	2
2	1	-	2	Computer and Data Security	امنية الحاسوب والبيانات	3
3	1	2	2	Operating Systems	نظم التشغيل	4
3	1	2	2	Advanced Intelligent systems	أنظمة ذكية متقدمة	5
3	1	2	2	Web programming	برمجة مواقع الأنترنت	6
3	-	2	2	Machine vision	الرؤيا بالماكنة	7
3	-	4	1	Project	مشروع	8
22	6	14	15	Total		

Total No. of Unit for One Semester: **(22)**Units
Total No. of Unit for Year: **(44)** Units

مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة
مجموعة الوحدات لسنة دراسية: (44) وحدة

1- Planning & Robotics:

Planning and Navigation(path planning, Planning with if-Add Delete Operators, Least commitment planning, Hierarchical task network planning), Motion Planning(Basic concepts, robot? What Robot?, Space objects,- Input Information sensing, Egress of freedom. Coordinate systems,- Motion control, Robot programming, Motion Planning), Major Issues in Robotics(Kinematics, Static, Feedback Control, Complaint Motion,- Trajectory modification,- Collision Avoidance,- Motion Planning with Complete information, Motion planning with incomplete information), Motion Planning for a Mobile Robot , Basic methods, from a point robot to a physical robot , Which algorithm to choose), Motion planning for Two –Dimensional arm manipulator

References:

1- 'Robot Motion Planning and Control',J.-P. Laumond (Ed.),Springer-Verlag London Limited 1998 .
2- 'Introduction to Autonomous Mobile Robots Intelligent Robotics and Autonomous Agents ', Siegwart, Roland.; Nourbakhsh, Illah Reza ,MIT Press ,2004.
3- Elin Rich, "Artificial Intelligence",1991.
4. Luger E.George,"Artificial Intelligence structure and strategies", 2005.

2- Communications and Computer Networks

Data Communication, Physical Topology, Basic Network Technology, LAN Devices, Collision and Collision Domains in Shared Layer Environments, Network Devices, Network Layer Addressing, Network Layer Field & Datagram, IP address Class, Subnet NW, Private Addresses, Transmission of Digital Data Interfaces and Modems, Transmission Media, Unguided Media, Satellite Communication, Error Detection and Correction, Data Link Control, Multiplexing, De Multiplexing, Data Link Protocols, ARP, FTP, TELNET, DNS, UDP, TCP, NFS and RPC, SMTP, TFTP, HTTP, WAIS, Gopher, SNMP, WWW, Browser Architecture, Methods for Assigning IP Address, Advance ARP, DHCP, Dynamic Addressing, Routable and non Routable Protocols, RIP Features.

References:

1- "Computer Networks", 3rd Edition, A. Tannenbaum, Prentice-Hall, 1996.
2- "Data Communications, Computer Networks and OSI", 4th Edition, F. Halsall, Addison-Wesley, 1995.
3- "Computer Communications and Networks", J. R. Freer, USL Press, 1996.

3- Computer and Data Security:

- Introduction of Data security:-terminology, Steganography, substitution and transposition cipher, Simple XOR, One time Pads, Computer Algorithms.
- Protocol Building Blocks:- Introduction to protocols, communication using symmetric cryptography, one way functions, one way hash functions, communication using public key cryptography, digital signature, digital signature with encryption random and pseudo random sequence generation
- Basic Protocols:- Key Exchange, Authentication, Multiple key Public key cryptography, secret splitting, secret sharing, cryptographic protection of data base.
- Key Length:- Symmetric key length, public key key length, comparing Symmetric and public key key length, public key key management
- Algorithm types and Modes:- electronic Code Book Mode, Block replay, cipher block chaining mode, stream cipher, self synchronize stream cipher, cipher-feedback mode, counter mode, other block cipher mode, choosing a cipher mode, interleaving , block cipher vs. stream ciphers
- Using Algorithms:- choosing an algorithm, public key cryptography vs. symmetric cryptography, encrypting communication channels, encrypting data for storage, hard ware encryption v. software encryption, compression, encoding and encryption, detecting encryption, Hiding cipher text in cipher text, destroying information.

- Data encryption standards:- background, description of DES, security of DES.
- Pseudo random sequence generator and stream:- linear congruential generators, linear feedback shift registers, stream cipher using LFSRs, A5.
- Public Key Algorithms:- Background, knapsack algorithm, RSA, Pohilig Hellman, Rabin, ElGamal, McEliece, Elliptic Curve Cryptosystems
- Public key Digital Signature Algorithm :- Digital Signature Algorithm (DSA), DSA variants, GOST

References:

1. Cryptography and Network Security, William Stalling , 2003

4- Operating Systems:

Operating system overview , Operating system History and types:- Main frame systems, Desktop systems, Multiprocessor systems, Distributed systems, Clustered systems, Real time systems, Handheld systems, Computing environment , Computer system structure , Hardware protection , operating system structure , operating system components ,operating system services , processes ,process concepts , cooperating process , threads , CPU scheduling(concepts, Scheduling Criteria, Scheduling Algorithms, First Come First Served and Shortest Job First, Priority Scheduling algorithm and Round Robin Algorithm, Multi level queue scheduling, multiprocessor scheduling, real time scheduling , Introduction to Deadlocks handling , threads , Introduction to process synchronization , Memory Management , Storage management , Protection and Security

References

1. "Operating System Concepts" by Silberschatz, Galvin and Gagne, 2003.

5- Advanced Intelligent Systems

Complexity Theory Concepts, Optimization Methods Concept, Some Problems, Concepts of Metaheuristic, Constraint Handling, Analysis of Metaheuristic, Single Solution Metaheuristic (Local Search, Simulated Annealing, Tabu Search, Iterated Local Search, Variable Neighborhood Search, Guided Local Search, GRASP), Population Solution Metaheuristic (Evolutionary Strategy, Evolutionary Algorithm, Scatter Search, Cultural Algorithm, Memetic Algorithm), Swarm Intelligent (Bees Colony Algorithm, Ant Colony Algorithm, Particle Swarm Optimization). Petri Nets Concepts, Petri Nets Components, Petri Nets Applications, Petri Net Case Study.

References

1- Computational Intelligent by Andries P. Engelbrecht
2- Metaheuristic by Talibi Elghazali, 2006.

3- Soft Computing by Amit Konar, 2004.
4- Clever Algorithms by Bronili K., 2010.

6- Web Programming :

Introduction to Web, Introduction to the Internet, The World Wide Web, The Internet and Web, The History and Growth of the Web, The Purpose of the Web, The Web Concepts, The Web Site Generations, Classifying the Web Sites, Programming Technologies, ASP Principles, Web Programming with ASP ,Web based Applications.

References:

1. World Wide Web Consortium (W3C) ,http://www.w3c.org
2. Tim Berners-Lee Web Page,http://www.w3.org/People/Berners-Lee
3. Weaving the Web … "Book" ,http://www.w3.org/ People/Berners-Lee/Weaving/Overview.html
4. Web Site Engineering … "Book" , http://www.geocities.com/website_engineering/chapter01.htm

7- Machine Vision

Image Acquisition(Image representation , Image Processing , Image Analysis , Image Classification) , Machine Vision Techniques (Elementary Image processing Functions ,- Monadic Point – by – point operators , Intensity histogram , Look-up-table (LUT), Dyadic , point- by – point ,Local operator (Neighborhood operation), Linear local operator, non-linear local operator, Edge Detections, N- tuple operators (templates), Gray Scale Corner Detection, Segmentation , Non-contextual technique –thredsholding, Contextual technique, Pixel Connectivity, Region Similarity, Region growing, The split and merge algorithm), Mathematical Morphology(Dila/tion and Erosion, Opening and Closing, Skeletonisation), Pattern Recognition (Pattern Recognition System Design, Feature Selection, Boolean Operators, Binary object features (object measurements) , Size management,- Shape measurement , Location measurement ,Pattern Classification , Template matching, Distance measure, Similarity measures, Optical character Recognition (OCR),Content Based Image Retrieval (CBIR)

References:

a. machin vision : theory, algorithms, practicalities, E. R. davies, 2004.
b. computer imaging : Digital image analysis and processing, Scott E. Umbauugh, 2005.
3. Algorithms for image processing and computer vision, J. R. parker , 1996.

8- Project.

Description for Research Project

Research project is an study proposed by teacher (supervisor) and developed by student (fourth class only), this study aim to train the student on it is specialization of scientific (the scientific branch in computer sciences).

2012 - 2013

Time for Research Project

The Student given full academic year for accomplishes his study.

Exam for Research Project

Research project will be evaluated by a supervisor and Committee of Experts.

Format for Research Projects

Research projects are written up in standardized format. Be formal & objective in English language, & cite all sources. The format includes the following sections:

Title

Title would normally include the major variables of student study. For example:

"A protection system for an Internet site"

Abstract

Begin with a brief Abstract of the study, which summarizes the entire study into one paragraph. The reader should be able to tell from Abstract what theory and hypothesis were, who you studied and how, what your findings were, and what they meant for the theory.

Introduction

The introduction includes a brief (~2-3 page) review of current theory & research in the area of your topic. In presenting this material, paraphrase it into your own words, but always cite the source of the information. Referencing must be complete & correct, or you are plagiarizing, which is a serious academic offence. End with an introduction to your study, including your hypothesis.

Method

1. Materials/Instruments , Describe any instruments employed to measure the variables of your study. (e.g. questionnaires, tests, etc.)
2. Procedure , The Procedure section reviews exactly how you did your study, & should include enough detail that anyone could repeat your procedure. Include your methodology (e.g. whether you did an experiment, or observation, etc.); a review of how you carried out the study; & any data analysis that you did.

Results

Include your results, summarized & presented in a way that is easy to follow & to understand. If possible, these results should be presented both in a table (which would include descriptive & inferential statistics) & in a written description of the results.

The results section should not include conclusions or interpretations; these would be in the Discussion section.

Discussion

Use the discussion to relate your results to the theory you described in the introduction. The "why" of your results are discussed here, & what they mean in terms of theory & research. Add a discussion of the limitations of your study.

References

All references in the introduction are included in the reference section at the end of the research report, in alphabetical order.

Appendix

Any information that is relevant to the study, but not needed within the body of the paper, should be included at the end of the report. These appendices would include further details of the research instructions, materials, results, psychological measures, etc., if needed. Your instructor may also wish you to attach the raw data of your project.

Elective Subjects for Forth Year **المواضيع الاختيارية للمرحله الرابعة**

No. of Units	Tutorial	No. of Lab. Hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Intelligent Databases	قواعد البيانات الذكية	1
2	1	-	2	Internet Architecture	معمارية الانترنيت	2
3	1	2	2	Advance Intelligent System	الانظمة الذكية المتقدمة	3

المناهج الدراسية لفرع الأمنية
للعام الدراسي 2012-2013

University of Technology
Computer Sciences Department

Computer Security Branch

2013-2012

First Year Syllabus

منهج المرحلة الأولى

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
4	1	2	3	Structured Programming	البرمجة المهيكلة	.1
2	1	-	2	Mathematics	الرياضيات	.2
2	1	-	2	Discrete Structures	الهياكل المتقطعة	.3
3	1	2	2	Computer Organization and Logic Design	تركيب الحاسبة والتصميم المنطقي	.4
2	1	-	2	Principals of security	مبادىء الامنية	.5
2	1	-	2	Probability Theory	نظرية الاحتمالات	.6
Pass	-		2	English Language	لغة انكليزية	.7
15	6	4	15	Total		

Total No. of Unit for One Semester: **(15)**Units
Total No. of Unit for Year: **(30)** Units

مجموعة الوحدات للفصل الدراسي الواحد: (15) وحدة
مجموعة الوحدات لسنة دراسية: (30) وحدة

Second Year Syllabus

منهج المرحلة الثانية

No. of Units	Tutorial	No. of Lab. hour	No. Of 2 Theory hour	Subject	اسم المادة	ت
3	1	2	2	Object Oriented programming	البرمجة الشيئية	1
3	1	2	2	Data Structures and Algorithms	هياكل البيانات والخوارزميات	2
3	1	2	2	Advance Mathematic and Numeric Analysis	الرياضيات المتقدمة والتحليل العددي	3
2	1	-	2	Information Theory	نظرية معلومات	4
2	1	-	2	Stream ciphers	التشفير الانسيابي	5
2	1	-	2	Number Theory	نظرية الارقام	6
2	1	-	2	Computation Theory	النظرية الاحتسابية	7
1	-	-	1	Human rights and Democracy	حقوق الانسان وديمقراطية	8
18	7	6	15	Total		

Total No. of Unit for One Semester: **(18)**Units
Total No. of Unit for Year: **(36)** Units

مجموعة الوحدات للفصل الدراسي الواحد: (18) وحدة
مجموعة الوحدات لسنة دراسية: (36) وحدة

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Third Year Syllabus

منهج المرحلة الثالثة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	-	2	2	Compilers	المترجمات	1
3	1	2	2	Databases	قواعد البيانات	2
3	1	2	2	Computer Architecture and microprocessor	معمارية الحاسبة و المعالجة المايكروية	3
2	1	-	2	Secure software design	أمنية تصميم البرامجيات	4
3	1	2	2	Artificial Intelligent	الذكاء الاصطناعي	5
3	1	2	2	Block cipher standard and public key	تشفير الكتلي المعتمد والمفتاح العام	6
3	1	2	2	Computer Network s	شبكات الحاسوب	7
3	1	2	2	multimedia	تعدد الوسائط	8
23	7	14	16	Total		

Total No. of Unit for One Semester: **(23)**Units
مجموعة الوحدات للفصل الدراسي الواحد: (23) وحدة

Total No. of Unit for Year: **(46)** Units
مجموعة الوحدات لسنة دراسية: (46) وحدة

Forth Year Syllabus

منهج المرحلة الرابعة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Intelligent Systems	أنظمة ذكية	1
2	1	-	2	Mobile and network Security	امنية الموبابيل والشبكات	2
2	1	-	2	Cryptanalysis	تحليل شفرة	3
3	1	2	2	Secure Operating System	نظم التشغيل الآمنية	4
2	1	-	2	Advance Cryptography	تشفير متقدم	5
3	1	2	2	Web Programming	برمجة مواقع	6
2	1	-	2	Information hiding	اخفاء المعلومات	7
3	-	4	1	Project	المشروع	8
20	7	10	15	Total		

Total No. of Unit for One Semester: **(20)**Units
مجموعة الوحدات للفصل الدراسي الواحد: (20) وحدة

Total No. of Unit for Year: **(40)** Units
مجموعة الوحدات لسنة دراسية: (40) وحدة

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First Year Syllabus

منهج المرحلة الأولى

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
4	1	2	3	Structured Programming	البرمجة المهيكلة	.8
2	1	-	2	Mathematics	الرياضيات	.9
2	1	-	2	Discrete Structures	الهياكل المتقطعة	.10
3	1	2	2	Computer Organization and Logic Design	تركيب الحاسبة والتصميم المنطقي	.11
2	1	-	2	Principals of security	مبادىء الامنية	.12
2	1	-	2	Probability Theory	نظرية الاحتمالات	.13
Pass	-		2	English Language	لغة انكليزية	.14
15	6	4	15	Total		

Total No. of Unit for One Semester: **(15)**Units مجموعة الوحدات للفصل الدراسي الواحد: (15) وحدة
Total No. of Unit for Year: **(30)** Units مجموعة الوحدات لسنة دراسية: (30) وحدة

1.Structured Programming (with C++ Programming Language): *update*

- Introduction,
- Procedural Programming Principles,
- Algorithm ,Algorithm properties ,Examples,

- Flowcharts, Flowchart Figure, Examples
- C++ Language Basics (Character set, Identifiers, Getting Started with C++, Variables Declaration, Variables, Constants, Arithmetic Operations,
- The "math.h" Library, Unary Minus, Increment and /decrement Operators, Operational Assignment Operators, Relational Operators, Logical Operators, Bitwise Operator),
- Selection Statements (Selection Statements, The Single If Statement Structure, The Single If Statement Structure (Blocks), The If/else Statement Structure, Nested If and If/else Statements, The Switch Selection Statement (Selector),
- Conditional Statement), Iteration Statements (Selection Statements, While Repetition Structure, Do/While Statement, For Statement, More about For Statement, Nested Loops, Break and Continue Control Statements),
- Functions (Function, Passing Parameters (Passing by Value, Passing by Reference)), Arrays (Array of One Dimension (Declaration of Arrays, Initializing Array Elements, Accessing Array Elements, Read / Write / Process Array Elements), Array of Two Dimension (Declaration of 2D-Arrays, Initializing 2D-Array Elements, Read / Write / Process Array Elements)),
- String (Read / Write / Process Array Elements, Member Function of String, stdlib Library),
- Structures (The Three Ways for Declare the Structure, Array of Structures).

References:

1- *Mastring C++ , Amman-Jordan, AL-Shorok\2002.*
2- *Oqeili Salch, prof. Department of IT-AL-Balqa Applied University.*

2.Mathematics:

- Matrix,Type of matrix,Additional and multiplication,Determent,Transposem, symmetric, Rank of matrix, Method of finding inverse of matrix , Absolute vale ,Polynomials, Roots, Graphic of functions, Limits , Type of limits ,One side & two sided limits, Limits at infinity, Sandwich theorem, Continuous functions ,Derivative ,Mathematical definition of derivative, Rules of derivative, Implicit derivative ,Higher derivative ,Velocity and acceleration, Chain rule & parameter equations, Derivative of (trigonometric , inverse trigonometric ,logarithm , exponential , hyperbolic , inverse of hyperbolic functions) ,Application of derivative (curve sketching , minimum and maximum problems), Series, Integrals, Infinite integral, Definite integral, Multiple integrals, methods for finding integrals, Application of integrals

References:

1- Calculas , Thomas.

3.Discrete Structures

Set theory –sets & subsets – how to specify sets -, sequences –Operations on sets-, Algebra of sets & its proves, sets of numbers- Finite sets, Mathematical induction & recursion, Logic and propositions- Equivalency, Tautology& Contradiction, Relations- Computer representation of relations & Digraph, Manipulation of relations, Properties of relations, Composition of relations (Functions-types of functions, Graphs-definition-graphs & multigraphs- subgraph – degree of graph), Walk –length of walk- trail- path- cycle- the bridges of konnisberg, Traversable multigraphs- Euler theorem- special graph- bipartite graph matrices & graph, Labeled graphs – trees- rooted tree- ordered rooted tree- polish notation, Spanning tree- directed graph- matrix of digraph, Finite state machines, Language & pattern recognition machines, Optimistic approach to construct FSM, Finite automata, Finite automata (Contd).

References:

Discrete mathematics by Seymour Lipchitz
Discrete mathematical structures for computer science by Bernard Kolman & Robert C. Busby

4.Computer Organization and Logic Design:

Number system conversion, and Number system operation codes (binary coded decimal and digital codes),Digital system arithmetic (addition and subtraction),1's and 2's complements of binary number.
Subtraction with complement, Logic gates and half adder, full adder.
Boolean algebra and logic simplification, Simplification by karnaugh map(three and four-variable k-map),Combinational logic(NAND and NOR gates)and bit parallel adder ,Decoder and encoder ,Multiplexer and de-multiplexer, Flip-flop(SR,D and JK),Computer definition.
Computer structure, Computer generation, CPU operation ,Memory type,
Primary storage, Secondary storage ,Computer classification ,Language classification,

Translators program ,Operation system, networking, internet.

References:

1. *Computer System Architecture, M. Morris Mano, Third Edition, 1993.*
2. *Digital Fundamental, Floyd, Eight Edition, 2003.*
3. *Principle Of Computer Architecture, Murdocca. M. J., Heuring .V.P., Prentice-Hall, Inc.*
4. *Computer Communications and Information, Hutchinson .S.E., Sawyer .S.C. ,with Contribution by Coulthard G.J. .*

5- Principals of security:

Introduction, Why computers aren't secure, Requirements for computers Protection Security Concepts, security mechanisms, Authentication, Chain of Authority ,Access Control , Permissions-Based Access Control, Understanding Hacking, Vectors That Hackers Exploit, Direct Intrusion , Dial-Up,Hacking Techniques, firewall, Firewall Definition: Firewall Concept, Conditions .The components of the cryptographic system. (Cryptosystem) Encryption Algorithms Traditional Transposition., Monoalphabetic substituation cipher systems (keywords method,….), Homophonic substitution cipher systems(Beal cipher,Higher order homophnics ,…), polyaphabetic substitution cipher systems(Vigener cipher, Beaufort cipher ,Running ker cipher…), polygram substitution cipher systems(playfair cipher, hill cipher ,product cipher…), Understanding Viruses, Macro, scripting hosts Understanding Virus Propagation, Worms, Common Types of Virus Attacks, Boot Sector Viruses, Executable Viruses, Macro Viruses, Understanding Worms and Trojan Horses.

References:

1- Managing Cisco Network Security: Building Rock-Solid Networks,2000
2- William Stallings, *Cryptography and Network Security, (Principles and Practice)*, 2003

6- Probability Theory:

set theory, binary operations on set, cardinality, Cartesian product, Permutation and combination, binomial theorem, some theorems in Permutation and combination, multiplication principle, addition principal , Probability theory, Basic probability definition and rules, sample space, event, type of sample space, complement theorem, addition theorem, Boole's inequality, multiplication theorem , Conditional probability, the general multiplication rule, Independent of events, random variable, the probability density function , cumulative probability , the Binomial distribution.

References:

1- Probability and Statistics Theory and Applications, Gunnar Blom.

7- English language:

Toofl lectures for first stage students in the department of computer sciences, UOT.

Part One: Structure and written expression

1. Nouns, Pronoun, part of sentence, verbs, prepositions, articles, noun class, adjectives class, adverb classes, prepositional phrases

Part Two: Reading

1. Reading of detail, reading of reference and vocabulary, reading of main idea, reading of inference

Part Three: Listening

1. Short conversation, longer conversions, talks and lectures.

Part Four: writing

1. Strategies, topics.

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2013-2012

Second Year Syllabus منهج المرحلة الثانية

No. of Units	Tutorial	No. of Lab. hour	No. Of 2 Theory hour	Subject	اسم المادة	ت
3	1	2	2	Object Oriented programming	البرمجة الشيئية	1
3	1	2	2	Data Structures and Algorithms	هياكل البيانات والخوارزميات	2
3	1	2	2	Advance Mathematic and Numeric Analysis	الرياضيات المتقدمة والتحليل العددي	3
2	1	-	2	Information Theory	نظرية معلومات	4
2	1	-	2	Stream ciphers	التشفير الانسيابي	5
2	1	-	2	Number Theory	نظرية الارقام	6
2	1	-	2	Computation Theory	النظرية الاحتسابية	7
1	-	-	1	Human rights and Democracy	حقوق انسان وديمقراطية	8
18	7	6	15	Total		

Total No. of Unit for One Semester: **(18)**Units
مجموعة الوحدات للفصل الدراسي الواحد: (18) وحدة

Total No. of Unit for Year: **(36)** Units
مجموعة الوحدات لسنة دراسية: (36) وحدة

1- Object Oriented Programming (*with C++ Programming Language*):

Introduction to OOP and its main features (Encapsulation and Data hiding, Inheritance and Reusing) Class Declaration, Construction and Destruction Functions, Default Argument, implicit member Argument, Friend functions and friend Classes.

Functions and operators overloading, Constant members, Scope Operator, Member Initialization List, Constant Members, Static Members, Member Pointers, References Members, Class Object Members, Object Arrays.

Inheritance and Derived Classes, Class Hierarchy Notation, Constructors and Destructors, Protected Class Members, Private, Public, and Protected Base Classes, Multiple Inheritance. Templates, Function Template Definition, Function Template Instantiation, Example: Binary Search, Class Template Definition, Class Template Instantiation, Class Template Members. Virtual Functions, Polymorphism, type of Polymorphism.

References:

1 “Mastering C++”, Prof. Oqeili Saleh and others, Dar Al-Shorok, Amman-Jordan, 2004.

2“Object Oriented Programming Language with C++”, Bjarne Stroustrup, Addison-Wesley Publication, 2003.

2- Data Structures and Algorithms:

Introduction to Data Structures, Memory representation for 1D and 2D arrays, Linear list, Linear list types, files, Stack: (Stack Operations, Applications of stack), Queue: (Queue Operations, Applications of queue), Circular Queue: (CQueue Operations, Applications of CQueue), Linked List, Linked-Stack, Linked-Queue, Linked-CQueue, Recursion, Graph, Trees: (Types of Tree, Binary tree, Binary tree scan, convert tree to binary tree, Binary Search Tree), Sorting: (Sorting Algorithms, Types of Sorting algorithms, Bubble Sort, Insertion Sort, Quick Sort), Searching: (Searching Algorithm, Sequential Search, Binary Search).

References:

1- Data structures and Algorithms with Object- Oriented design Patterns in C++
BY: Bruno R. Preiss, B.A.Sc., M.A.Sc.Ph.D., P.Eng. Associate Professor, Department of electronic and computer engineering, university of waterloo.
2- Data Structures and algorithm analysis in C, By: Mark Allen Weiss.
3- Data Structures and algorithms in Java PDF file.
4- Data Structures using C and C++, Yedidyah language, Moshe J. augenstein, Aaeon M. Tenenbaum, Brooklyn College.

3- Advance Mathematic and Numeric Analysis:

Partial Differentiation, Function with two independent variables or more...,Partial differentiation for first and higher order of derivative. Chain rule, Directional derivative , Total derivative .

Differential Equations First order differential equations, Definition. Solution of differential equation by:-Direct integration. Separating the variables. Homogeneous equation. Exact equation. Integrating factor ,Linear equations. Bernoulli's equation. Second order differential equations. Special types of second order equations.
Linear second order differential equations with constant coefficients.
Solution of second order homogeneous linear differential equations with constant coefficients. Solution of second order non-homogeneous linear differential equations with constant coefficients by:-Undetermined coefficients.Variation of parameters.

Fourier series Definition. Periodic functions. Fourier series for Odd and even function. Half range Fourier sine and cosine series.

Partial differential equations ,Formation of Partial differential quations.
Solution of first order Partial differential equations (by using characteristic equation).
Method of variable separable.Initial and boundary conditions.
Solution of wave equation.Solution of heat equation.

Laplace Transform (L.T) Mathematical definition of Laplace transforms.
Laplace transform for standard important function. Properties of L.T:-
Linearity. Shifting. Multiplication by t^n. Division by t. Laplace Transform of Derivatives.
Laplace Transform of Periodic functions. Unit step function.

Mathematical definition of inverse Laplace transform. Inverse Laplace transform for standard important function. Properties of inverse Laplace transform:-Linearity. Shifting. Inverse Laplace Transform of Derivatives.
Inverse Laplace Transform of integral. Partial fraction for finding inverse Laplace Transform. Long division for finding inverse Laplace Transform.
Laplace Transform applications: Solution of ordinary differential equations.
Numerical Analysis Solution of Non-Linear Equations. Newton-Raphson Method for Approximating. Interpolation. Lagrange Approximation.
Numerical Differentiation and Integration. Approximate Integration.
Integration Equal Spaces. The Trapezoidal Rule. Simpson's Rule. Simpson's (3/8) Rule.
Solutions of Ordinary Differential Equation. Numerical Differentiation. Euler Method. The Step by Step Methods. Modified Euler Method (Euler Trapezoidal Method). Runge Kutta Method. Runge- Kutta-Merson Method . System of Linear Equation. Cramer's Rule. Solution of Linear Equations by using Inverse Matrices. Gauss Elimination Method.
Gauss Siedle Methods. Least Squares Approximations.
division for finding inverse Laplace Transform. Laplace Transform applications: Solution of ordinary differential equations. The Gamma function.
Partial differential equations
Formation of Partial differential equations. Types of Partial differential equations. Solution of Partial differential equations. Formation of Partial differential equations. Solution of first order Partial differential equations. Method of variable separable. Initial and boundary conditions. Solution of heat equation. Solution of wave equation. Solution of laplace equation.

References:

1- Thomas, G. Calculus and Analytic Geometry, 5th Edition, Addison Wesly, 1999.
2- Numerical Methods Using Matlab, Prentice Hall.

4-Information Theory.

The measure of information, self information, average information entropy, maximum entropy of a discrete source, binary source, ternary source, matual information, normal noisy channel, noiseless channel, total channel, channel capacity, channel efficiency, channel redundancy, source efficiency, symmetric channel, capacity of symmetric channel, binary symmetric channel capacity, cascade channel, coding, source coding, average length of coding, compact code, code efficiency and redundancy , source coding technique, fixed length coding, variable length coding, source coding for special source, Shannon-fano method, Huffman method, extension of code.

References:

1- Coding and Information Theory , Richard W.Hamming.

5- Stream ciphers:

Stream Ciphers) Self-Synchronizing Stream Ciphers ,Cipher-Feedback Mode ,Synchronous Stream Ciphers ,Output-Feedback Mode ,Counter Mode ,Other Block-Cipher Modes , choosing a cipher mode, interleaving ,Block Ciphers vs. Stream Ciphers), Modern Stream Ciphers(One-Time Pad ,Using a Vernam Cipher ,Stream Ciphers and Pseudo-Random Generators ,Using Block Ciphers as Stream Ciphers ,Cipher Feedback ,Linear Feedback Shift Registers (LFSR), LFSR Insecurities, Berlecamp-Massey algorithm),Stream Ciphers Design Criteria(large linear complexity (based on size of equiv LFSR, correlation immunity (have tradeoff with linear complexity, confusion (output bits depend on all key bits), diffusion (use of highly non-linear Boolean functions),Stream Ciphers Based on LFSRs ,A5 ,SOBER ,RC4 ,RC4 Security.

References:

1. B Schneier, "Applied Cryptography", 2/e, Chs 16-17
2. R A Rueppel, "Analysis and Design of Stream Ciphers", Springer-Verlag, 1986

6 Number Theory

Divisibility , Prime Numbers , Division , Greatest Common Divisor , The Euclidean Algorithm , Congruences , Divisibility Tests ,More Properties of Congruences, Residue Classes ,16 Zm and Complete Residue Systems , Addition and Multiplication in Zm , The Group of Units, The Chinese Remainder Theorem , Fermat's Little Theorem , Euler's Function , Prime Numbers, Prime Testing and Certification Strong Pseudoprimes Industrial-Grade Primes Prime Certification Via Primitive Roots An Improvement Pratt Certificates

References:

1-Elementary Number Theory ,William Stein, 2004

7- Computation Theory:

Regular Expression, Finite Automata, DFA and NFA, Equivalence of NFA and DFA, Equivalence of NFA and DFA with E-moves, Introduction to Crammers, Phrase Structure Grammar, Context sensitive Grammar, Context Free grammar, Chomsky Normal Form, Greibach Normal Form, Tree, The empty string in context free grammar ambiguity, Regular grammar, Left linear grammar, Right linear grammar, Kleen theorem, Two way finite automata with output (mealy machine, moor machine), The equivalence of mealy and moor machine, Push down automata, Top down –bottom up derivation, Turing machine.

References:

1. H.R.Lewis And G.H Papadimitiou,"Elements Of The Theory Of Computation", Prentig-Hall, 1981.

2. R.W.Floyd And R.Beigel,"The Languae Of Machine:An Introduction To Computability And Formal Languages"Computer Science Press, Network, 1994.
3. M.Sipser."Introduction To The Theory Of Computation" ,Boston Pws Pub ,1996.

8- Human rights and Democracy.

- مفهوم حقوق الإنسان،حقوق الإنسان في الشرائع السماوية،مصادر حقوق الإنسان،ضمانات حقوق الإنسان، مستقبل حقوق الإنسان.
- مفهوم الديمقراطية، أشكال الديمقراطية- الديمقراطية المباشرة- الديمقراطية شبه المباشرة-الديمقراطية النيابية- المجلس النيابي، الية النظام التمثيلي(الانتخاب)- مفهوم الانتخاب- هيئة الناخبين- تنظيم عملية الانتخاب- نظم الانتخاب.

المصادر

1- حقوق الانسان والطفل والديمقراطية
د ماهر صالح علاوي الجبوري وآخرون
2- محاضرات في الديمقراطية- د فيصل شطناوي

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Third Year Syllabus

منهج المرحلة الثالثة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	-	2	2	Compilers	المترجمات	1
3	1	2	2	Databases	قواعد البيانات	2
3	1	2	2	Computer Architecture and microprocessor	معمارية الحاسوب و المعالجة المايكروية	3
2	1	-	2	Secure software design	أمنية تصميم البرامجيات	4
3	1	2	2	Artificial Intelligent	الذكاء الاصطناعي	5
3	1	2	2	Block cipher standard and public key	تشفير الكتلي المعتمد والمفتاح العام	6
3	1	2	2	Computer Networks	شبكات الحاسوب	7
3	1	2	2	multimedia	تعدد الوسائط	8
23	7	14	16	Total		

Total No. of Unit for One Semester: **(23)**Units
Total No. of Unit for Year: **(46)** Units

مجموعة الوحدات للفصل الدراسي الواحد: (23) وحدة
مجموعة الوحدات لسنة دراسية: (46) وحدة

1- Compilers:

Programming Language, Introduction to Compiler, Type of Errors, One Pass Compiler, Syntax Definition, Context Free Grammar, Parsing Tree & leftmost and rightmost derivations, Transition Graph, Lexical analysis, Syntax of Analysis, Problems of Compiler, First and Follow, Top down Parsing, Predictive Parsing Method, Bottom up Parsing, Operation Precedence Parser, Simple Left to Right Parser, Canonical LR Parser, Look Ahead LR, Semantic Analysis, Intermediate Code Generation, Code Optimization, Examples of Code Optimization, Code Generation.

References:

1. Principles of Compiler Design ,Alfred V. Aho, Jeffry D. Ulman.

2- Databases:

Centralized database system (introduction, purpose of database, DBMS, differences between a file processing system and DBMS, ….),Entity relationship model (entities and entity sets,relationships and relationship set, attributes, mapping constraints, keys,….),Relational model (data representation in relational model, data manipulation language : Calcuse of relations-SQL and algebra of relation –AQL,..),Hierarchical model (data representation in Hierarchical model, data manipulation language DL/1, example about DL/1,..),Network model (data representation in Network model, data manipulation language CODASYL, example about DML by using CODASYL language,Data and file

organization in physical database model (sequential file, indexed connected files, has indexing ,inverted files).

References:

3- Computer Architecture and microprocessor:

Introduction to computer architecture and CPU architecture, Instruction set and format, Addressing modes, Program control (interrupt and subroutine call), Microprogramming Design of CPU Control Unit and Micro programmed vs., ardwired Control, RISC and CISC, I/O organization and Peripheral Control Strategies, Input / output interfaces, Asynchronous data transfer, Programmed I/O, Memory Management, types and hierarchy, Main memory and memory address map, Direct Memory Access, Input / output processor (IOP) and Channels, Associative Memory and Content-Addressable Memories, Cache memory, Parallel processing, Pipeline (general consideration), Arithmetic pipeline, Instruction pipeline, Difficulties in Instruction pipeline, And theme solutions, Vector processing, And array processors, Interprocessor communication, Cache coherence, introduction to hardware description languages (HDL),LAB(introduction to machine code,description of the types of registers in 8086, arithmetic and logical instructions and their influence on the flag, register,string instructions, examples, programming).

References:

1- M.M Mano "Computer System Architecture " third Edition, Prentice Hall, 1993.
2- David A. patterson And John L.Hennessy, "Computer Organization And Design " Morgan Kaufmann, 1998.

4- Secure software design

Introduction to software Security (Building security in ,Security goals ,Guiding principles for software security),Security Measurement ,The Secure Software Life Cycle (Stage (1) :-Requirement Stage, Stage (2):-Analysis Stage ,Stage(3):- Design Stage ,Stage (4):- Implementation Stage ,Stage(5):- Testing),System Architecture (Number of layers ,Hierarchal Layers ,Functions of Layers),Possible attack ,Authorization Application, Secure Mechanizes(Open vs. closed source ,Randomness and determinism ,Buffer overflows ,Race conditions ,Access control ,Strategies for firewalls ,Applying Principles of Software Security (Risk analysis ,Software metrics ,Software auditing ,Trust management and input validation ,Client-side security).

References:

1- J. Viega and G. McGraw, *Building Secure Software*, Addison-Wesley, 2002
2- Selected Papers, Current Articles on Computer Security and Software Engineering.

5- Artificial Intelligent:

Introduction to Programming in Logic, Prolog Language Structure, Prolog Language Components, Facts, Simple Rules, Built in Functions in Prolog Language, Recursion in Prolog (Tail Recursion), Non Tail Recursion, Fail Structure, List Processing, String Processing, Database Structure and Properties, Files in Prolog and Applications with Database, Introduction to Artificial Intelligence, Knowledge Representation, Logical Representation (propositional calculus & predicate logic) , non logical Representation (production rules, semantic net & frames), Problem State Space Characteristics, Problem Solving, Search Technique, Blind search (depth & breadth), Heuristic Search (hill climbing, best first search, A algorithm, A* algorithm minmax and alpha-beta), The 8_Puzzle Problem, Tic tac toe problem, tour of Hanoi, Control Strategy (Forward Chaining, Backward Chaining), Hybrid Method (Rule Cycle), expert system fundamentals.

References:

1- Elian Rich, Artificial Intelligence, Prentice Hall 1991.

6- Block cipher standard and public key

Data encryption standard (DES)(description , security differential and cryptanalysis' , who secure is des today,…), other block algorithms (Lucifer ,RC2,LOKI,CA_1.1, SKIPJACK,..), GOST.CAST, Blowfish, RC4,Combining block algorithms(double encryption, triple encryption, cascading multiple block algorithms, Knapascak algorithms, RSA, Pohlig-Hellman, Rabin, Elgamal ,….), Digital signature algorithms DSA(DSA variants, Gost, digital signature algorithms, key-exchange algorithms (diffie –helman, shamirs three-pass protocol, encrypted key exchange,…), Authentication(introduction, massage authentication,….).

***References*:**

1. Applied cryptography , 2nd edition
2. Cryptography and network security by WilliamStalling ,2003.

7- Computer Network:

Data Communication,Physical Topology,Basic Network Technology,LAN Devices,Collision and Collision Domains in Shared Layer Environments Network Devices,Network Layer Addressing, Network Layer Field & Datagram IP address Class, Subnet NW, Private Addresses,Transmission of Digital Data Interfaces and Modems, Transmission Media,Unguided Media, Satellite Communication, Error Detection and Correction ,Data Link Control Multiplexing, De Multiplexing, Data Link Protocols, ARP, FTP, TELNET, DNS, UDP, TCP, NFS and RPC,SMTP, TFTP, HTTP, WAIS, Gopher, SNMP, WWW Browser Architecture,Methods for

Assigning IP Address, Advance ARP, DHCP, Dynamic Addressing,Routable and non Routable Protocols, RIP Features.

References:

1- "Computer Networks", 3rd Edition, A. Tannenbaum, Prentice-Hall, 1996.
2- "Data Communications, Computer Networks and OSI", 4th Edition, F. Halsall, Addison-Wesley, 1995.

8-: multimedia

Introduction to multimedia, component of multimedia, present multimedia applications, Elementary Graphics: Drawing Algorithms, 2D Transformations (Pictures Translation, Pictures Scaling, Pictures Rotation, Pictures reflection), image, audio, video, Capturing the various media, Creating, editing and storing the various media, image processing : arithmetic operation on images, logical operation on images, noise and type of noise, low pass filters, edge detection, high pass filters, Animation Techniques ,Introduction to the nature of text, fundamental concept in video: type of video signals, analogue video , digital video, basic of digital audio : digitization of sound, nyquist theorem, synthesis sound, quantization and transmission audio, coding of audio, lossless compression algorithm, lossely compression algorithm, Web-based multimedia and the special problems involved in delivering media over the WWW, Learn about effective graphical user interfaces, Authoring tools for packaging multimedia systems, A variety of common software packages to complete the above objectives.

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Elective Subjects for Third Year **المواضيع الاختيارية للمرحله الثالثة**

No. of Units	Tutorial	No. of Lab. hour	No. 0f Theory hour	Subject	اسم المادة	ت
2	-	-	2	Intrusion Detection	تعقب المتطفلين	1
3	-	2	2	Neural Networks + Genetic Algorithms	الشبكات العصبية و الخوارزميات الجينية	2
3	-	2	2	Internet and Intranet	أنترنيت وانترانيت	3
3	-	2	2	Compilers	المترجمات	4
3	-	2	2	Databases	قواعد البيانات	5

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Forth Year Syllabus

منهج المرحلة الرابعة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Intelligent Systems	أنظمة ذكية	1
2	1	-	2	Mobile and network Security	امنية الموبابيل والشبكات	2
2	1	-	2	Cryptanalysis	تحليل شفرة	3
3	1	2	2	Secure Operating System	نظم التشغيل الآمنة	4
2	1	-	2	Advance Cryptography	تشفير متقدم	5
3	1	2	2	Web Programming	برمجة مواقع	6
2	1	-	2	Information hiding	اخفاء المعلومات	7
3	-	4	1	Project	المشروع	8
20	7	10	15	Total		

Total No. of Unit for One Semester: **(20)**Units
Total No. of Unit for Year: **(40)** Units

مجموعة الوحدات للفصل الدراسي الواحد: (20) وحدة
مجموعة الوحدات لسنة دراسية: (40) وحدة

1- Intelligent Systems:

Rule Base Expert System (Design and Architecture),Chemical Synthesis system,Pattern Recognition System (Text Recognition),Model Based Expert System: (Design ,Architecture and Characteristic),Classification system: Back word chaining, For word chaining,Prediction system (Weather forecasting system),Case Based Expert system (Design ,Architecture and Characteristic),Natural language processing (Formal method), Natural language processing (InFormal method),Systems Designs under uncertainty, Probability method, Approximation method,Systems that depends (Explain) their actions, How facility, Why Facility, Shell Facility,Artificial Neural Networks (Principles , characteristic , Design and Taxonomy), Single layer NN (Perception and Adaline), Multilayer NN (Back propagation), Supervised NN (Hopfield), Unsupervised NN (self organization (BAM + Kohenen)) ,Genetic Algorithm (Principles , General forms and operations), Bits transition problem, 8 – puzzle example, TSP example,Random Search Fundamentals , General Algorithms and methods,Text Mining, Text summarization.

References:

1. Daniel H. Marcellus, Expert Systems Programming in Turbo Prolog, Prentice Hall (New Jersey) 1992.
2. 1.George F. Luger,Artificial Intelligence (structures and strategies for complex problem solving), Pearson Education Asia (Singapore), 2002.
3. 2. Laurene Fausett, Fundamantals of neural Networks: Architecture, Algorithms, and Applications, 1994.

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2- Mobile and networks Security:

1.Introduction to Network and Mobile Security
- 1.1 Definition of security
- 1.2 introductions to network
- 1.3 Introduction Mobile cellular networks
- 1.4 IEEE wireless networks
- 1.5 Mobile Internet networks
- 1.6 Security Attacks.
- 1.7 Methods of Defense.

2: Vulnerabilities
- 2.1 Reasons for Security Problems.
- 2.2 Security Threats.
- 2.3 Security Involving Programs.
- 2.4 Trojan Horse Applications.

3: Fundamental Security Mechanizes
- 3.1 Introduction.
- 3.2 Encryption:
- 3.3 Port Protection:
- 3.5 Traffic Control:
- 3.6 Data Integrity:
- 3.7 Authentication

4: Security in Network
- 4.1 Kerberos Authentication System
- 4.2 Firewalls
- 4.3 Intrusion Detection Systems
- 4.4 Secure E-Mail
- 4.5 Multilevel Security on Networks

5:Security in Mobile Telecommunication Networks
- 5.1. Introduction
- 5.2. Signaling
- 5.3. Security in the GSM
- 5.4. GPRS security
- 5.5. 3G security
- 5.6. Network interconnection

6: Security in Next Generation Mobile Networks
- 6.1. Introduction
- 6.2. The SIP
- 6.3. VoIP
- 6.4. IP Multimedia Subsystem (IMS)
- 6.5. 4G security
- 6.6. Confidentiality

3- Cryptanalysis:

Introduction (definition of Cryptanalysis and Cryptanalyst, Cryptanalyst position is some, simple cryptosystems, Requirements of Cryptosystems), Type of Attacks on Cryptosystems, Cryptanalysis of the Classical cryptography (Transposition cryptanalysis, Scrytal, Keyword columnmer transposition,Doubul transposition). substution cryptanalysis,(additive,multiplication, affine, keyword, Polyalabetic analysis: vigener method, computing key length, Kasiski test, Shift itself, Percentage of coincidence, complete examples.), Statistical cryptanalysis(unilateral frequency distribution , Letter frequency in cryptogram, roughness ,Coincidence tests, index of coincidence, Cryptanalysis for the affine using statistical cryptanalysis), Stream cipher cryptanalysis (introduction of stream cipher, LFBSR, primitive polynomials, Matrix approach to analyzing stream cipher , examples, solve problems, , Massy algorithm , examples), DES cryptanalysis, RSA cryptanalysis .

References:

1- Applied cryptanalysis' /Breaking Ciphers in the Real World/2007 PDF

4- Secure Operating System :

Operating system overview ,Operating system History and types:-(Main frame systems, Desktop systems, Multiprocessor systems, Distributed systems, Clustered systems, Real time systems, Handheld systems),Computing environment,Computer system structure,Hardware protection,operating system structure,operating system components,operating system services,processes: (process concepts ,operation on processes,cooperating process),threads,CPU scheduling(concepts, Scheduling Criteria, Scheduling Algorithms, First Come First Served and Shortest Job First, Priority Scheduling algorithm and Round Robin Algorithm, Multi level queue scheduling, multiprocessor scheduling, real time scheduling),Introduction to Deadlocks handling ,threads ,Introduction to process synchronization,Memory Management, Storage management ,Protection and Security.

References:

1. "Operating System Concepts" by Silberschatz, Galvin and Gagne, 2003.

5- Advanced cryptography:

Polynomial Arithmetic, reducible and irreducible polynomials, Quadratic residues and quadratic reciprocity ,Finite Fields Of the Form GF(2n), Evaluation Criteria For AES, The AES Cipher, Polynomials with Coefficients in GF(28), Simplified AES, Multiple Encryption and Triple DES, Placement of Encryption Function, Key Distribution, Discrete Logarithms, Principles of Public-Key Cryptosystems, Diffie-Hellman Key Exchange, Elliptic Curve Arithmetic(Elliptic curves over finite fields , elliptic curve discrete logarithm problem , Elliptic curve cryptography , elliptic curve factorization algorithm , Elliptic curves over F2 and over F2*k)*.

References:

1- Cryptograph and Network Security Principles and Practices, Four Edition By William Statings,2005.

6- Web Programming :

Web Based Application, Introduction, The world wide web, The internet and web, The history and growth of the web, internet service provider , Http, The purpose of the web, web application ,The web concepts, Hypertext, web page, web site, web page address, web browsing, The classifying the web sites, environment, the general approach, range of complexity, Programming Technologies, Client side, HTML, CSS, external , internal , scripting language, Java script, VB script, create data object ,function , popup Boxes, create an array , document.getelementByid ,web programming with ASP, internet information server , ASP Principles, ASP Objects, Response Object, write , clear, end, flush, redirect, Request Object, querystring, request, form, get ,post, external , internal , cooke, application-onend, application-onstart, Server Object, scripttimeout, execute, HTML encode, mappath, URLencode, ASP-File System Object, bulidpath, copyfile, copyfolder, createtextfile, deletefile, deletefolder, folderexistes, driverexistes, fileexists, ASP Applications, dynamic web site, online examination, simple search directory, simple Email system.

References:

Web Based Application.
Web Programming with ASP.

7- Information Hiding

Main Subdisciplines of Information Hiding,A Brief History of Information Hiding, Some Applications of Information Hiding, Frameworks for Secret Communication, Security of information hiding, Information Hiding in Noisy Data,Information Hiding in Written Text, Examples of Invisible Communication, Least Significant Bit Substitution, active and msalicious attackers, watermarking and copyright protection,basic watermarking principles,watermarking applications,requirements and algorithmc design

issues, fingerprinting,examples, classification of fingerprint,Cover-Regions and Parity Bits, Palette-Based Images, Information Hiding in Binary Images, Steganography in the DCT Domain, Information Hiding and Data Compression, Statistical Steganography,Encoding Information in Formatted Text, Distortion of Digital Images.

References:

1- 1- Information Hiding Techniques for Steganogrophy and Digital Watermarking By Stefan Katzenbesser, Fabien Pericolas,\2000.
2- Steganography and watermarking attacksand countermeasure / 2000

8- Project.

Description for Research Project

Research project is an study proposed by teacher (supervisor) and developed by student (fourth class only), this study aim to train the student on it is specialization of scientific (the scientific branch in computer sciences).

Time for Research Project

The Student given full academic year for accomplishes his study.

Exam for Research Project

Research project will be evaluated by a supervisor and Committee of Experts.

Format for Research Projects

Research projects are written up in standardized format. Be formal & objective in English language, & cite all sources. The format includes the following sections:

Title

Title would normally include the major variables of student study. For example:

"A protection system for an Internet site"

Abstract

Begin with a brief Abstract of the study, which summarizes the entire study into one paragraph. The reader should be able to tell from Abstract what theory and hypothesis were, who you studied and how, what your findings were, and what they meant for the theory.

Introduction

The introduction includes a brief (~2-3 page) review of current theory & research in the area of your topic. In presenting this material, paraphrase it into your own words, but always cite the source of the information. Referencing must be complete & correct, or you are plagiarizing, which is a serious academic offence. End with an introduction to your study, including your hypothesis.

Method

1. Materials/Instruments , Describe any instruments employed to measure the variables of your study. (e.g. questionnaires, tests, etc.)
2. Procedure , The Procedure section reviews exactly how you did your study, & should include enough detail that anyone could repeat your procedure. Include your methodology (e.g. whether you did an experiment, or observation, etc.); a review of how you carried out the study; & any data analysis that you did.

Results

Include your results, summarized & presented in a way that is easy to follow & to understand. If possible, these results should be presented both in a table (which would include descriptive & inferential statistics) & in a written description of the results. The results section should not include conclusions or interpretations; these would be in the Discussion section.

Discussion

Use the discussion to relate your results to the theory you described in the introduction. The "why" of your results are discussed here, & what they mean in terms of theory & research. Add a discussion of the limitations of your study.

References

All references in the introduction are included in the reference section at the end of the research report, in alphabetical order.

Appendix

Any information that is relevant to the study, but not needed within the body of the paper, should be included at the end of the report. These appendices would include further details of the research instructions, materials, results, psychological measures, etc., if needed. Your instructor may also wish you to attach the raw data of your project.

Elective Subjects for Forth Year **المواضيع الاختيارية للمرحلة الرابعة**

No. of Units	Tutorial	No. of Lab. Hour	No. Of Theory hour	Subject	اسم المادة	ت
3	-	2	2	3D Graphics and Vision	الرسوم ثلاثية الابعاد والرؤية	1
2	-	-	2	Internet Architecture	معمارية الانترنيت	2
3	-	2	2	Image Processing	معالجة الصور	3
2	-	-	2	Modeling and Simulation	النمذجة والمحاكاه	4
2	-	-	2	Data Compression	ضغط البيانات	5
3	-	2	2	Web Programming	برمجة المواقع	6

المناهج الدراسية لفرع ادارة الشبكات

للعام الدراسي 2012-2013

University of Technology
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First Year Syllabus **منهج المرحلة الاولى**

No. of Units	Tutorial	No. of Lab hour	No. of Theory hour	Subject	أسم المادة	ت
4	1	2	3	Structure Programming	البرمجة المهيكلة	1
2	1	-	2	Mathematics	الرياضيات	2
2	1	-	2	Principles of Network	مبادئ الشبكات	3
2	1	-	2	Discrete Structures	الهياكل المتقطعة	4
3	1	2	2	Logic Design	تصميم منطقي	5
2	1	-	2	Computer and Network Organization	تركيب الحاسوب و الشبكات	6
Pass	-	-	2	English Language	اللغة الانكليزية	7
15	6	4	15	**Total**		

Total No. of Unit for One Semester: **(15)**Units

مجموعة الوحدات للفصل الدراسي الواحد: (15) وحدة

Total No. of Unit for Year: **(30)** Units

مجموعة الوحدات لسنة دراسية: (30) وحدة

Second Year Syllabus **منهج المرحلة الثانية**

No. of Units	Tutorial	No. of Lab hour	No. of Theory hour	Subject	أسم المادة	ت
3	1	2	2	Object Oriented Programming	البرمجة الشيئية	1
3	1	2	2	Data Structure & Algorithms	هياكل البيانات والخوارزميات	2
3	-	2	2	Network Architecture	معمارية الشبكات	3
3	1	2	2	Database	قواعد البيانات	4
3	-	2	2	Internet Programming	برمجة الإنترنت	5
3	1	2	2	Advanced Mathematics & Numerical Analysis	الرياضيات المتقدمة والتحليل العددي	6
2	1	-	2	Coding & Information Theory	الترميز و نظرية المعلومات	7
1	-	-	1	Human Rights and Democracy	حقوق الانسان والديمقراطية	8
21	5	12	15	**Total**		

Total No. of Unit for One Semester: **(21)**Units

مجموعة الوحدات للفصل الدراسي الواحد: (21) وحدة

Total No. of Unit for Year: **(42)** Units

مجموعة الوحدات لسنة دراسية: (42) وحدة

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مناهج فرع إدارة الشبكات

First Year Syllabus منهج المرحلة الأولى

No. of Units	Tutorial	No. of Lab hour	No. of Theory hour	Subject	أسم المادة	ت
4	1	2	3	Structure Programming	البرمجة المهيكلة	1
2	1	-	2	Mathematics	الرياضيات	2
2	1	-	2	Principles of Network	مبادئ الشبكات	3
2	1	-	2	Discrete Structures	الهياكل المتقطعة	4
3	1	2	2	Logic Design	تصميم منطقي	5
2	1	-	2	Computer and Network Organization	تركيب الحاسوب و الشبكات	6
Pass	-	-	2	English Language	اللغة الانكليزية	7
15	6	4	15	**Total**		

Total No. of Unit for One Semester: **(15)**Units
مجموعة الوحدات للفصل الدراسي الواحد: (15) وحدة

Total No. of Unit for Year: **(30)** Units
مجموعة الوحدات لسنة دراسية: (30) وحدة

1. Structured Programming (*with C++ Programming Language*):

Introduction, Procedural Programming Principles, Algorithm ,Algorithm properties ,Examples, Flowcharts, Flowchart Figure, Examples C++ Language Basics (Character set, Identifiers, Getting Started with C++, Variables Declaration, Variables, Constants, Arithmetic Operations, The "math.h" Library, Unary Minus, Increment and /decrement Operators, Operational Assignment Operators, Relational Operators, Logical Operators, Bitwise Operator), Selection Statements (Selection Statements, The Single If Statement Structure, The Single If Statement Structure (Blocks), The If/else Statement Structure, Nested If and If/else Statements, The Switch Selection Statement (Selector), Conditional Statement), Iteration Statements (Selection Statements, While Repetition Structure, Do/While Statement, For Statement, More about For Statement, Nested Loops, Break and Continue Control Statements), Functions (Function, Passing Parameters (Passing by Value, Passing by Reference)), Arrays (Array of One Dimension (Declaration of Arrays, Initializing Array Elements, Accessing Array Elements, Read / Write / Process Array Elements), Array of Two Dimension (Declaration of 2D-Arrays, Initializing 2D-Array Elements, Read / Write / Process Array Elements)), String (Read / Write / Process Array

Elements, Member Function of String, stdlib Library), Structures (The Three Ways for Declare the Structure, Array of Structures).

References:

1- Mastring C++ , Amman-Jordan, AL-Shorok\2002.
2- Oqeili Salch, prof. Department of IT-AL-Balqa Applied University.

2. Mathematics:

Functions, Transcendental Functions, Sequence and Series, Differentiation and Applications, Integration and Applications, Multiple Integrals, Polar Plane, Complex Numbers, Matrices, Vector Analysis.

References:

1- Calculas , Thomas.

3. Principles of Networks:

Introduction to data communication , five components of data communication , data representation , data flow {simplex , half-duplex , and full-duplex } , introduction too network , definition , distributed processing , network criteria ,network physical structures ,type of connection [point to point and multipoint] , physical topology [mesh, star, bus, ring] ,network models , categories of network [LAN, MAN, WAN], introduction of network internetwork , internet , a brief history ,the internet today , international internet service providers , national internet service providers, regional internet service providers, local internet service providers, , network models , osi , tcp/ip , network transmission media , guided , unguided , communication , contention , token passing ,polling .

References:

1. Computer net working, a top down approach, fifth edition, Jams F. Kurose, Keith W. Ross, 2012.
2. A. Leon Garcia and I. Widjaja : Communication Networks: Fundamental concepts and key architectures, second edition, Tata McGraw-hill, New Delhi, 2004

4. Discrete Structures

Set theory -sets and subsets - how to specify sets -, sequences -Operations on sets-, Algebra of sets and its proves, sets of numbers- Finite sets, Mathematical induction and recursion, Matrices, Logic and propositions- Equivalency, Tautologyand Contradiction, Relations- Computer representation of relations and Digraph, Manipulation of relations, Properties of relations, Composition of relations (Functions-types of functions, Graphs-definition-graphs and multigraphs- sub graph – degree of graph), Walk –length of walk- trail- path- cycle- the bridges of Konigsberg,

Traversable multigraphs- Euler theorem- special graph- bipartite graph matrices and graph, Labeled graphs – trees- rooted tree- ordered rooted tree- polish notation, Spanning tree- directed graph- matrix of digraph, Minimal path, Finite state machines, Language and pattern recognition machines, Optimistic approach to construct FSM, Finite automata, Finite automata (Contd).

References:

1. Discrete mathematics by Seymour Lipchitz
2. Discrete mathematical structures for computer science by Bernard Kolman and Robert C. Busby

5. Logic Design:

Logic with computer: Number system and codes, Logic gates, Boolean algebra, Minimization Methods (K-map, Q-M), Combination Logic, Adders, Subtractors, comparators, code convertors, Multiplexers, Sequential logic Circuits, Flip-Flops (S-R FF, D FF, J-K FF, T FF, Registers, Counters, State Diagram and FSA, ROM, RAM.
Logic with Communication: Digital-to-digital conversion, line Coding, Line coding schemes, block coding, scrambling, analog-to-digital conversion, pulse code modulation, delta modulation, digital-to-analog conversion, amplitude shift keying, frequency shift keying, phase shift keying, Quadrature modulation, Analog-to-analog conversion, amplitude modulation, frequency modulation, phase modulation.

6. Computer and Network Organization:

Computer organization: Introduction to computer architecture , computer definition + history of computer , importance advantages of computer, application with computer system, Main parts of a personal computer, Hardware :the structure of computer system input units , output units central processing units [cpu] , cpu definition , cpu components [alu, rs, cu] , cpu operations , main memory , primary storage, instruction format with memory , secondary storage , type of main memory [RAM,ROM] , type of secondary storage ,computer classification [analog, digital, hybrid], Software Programs and application programs and utilities , system software and operating system and utilities , application packages.

Network organization: Computer ports: universal serial bus [USB] port and serial port and parallel and network port , fire wire port , connectivity devices : nodes [host, client and server] and modem and repeaters and bridge and hub and switch and router and gateway , network topology single topology and logical topology , network management : centralization and decentralized , network software [protocols]

7 English Language:

Toofl lectures for first stage students in the department of computer sciences, UOT.

Part One: Structure and written expression

1. Nouns, Pronoun, part of sentence, verbs, prepositions, articles, noun class, adjectives class, adverb classes, prepositional phrases

Part Two: Reading

1. Reading of detail, reading of reference and vocabulary, reading of main idea, reading of inference

Part Three: Listening

1. Short conversation, longer conversions, talks and lectures.

Part Four: writing

1. Strategies, topics.

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Second Year Syllabus

منهج المرحلة الثانية

No. of Units	Tutorial	No. of Lab hour	No. of Theory hour	Subject	أسم المادة	ت
3	1	2	2	Object Oriented Programming	البرمجة الشيئية	1
3	1	2	2	Data Structure & Algorithms	هياكل البيانات والخوارزميات	2
3	-	2	2	Network Architecture	معمارية الشبكات	3
3	1	2	2	Database	قواعد البيانات	4
3	-	2	2	Internet Programming	برمجة الإنترنت	5
3	1	2	2	Advanced Mathematics & Numerical Analysis	الرياضيات المتقدمة والتحليل العددي	6
2	1	-	2	Coding & Information Theory	الترميز و نظرية المعلومات	7
1	-	-	1	Democracy	الديمقراطية	8
21	5	12	15	**Total**		

Total No. of Unit for One Semester: **(21)**Units

مجموعة الوحدات للفصل الدراسي الواحد: (21) وحدة

Total No. of Unit for Year: **(42)** Units

مجموعة الوحدات لسنة دراسية: (42) وحدة

1- Object Oriented Programming and Visual C++

Overview for functions and parameter transmission in C++ , Introduction of OOP and its main features , Defining a Simple Class with Inline Member Functions, Constructors and destructors functions, Friends functions, Constant Members, Static Members, Default Arguments and Implicit Member Argument, Function and operators Overloading, Inheritance and Derived Classes, Virtual Functions and Multiple Inheritance, Function Template Definition and Function Template Instantiation, Class Template Definition and Class Template Instantiation, Introduction to Visual Studio. NET C++, Starting Visual C++ MDE, Starting Developer studio to implement a simple program, Concepts and tools for Windows Application, Microsoft Foundation Class Library Fundamentals, Explore the Microsoft Foundation Class (MFC) Library and the Visual C++ IDE (Integrated Development Environment), Create the standard MFC Application Architectures, use the Graphical Output features of MFC, Explore Message Maps, Message Handlers, and Command Routing, and add standard User Interface Elements to an MFC Application, Create Modal and Modeless Dialog Boxes for user interaction,

implement Exception Handling, and use MFC Debugging Support and Visual C++ Debugging Tools, Add Data Access Services with MFC, build and use MFC-based ActiveX Controls, develop Internet applications with MFC, add Persistence using MFC Serialization Support, create multithreaded MFC Applications, and implement regular and extension MFC DLLs.

References:

1. "Mastering C++", Prof. Oqeili Saleh and others, Dar Al-Shorok, Amman-Jordan, 2004.
2. "Object Oriented Programming Language with C++", Bjarne Stroustrup, Addison-Wesley Publication, 2003.

2- Data Structures and Algorithms:

Introduction to Data Structures, Memory representation for 1D and 2D arrays, Linear list, Linear list types, Stack: (Stack Operations, Applications of stack), Queue: (Queue Operations, Applications of queue), Circular Queue: (CQueue Operations, Applications of CQueue), Linked List, Linked-Stack, Linked-Queue, Linked-CQueue, Recursion, Graph, Trees: (Types of Tree, Binary tree, Binary tree scan, Represent Regulars expression using trees, convert tree to binary tree, Binary Search Tree), Sorting: (Sorting Algorithms, Types of Sorting algorithms, Bubble Sort, Insertion Sort, Quick Sort), Searching: (Searching Algorithm, Sequential Search, Binary Search).

References:

1. Data structures and Algorithms with Object- Oriented design Patterns in C++ by: Bruno R. Preiss, B.A.Sc., M.A.Sc.Ph.D., P.Eng. Associate Professor, Department of electronic and computer engineering, university of waterloo.
2. Data Structures and algorithm analysis in C, By: Mark Allen Weiss.
3. Data Structures and algorithms in Java PDF file.
4. Data Structures using C and C++, Yedidyah language, Moshe J. augenstein, Aaeon M. Tenenbaum, Brooklyn College.

3- Network Architecture

Introduction :(Network Hardware, Network Software, Reference models, Network standardization), The Physical Layer: (Guided transmission media, Wireless Transmission, Communication satellites, The public switched telephone network, The mobile telephone system, Cable television), The Data Link Layer: (Design issues, Error detection and correction, Data link protocols, Sliding window protocols, Protocol specification and verification), The Medium Access Control Sub-layer: (The channel allocation problem, Multiple access protocols, Ethernet, Wireless LANS, Broadband wireless, Bluetooth, Data link layer switching), The Network Layer: (Design issues, Routing algorithms, Congestion control algorithms), The Transport Layer: (Elements of transport protocols, UDP and TCP, Processes and

threads, Communication and invocation), The Application Layer: (DNS,P2P, Electronic mail, The world wide web, Multimedia).

4- Database:

Centralized database system (introduction, purpose of database, DBMS, differences between a file processing system and DBMS, ….), Entity relationship model (entities and entity sets, relationships and relationship set, attributes, mapping constraints, keys,….), Relational model (data representation in relational model, data manipulation language : Clause of relations-SQL and algebra of relation –AQL,..), Hierarchical model (data representation in Hierarchical model, data manipulation language DL/1, example about DL/1,..), Network model (data representation in Network model, data manipulation language CODASYL, example about DML by using CODASYL language, Data and file organization in physical database model (sequential file, indexed connected files, has indexing ,inverted files)

References:

1. Date C. J.,"An Introduction to Database Systems",2004
2. Abraham Silberschatz, Henry F.Korth, S. Subarshan, " Database System Concepts",2006
3. David M. Kroenke, "Database Concepts", 2005.

5- Internet Programming:

- Computer Networking: Introduction, Network Infrastructure, Delays, Packet-Switching, Circuit-Switching, Protocol Stacks OSI, Layering, Sockets, Application layer, Physical Layer, Link layer basics, Ethernet, Transport Layer, Bridging/Switching, 802.11, PPP, IP forwarding tables, IP addressing, ARP, IP Packets, Routers, Routing: Distance-Vector (RIP), Routing: Link-State (OSPF), Multicast, DNS.
- Web Protocols and Practice: Traffic Measurement, Transmission control protocol(TCP), User datagram protocol(UDP), Internet Protocol (IP),Application Process (HTTP,FTP,TFTP,SMTP,SSH,POP,NTP), Quality of Service (QoS), Internet Traffic Control.
- Socket Programming in visual C Sharp: Networking Basics, Client-server programming with TCP/IP, Multitasking with UDP, Network diagnosis commands.

6- Advance Mathematic and Numerical Analysis:

Partial differentiation, (partial differentiation for first and higher order of derivative, chain rule, directional derivative),first order equations, (solution of differential equation by direct integration, separating the variables, homogeneous equation,….),Second and higher order differential equations, linear second order differential equation with constant) ,Lap Transform (Laplace transform for standard important function, multiplication by tn,division by t, Inverse Laplace transform of derivatives, Partial differential equations (formation of partial differential equations, types of partial differential equations,….),Fourier series (periodic functions, Fourier series for odd and even function, half range Fourier sin and cosine series, change of interval),Numerical analysis (solving sets of equation, elimination and iterative methods, interpolating polynomials, Lagrange polynomial),solving non-liner equation, numerical differentiation and numerical integration, numerical solution of ordinary differential equations, curve-fitting and approximations.

References:

1- Thomas, G. Calculus and Analytic Geometry, 5th Edition, Addison Wesly, 1999.
2- Numerical Methods Using Matlab, Prentice Hall.

7- Coding and Information theory:

The measure of information, self information, average information entropy, maximum entropy of a discrete source, binary source, ternary source, matual information, normal noisy channel, noiseless channel, total channel, channel capacity, channel efficiency, channel redundancy, source efficiency, symmetric channel, capacity of symmetric channel, binary symmetric channel capacity, cascade channel, coding, source coding, average length of coding, compact code, code efficiency and redundancy , source coding technique, fixed length coding, variable length coding, source coding for special source, Shannon-fano method, Huffman method, extension of code.

8- حقوق الانسان و الديمقراطية

- مفهوم حقوق الإنسان،حقوق الإنسان في الشرائع السماوية،مصادر حقوق الإنسان،ضمانات حقوق الإنسان، مستقبل حقوق الإنسان.
- مفهوم الديمقراطية، أشكال الديمقراطية- الديمقراطية المباشرة- الديمقراطية شبه المباشرة-الديمقراطية النيابية- المجلس النيابي، الية النظام التمثيلي(الانتخاب)- مفهوم الانتخاب- هيئة الناخبين- تنظيم عملية الانتخاب- نظم الانتخاب.

المصادر

1- حقوق الانسان والطفل والديمقراطية

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Network Management
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2012 - 2013

د ماهر صالح علاوي الجبوري وآخرون
2- محاضرات في الديمقراطية- د فيصل شطناوي

Multimedia Branch

فرع الوسائط المتعددة 2013-2012

University of Technology

Computer Sciences Department

Multimedia Branch

2013-2012

First Year Syllabus **منهج المرحلة الأولى**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
4	1	2	3	Structured Programming	البرمجة المهيكلة	1
2	1	-	2	Mathematics	الرياضيات	2
2	1	-	2	Discrete Structures	الهياكل المتقطعة	3
3	1	2	2	Organization and Logic Design	التركيب والتصميم المنطقي	4
2	1	-	2	Information theory and coding	نظرية معلومات والترميز	5
2	1	-	2	Fundamentals of digital media	أساسيات الوسائط الرقمية	6
Pass	-	-	2	English Language	لغة انكليزية	7
15	6	4	15	Total		

Total No. of Unit for One Semester: **(15)**Units مجموعة الوحدات للفصل الدراسي الواحد: (15) وحدة

Total No. of Unit for Year: **(30)** Units مجموعة الوحدات لسنة دراسية: (30) وحدة

Second Year Syllabus **منهج المرحلة الثانية**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory 2 hour	Subject	اسم المادة	ت
3	1	2	2	Object Oriented programming and VC++	البرمجة الشيئية ولغة VC++	1
3	1	2	2	Data Structures and Algorithms	هياكل البيانات والخوارزميات	2
3	1	2	2	Mathematics and Numeric Analysis	الرياضيات والتحليل العددي	3
3	1	2	2	Databases	قواعد البيانات	4
2	1	-	2	Computation Theory	النظرية الاحتسابية	5
3	1	2	2	Multimedia design and application	تصميم وتطبيق الوسائط المتعددة	6
3	1	2	2	Microprocessors and assembly language programming	المعالجات المايكروية والبرمجة بلغة التجميع	7
1	-	-	1	Human rrights & Democracy	حقوق الانسان والديمقراطية	8
21	7	12	15	Total		

Total No. of Unit for One Semester: **(21)**Units مجموعة الوحدات للفصل الدراسي الواحد: (21) وحدة

otal No. of Unit for Year: **(42)** Units مجموعة الوحدات لسنة دراسية: (42) وحدة

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Third Year Syllabus **منهج المرحلة الثالثة**

No. of Units	Tutorial	No. of Lab. Hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Computer graphics	رسوم الحاسبة	1
3	1	2	2	Image processing	معالجة صور	2
3	1	2	2	Multimedia security	أمنية الوسائط المتعددة	3
2	1	-	2	Computer architecture	معمارية الحاسبة	4
3	1	2	2	Artificial Intelligent	الذكاء الاصطناعي	5
3	1	2	2	Computer Networks	شبكات الحاسبة	6
2	1	-	2	Planning and robotics	التخطيط والأنسان الآلي	7
3	1	2	2	Data compression	ضغط البيانات	8
22	8	12	16	Total		

Total No. of Unit for One Semester: **(22)**Units مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة

Total No. of Unit for Year: **(44)** Units مجموعة الوحدات لسنة دراسية: (44) وحدة

Forth Year Syllabus **منهج المرحلة الرابعة**

No. of Units	Tutorial	No. of Lab. hour	No. of Theory hour	Subject	اسم المادة	ت
3	1	2	2	3-D Graphics & animation	الرسوم ثلاثية الأبعاد والتحريك	.1
3	1	2	2	Pattern recognition	تمييز الأنماط	.2
2	1	-	2	Modeling and simulation	نمذجة ومحاكاة	.3
2	1	-	2	Multimedia security	اخفاء المعلومات	.4
3	1	2	2	Operating System	نظم التشغيل	.5
3	1	2	2	Web Programming	برمجة مواقع	.6
3	1	2	2	Digital sound and video	الصوت والفيديو الرقمي	.7
3	-	4	1	Project	المشروع	.8
22	7	14	15	Total		

Total No. of Unit for One Semester: **(22)**Units مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة

Total No. of Unit for Year: **(44)** Units مجموعة الوحدات لسنة دراسية: (44) وحدة

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First Year Syllabus **منهج المرحلة الأولى**

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
4	1	2	3	Structured Programming	البرمجة المهيكلة	1
2	1	-	2	Mathematics	الرياضيات	2
2	1	-	2	Discrete Structures	الهياكل المتقطعة	3
3	1	2	2	Organization and Logic Design	التركيب والتصميم المنطقي	4
2	1	-	2	Information theory and coding	نظرية المعلومات والترميز	5
2	1	-	2	Fundamentals of digital media	أساسيات الوسائط الرقمية	6
Pass	-		2	English Language	لغة انكليزية	7
15	6	4	15	Total		

Total No. of Unit for One Semester: **(15)**Units مجموعة الوحدات للفصل الدراسي الواحد: (15) وحدة

Total No. of Unit for Year: **(30)** Units مجموعة الوحدات لسنة دراسية: (30) وحدة

!. Structured Programming (*with C++ Programming Language*):

- Introduction,
- Procedural Programming Principles,
- Algorithm ,Algorithm properties ,Examples,

Flowcharts, Flowchart Figure, Examples

C++ Language Basics (Character set, Identifiers, Getting Started with C++, Variables Declaration, Variables, Constants, Arithmetic Operations,

The “math.h” Library, Unary Minus, Increment and /decrement Operators, Operational Assignment Operators, Relational Operators, Logical Operators, Bitwise Operator),

Selection Statements (Selection Statements, The Single If Statement Structure, The Single If Statement Structure (Blocks), The If/else Statement Structure, Nested If and If/else Statements, The Switch Selection Statement (Selector),

Conditional Statement), Iteration Statements (Selection Statements, While Repetition Structure, Do/While Statement, For Statement, More about For Statement, Nested Loops, Break and Continue Control Statements),

Functions (Function, Passing Parameters (Passing by Value, Passing by Reference)), Arrays (Array of One Dimension (Declaration of Arrays, Initializing Array Elements, Accessing Array Elements, Read / Write / Process Array Elements), Array of Two Dimension (Declaration of 2D-Arrays, Initializing 2D-Array Elements, Read / Write / Process Array Elements)),

String (Read / Write / Process Array Elements, Member Function of String, stdlib Library),

Structures (The Three Ways for Declare the Structure, Array of Structures)

References:

1. *Mastering C++ , Amman-Jordan, AL-Shorok\2002.*

2. *Programming with C++ , D. Ravichandran.*

.Mathematics:

Matrix, Type of matrix, Additional and multiplication, Determent,Transposem, symmetric, Rank of matrix, Method of finding inverse of matrix , Absolute vale ,Polynomials, Roots,

Graphic of functions, Limits , Type of limits ,One side and two sided limits, Limits at infinity,

Sandwich theorem, Continuous functions ,Derivative ,Mathematical definition of derivative,

Rules of derivative, Implicit derivative ,Higher derivative ,Velocity and acceleration,

Chain rule and parameter equations, Derivative of (trigonometric , inverse trigonometric ,logarithm , exponential , hyperbolic , inverse of hyperbolic functions) ,Application of derivative

(curve sketching , minimum and maximum problems), Series, Integrals, Infinite integral,

Definite integral, Multiple integrals, methods for finding integrals, Application of integrals

References:

1- Calculus , Thomas.

.Discrete Structures

- Set theory –sets and subsets – how to specify sets -, sequences –Operations on sets-, Algebra of sets and its proves, sets of numbers- Finite sets,
- Mathematical induction and recursion,
- Logic and propositions- Equivalency, Tautology and Contradiction,
- Relations- Computer representation of relations and Digraph, Manipulation of relations, Properties of relations, Composition of relations (Functions-types of functions, Graphs-definition-graphs and multigraphs- subgraph – degree of graph),
- Walk –length of walk- trail- path- cycle- the bridges of Konigsberg, Traversable multigraphs- Euler theorem- special graph- bipartite graph matrices and graph, Labeled graphs – trees- rooted tree- ordered rooted tree- polish notation, Spanning tree- directed graph- matrix of digraph,
- Finite state machines, Language and pattern recognition machines, Optimistic approach to construct FSM,

Finite automata, Finite automata (Contd).

References:

1. *Discrete mathematics by Seymour Lipchitz*
2. *Discrete mathematical structures for computer science by Bernard Kolman and Robert C. Busby*

4. Organization and Logic Design:

Number system conversion, and Number system operation codes (binary coded decimal and digital codes), Digital system arithmetic (addition and subtraction), 1's and 2's complements of binary number.

Subtraction with complement, Logic gates and half adder, full adder.

Boolean algebra and logic simplification, Simplification by karnaugh map (three and four- variable k-map), Combinational logic (NAND and NOR gates) and bit parallel adder, Decoder and encoder, Multiplexer and de-multiplexer, Flip-flop (SR, D and JK), Computer definition.

Computer structure, Computer generation, CPU operation ,Memory type,

Primary storage, Secondary storage, Computer classification, Language classification, Translators program, Operation system, networking, internet**.**

References:

1. *Computer System Architecture, M. Morris Mano, Third Edition, 1993.*
2. *Digital Fundamental, Floyd, Eight Editions, 2003.*
3. *Principle Of Computer Architecture, Murdocca. M. J., Heuring .V.P., Prentice-Hall, Inc.*
4. *Computer Communications and Information, Hutchinson .S.E., Sawyer .S.C., with Contribution by Coulthard G.J.*

5- ***Information theory and coding***

The measure of information, self information, average information entropy, maximum entropy of a discrete source, binary source, ternary source, matual information, normal noisy channel, noiseless channel, total channel, channel capacity, channel efficiency, channel redundancy, source efficiency, symmetric channel, capacity of symmetric channel, binary symmetric channel capacity, cascade channel, coding, source coding, average length of coding, compact code, code efficiency and redundancy , source coding technique, fixed length coding, variable length coding, source coding for special source, Shannon-fano method, Huffman method, extension of code.

References:

1- Coding and Information Theory, Richard W. Hamming.

6- Fundamentals of Digital media:

1. Introduction to multimedia
2. Digital text fundamentals
3. Multimedia authoring and tools
4. Graphics and image representation
5. Color in image and video
6. Fundamental concepts in video
7. Basics of digital audio
8. Computer and multimedia
9. Virtual reality

References:

1- Fundamentals of Multimedia by Ze-Nian Li and Mark S. Drew

7- English language:

Toofl lectures for first stage students in the department of computer sciences, UOT.

Part One: Structure and written expression

1. Nouns, Pronoun, part of sentence, verbs, prepositions, articles, noun class, adjectives class, adverb classes, prepositional phrases

Part Two: Reading

1. Reading of detail, reading of reference and vocabulary, reading of main idea, reading of inference

Part Three: Listening

1. Short conversation, longer conversions, talks and lectures.

Part Four: writing

1. Strategies, topics.