



The Syllabus of Computer Sciences Department 2011-2012

المناهج الدراسية لقسم علوم الحاسوب

University of technology
Computer Sciences Department
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Software branch فرع البرمجيات

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University of Technology

Computer Sciences Department



Software Branch

2011 - 2012

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	الهيكل المتقطعة	4
2	1	-	2	Computer Organization & Information Technology	تركيب الحاسبة 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

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 الاحتمالية	7
Pass	-	-	2	Human Rights & Democracy	حقوق الانسان والديمقراطية	8
20	7	12	16	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

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 الحاسبة	1
3	-	2	2	Compilers	المتجمات	2
3	1	2	2	Advanced Databases	قواعد البيانات متقدمة	3
2	1	-	2	Computer Architecture	معمارية الحاسبة	4
3	1	2	2	Artificial Intelligent	الذكاء الاصطناعي	5
3	1	2	2	Software Engineering	هندسة البرمجيات (اختياري)	6
3	1	2	2	Computer Network	شبكات الحاسبة	7
2	1	-	2	Operation Research	بحوث عمليات	8
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

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	Communication and Computer Networks	الاتصالات وشبكات الحاسبة	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 (اختياري)	6
3	1	2	2	Image Processing	معالجة الصور (اختياري)	7
3	-	4	1	Project	المشروع	8
23	7	12	15	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

Elective Subjects for Third Year

المواضيع الاختيارية للمرحلة الثالثة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Software Engineering	هندسة البرمجيات	1
3	-	-	3	Advance IT	تكنولوجيا المعلومات المتقدم	2
3	-	2	2	Mathematics Applied in Computer	تطبيقات رياضية في الحواسيب	3

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	1	2	2	3D Graphics and Vision	الرسوم ثلاثية الابعاد والرؤية	1
3	1	2	2	Web programming	برمجة المواقع	2
3	1	2	2	Image Processing	معالجة الصور	3
2	1	-	2	Modeling and Simulation	النمذجة والمحاكاة	4
2	1	-	2	Data Compression	ضغط البيانات	5



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 المهيكلية	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 الحاسبة 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 konnissberg, 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

- ▶ General Concepts, Hardware ,Software ,Information Technology, Introduction to information technology, Introduction to computer architecture, Computer definition & history of computer. Importance and advantages of computers. Applications with computer systems. 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, 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).
- ▶ Managing organizational data and information(introduction)
- ▶ Translation programs Compiler. Interpreters. Assemblers. Linkers. Debugging.
 - ▶ 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.
- ▶ Security.

Reference

- 1- "Introduction to information technology", Turban&Rainer&Potter, 2001.
- 2- bcdl Module1 Reference Manual Concepts of information Technology IT,by Dr. M.Al. Kolaly,2005.
- 3- Fluency with Information Technology, Lawrence Snyder,2011.
- 4- “Fundamental of Computer Organization and Architecture”, John Wiley & Sons, Inc, 2005.

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

8- English Language



Second Year Syllabus

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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 الاحتمالية	7
pass	-	-	2	Human Rights & Democracy	حقوق الانسان و الديمقراطية	8
20	7	12	16	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++

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 Wesley, 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, Orthogonality, 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 - حقوق الانسان و الديمقراطية اولا/ الحقوق

المبحث الاول/ مفهوم حقوق الانسان المبحث الثاني/نشأت وتطور حقوق الانسان
ثانيا/الديمقراطية

الفصل الاول: مفهوم الديمقراطية

الفصل الثاني: انواع الديمقراطية

الفصل الثالث: الية النظام النيابي

المصادر:

- 1 - حقوق الانسان والطفل والديمقراطية ، د ماهر صالح الجبوري وآخرون
- 2 - محاضرات في الديمقراطية ،د فيصل شطناوي
- 3- التخل الدولي الانساني بين ميثاق الامم المتحدة والتطبيق العملي ، انس اكرم العزاوي



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 الحاسبة	1
3	-	2	2	Compilers	الترجمات	2
3	1	2	2	Advanced Databases	قواعد البيانات متقدمة	3
2	1	-	2	Computer Architecture	معمارية الحاسبة	4
3	1	2	2	Artificial Intelligent	الذكاء الاصطناعي	5
3	1	2	2	Software Engineering	هندسة البرمجيات (اختياري)	6
3	1	2	2	Computer Network	شبكات الحاسبة	7
2	1	-	2	Operation Research	بحوث عمليات	8
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, Van Dam, "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, Jeffrey 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- Software Engineering (Optional):

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 winwin 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:

4. Software Engineering by Roger Press Man 2001
5. Introduction to Software Engineering by Shari Lawrence &Joan M. Atlee, 2006
6. Software Engineering, by

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- 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.

Elective Subjects for Third Year

المواضيع الاختيارية للمرحلة الثالثة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Software Engineering	هندسة البرمجيات	1
3	-	-	3	Advance IT	تكنولوجيا المعلومات المتقدم	2
3	-	2	2	Mathematics Applied in Computer	تطبيقات رياضية في الحواسيب	3



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	Computer and Data Security	امنية الحاسبات والبيانات	1
3	1	2	2	Advance Windows Programming	برمجة نوافذ متقدمة	2
3	1	2	2	Communication and Computer Networks	الاتصالات وشبكات الحاسبة	3
3	1	2	2	Operating System	نظم التشغيل	4
3	1	2	2	Intelligence Applications	تطبيقات ذكية	5
3	1	-	2	Web programming	برمجة المواقع (اختياري)	6
3	1	2	2	Image Processing	معالجة الصور (اختياري)	7
3	-	4	1	Project	المشروع	8
23	7	12	15	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 and Data Security:

Introduction of Data security, Basic terminology of Data security, Mathematical Background, Basic definition of arithmetic modular with examples, How Compute the Greater common divisor (GCD) using different methods, Explain the methods to compute the Inv, Explain the methods to find Euler notation and compute inv using Euler notation, Introduction of types of cipher systems, Types traditional of ciphers systems, Introduction of transposition cipher systems, Implementation of simple transposition method with examples for encipher and decipher methods, Columnar method and fixed period method, Implementation of simple substitution methods with examples for encipher and decipher methods, Types of substitution cipher systems types, Monoalphabetic substitution cipher systems (keyword method), Homophonic substitution cipher systems (Beal cipher, Higher order homophonic), polyalphabetic substitution cipher systems (Vigenere cipher, Beaufort cipher, Running key cipher), polygram substitution cipher systems (playfair cipher, hill cipher, product cipher), Introduction to public key systems (secrecy and authenticity), Knapsack ciphers), Merkle-Hellman knapsacks, simple knapsack algorithm), Trapdoor knapsack algorithm, With example for encipher and decipher process, RSA algorithm (encryption and decryption processes), Public-key digital signature algorithms (RSA), Introduction of DES algorithm, X-box process in DES algorithm with example, Encryption process in DES algorithm with example, Decryption process in DES algorithm with example, Introduction of Stream ciphers, One time Pad system (Vernam system), The requirements of stream cipher, The Basic Five Randomness tests (i.e. frequency test, serial test, Poker test, run test, auto correlation test).

References:

Cryptography and network security, by William Stallings, 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", Herbert Schildt, Osborne McGraw-Hill, 2004.
2. "Windows 98 Programming from the ground up" Herbert Schildt, Osborne McGraw-Hill. 2001.
3. "Principle of Windows programming in Borland C++", Schildt, Osborne McGraw-Hill. 2001.
4. .

3- Communication 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.

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, 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

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

5- Advance 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, Fundamentals 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, servervariables, 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, deletetefile, deletetefolder, 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- Image Processing (Optional):

Introduction to Image Processing, Comparison between Computer Image and Computer Vision, Major topics for Computer Vision, Major topic for image processing, Image restoration, Image Enhancement, Image Compression, Image Representation, Digitization, Type of digital image, Binary Image, Gray Image, Color Image, HSL, Digital Image File Format, Spatial Domain, Frequency Domain, Region of interest image geometry (Crop, enlarge, shrinking, translate, rotate), Zoom algorithm, Zero order hold, First order hold, Convolution, Image Analysis: Image analysis steps, Preprocessing, Data reduction, Feature Analysis, Image algebra operation, Arithmetic operation, Logical operation, Spatial Filters, Mean Filters, Median Filters, Enhancement filters, Laplacian Filter, Difference Filter, Image Equalization, Gray level reduction, Spatial reduction, Edge line detection technique, Robert operator (Sobel operator, Prewitt operator, Krissch compass, Robinson compass mask, Laplacian operator, Frei chen mask), Segmentation, Region growing, Clustering methods, Boundaries detects, Combined approach, Histogram (Histogram features, Histogram Equalization, Histogram advantage, Image enhancement: Introduction, Gray scale modification, Histogram modification, Adaptive contrast enhancement, Color, Image sharpening (High pass filter, High frequency emphasis, Homomorphic filter), Image smoothing (Mean and median filters, Low pass filter, Image Restoration), Image Compression: Discrete transformation, Fourier transform (Walsh Hadamard transform, Wavelet transform).

References:

- 1- computer vision & image processing, Scotte E. ,1989
- 2- digital image processing
Rafal C. Gonzales.

8- 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	1	2	2	3D Graphics and Vision	الرسم ثلاثية الابعاد والرؤية	1
2	1	-	2	Internet Architecture	معمارية الانترنت	2
3	-	2	2	Image Processing	معالجة الصور	3
2	1	-	2	Modeling and Simulation	النمذجة والمحاكاة	4
2	1	-	2	Data Compression	ضغط البيانات	5



Branch Information system

فرع نظم المعلومات

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2011 - 2012

مناهج فرع نظم المعلومات

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	17	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	البرمجة الشيئية	1
3	1	2	2	Data Structures and Algorithms	هياكل البيانات والخوارزميات	2
2	1	-	2	Numeric Analysis	التحليل العددي	3
3	1	2	2	Databases	قواعد البيانات	4
3	1	2	2	Micro-Processors and Assembly Programming	المعالجات الميكروية و البرمجة بلغة التجميع	5
2	1	-	2	Advance Mathematics	الرياضيات المتقدمة	6
2	1	-	2	Computation Theory	النظرية الاحتمالية	7
Pass	-	-	2		حقوق الانسان	8
18	7	8	16	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

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	Computer Graphics	رسوم الحاسبة	1
3	-	2	2	Compilers	المتجمات	2
3	1	2	2	Distributed Databases	قواعد البيانات الموزعة	3
2	1	-	2	Computer Architecture	معمارية الحاسبة	4
3	1	2	2	Artificial Intelligent	الذكاء الاصطناعي	5
3	1	2	2	Software Engineering	هندسة البرمجيات (أختياري)	6
3	1	-	3	Advance IT	تكنولوجيا المعلومات المتقدم (أختياري)	7
2	1	-	2	Operation Research	بحوث عمليات	8
22	6	10	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
2	1	-	2	Management Information Systems	نظم ادارة المعلومات	1
3	1	2	2	Communication and Computer Networks	الاتصالات وشبكات الحاسبة	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	برمجة مواقع (اختياري)	6
3	1	2	2	Image Processing	معالجة الصور (اختياري)	7
3	-	4	1	Project	مشروع	8
22	7	14	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



Information System Branch

2011-2012

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 المهيكلية	1
3	1	-	3	Mathematics	الرياضيات	2
3	1	-	3	Discrete Structures	الهيكل المتقطعة	3
4	1	2	3	Computer Organization and Logic Design	تركيب الحاسبة والتصميم المنطقي	4
2	1	-	2	Principles of Information Technology	مبادئ تكنولوجيا المعلومات	5
3	1	2	2	Information Systems Analysis and Design	تحليل وتصميم نظم المعلومات	6
Pass	-	-	2	Democracy	حقوق الانسان والديمقراطية	7
Pass	-	2	-	Applications	التطبيقات الجاهزة (عملي)	8
19	6	8	18	Total		

Total No. of Unit for One Semester: (19)Units

مجموعة الوحدات للفصل الدراسي الواحد: (19) وحدة

Total No. of Unit for Year: (38) Units

مجموعة الوحدات لسنة دراسية: (38) وحدة

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

Introduction, Procedural Programming Principles, 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.

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 konnissberg, 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:

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

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. Murdocca .M .J ., Heuring .V .P ., "Principle Of Computer Architecture", Prentice-Hall, Inc .
2. Hutchinson .S .E ., Sawyer .S .C ., with Contribution by Coulthard .G .J ., " Computers, Communications , and Information", Revised Edition, Mc-Graw Hill Company (Irwin).

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, 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, Security.

References:

- 1-"Introduction to information technology", Turban&Rainer&Potter, 2001.
- 2- Fluency with Information Technology, Lawrence Snyder,2011.

6- 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:

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

7- حقوق الانسان والديمقراطية:

اولا/ الحقوق

المبحث الاول/ مفهوم حقوق الانسان المبحث الثاني/نشأت وتطور حقوق الانسان

ثانيا/الديمقراطية

الفصل الاول: مفهوم الديمقراطية

الفصل الثاني: انواع الديمقراطية

الفصل الثالث: الية النظام النيابي

المصادر

3 - حقوق الانسان والطفل والديمقراطية ، د ماهر صالح الجبوري واخرون

4 - محاضرات في الديمقراطية ، د فيصل شطناوي

3- التخل الدولي الانساني بين ميثاق الامم المتحدة والتطبيق العملي ، انس اكرم العزاوي

8- Applications:

Microsoft Windows, Microsoft Office (MS Word, MS PowerPoint, MS Excel).



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	Numeric Analysis	التحليل العددي	3
3	1	2	2	Databases	قواعد البيانات	4
3	1	2	2	Micro-Processors and Assembly Programming	المعالجات الميكروية و البرمجة بلغة التجميع	5
2	1	-	2	Advance Mathematics	الرياضيات المتقدمة	6
2	1	-	2	Computation Theory	النظرية الاحتمالية	7
Pass	-	-	2		حقوق الانسان	8
18	7	8	16	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

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

An Introduction: (The Evolution of OOP, Encapsulation and Data Hiding, Inheritance and Reuse, Polymorphism, Short History, C++ Program Development Process (PDP)), Classes: (Introduction, Declaration of classes, Class Constructors and Destructors, Overloading Constructors, Class Templates, Case Study1(Guessing Password Game)), Inheritance: (Introduction, Declaration of Inheritance, An Example – Single Inheritance, Inheritance based on access-specifier (Inheritance with Public access-specifier, Inheritance with Private access-specifier), Parent Constructors and Destructors), Polymorphism: (Introduction, Pointer to Classes, Static and Dynamic Binding, Types of Polymorphism (Polymorphism of Variables, Polymorphism of Functions, Polymorphism of Objects), Virtual Functions, Override Function, Constructor and Virtual Destructor, Abstract Base Class (ABC) and Pure Virtual Function), Operator Overloading: (Introduction, Operators that can't be overloaded, Operator Functions, Operator Overloading with the Member Operator Functions, Operator Overloading with the Non-member Operator Functions (Friend Function), The Flexibility of Friend Operator Functions, Overload the Output Operator), Selected Advance OOP Topics: (Custom Header Files, Selected Problems: Program's Self-Protection, Simple Virus and its Anti-Virus)).

References:

6. "Mastering C++", Prof. Oqeili Saleh and others, Dar Al-Shorok, Amman-Jordan, 2004.
7. "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- Numeric Analysis:

Binary Fraction and Shifting, Scientific Notation Machine Number and Computer Accuracy, Computer Floating Point Numbers, Error Analysis (Absolute band Relative Errors, Truncation, Round-Off and Chopping Errors), The Solution of non-Linear Equations $F(x)=0$, The Solution of Linear Systems $Ax=B$, Interpolation and Polynomial Approximation, Numerical Differentiation, Numeric Integration, Solution of Differential Equations (Euler 'S Method, Runge-Kutta Methods), Eigen Values and Vector.

References:

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

4- Databases:

Introduction (DBMS), Data abstraction, 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 Buses, Brief Introduction to Machine Code, Instruction Sets (Form, Orthogonality, 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:

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

6- Advance Mathematics:

Formation of Partial Differential Equations, First Order Linear and non-Linear Equations, Boundary Value Problems, Formation of the Wave Equation, Equation for the One Dimensional and Two Dimensional Heats Flow, Laplace Transform: (Laplace transformation and inverse, Properties of Laplace transform),

Fourier series: (Periodic functions, Odd and even functions, Half range Fourier sine and cosine series), Fourier Transformation (Definition, Sine Cosine Transformation, Finite Fourier Sine and Cosine Transformation, Convolution, Inverses), Bessel's Equations: (Beta and Gamma function, Series Solutions of Bessel Equation).

References:

- 1- Thomas, G. Calculus and Analytic Geometry, 5th Edition, Addison Wesley, 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:

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

-8 حقوق الانسان:

مفهوم حقوق الانسان، مفهوم الديمقراطية، خصائص وفئات حقوق الانسان، خصائص الديمقراطية، موقف الحضارات القديمة من حقوق الانسان/حضارة وادي الرافدين، وسائل تطبيق الديمقراطية ، الحضارة الرومانية ، الحضارة الاغريقية ، صور الديمقراطية/الديمقراطية المباشرة، موقف الشرائع السماوية من حقوق الانسان، الديمقراطية النيابية، الديانة المسيحية والديانة الاسلامية، المصادر القانونية لحقوق الانسان في بريطانيا، المدرسة الطبيعية ونظمية العقد الاجتماعي، الديمقراطية شبه المباشرة، اعلان حقوق الانسان والمواطن الفرنسي ، الحكومة وانواعها، منظمة الامم المتحدة وحقوق الانسان ، تقسيم الحكومة من حيث مصدر السلطة واحترام القانون ، الاعلان العالمي لحقوق الانسان، تقسيم الحكومة من حيث توزيع السلطة ومن حيث الشخص الاعلى في الحكم ، المواثيق والاتفاقيات/الاتفاقية الاوربية والاتفاقية الامريكية، النظام البرلماني واركانه، الميثاق الافريقي لحقوق، الانسان ومشروع الميثاق العربي، النظام البرلماني في بريطانيا، المنظمات غير الحكومية، المؤسسات الدستورية في بريطانيا.

المصادر:

1. محاضرات في الديمقراطية د. فيصل شطناوي.
2. محاضرات في الحرية والديمقراطية د. ولاء مهدي الجبوري.

University of Technology

Computer Sciences Department



Information Systems Branch

2011-2012

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	Computer Graphics	رسوم الحاسبة	1
3	-	2	2	Compilers	الترجمات	2
3	1	2	2	Distributed Databases	قواعد البيانات الموزعة	3
2	1	-	2	Computer Architecture	معمارية الحاسبة	4
3	1	2	2	Artificial Intelligent	الذكاء الاصطناعي	5
3	1	2	2	Software Engineering	هندسة البرمجيات (اختياري)	6
3	1	-	3	Advance IT	تكنولوجيا المعلومات المتقدم (اختياري)	7
2	1	-	2	Operation Research	بحوث عمليات	8
22	6	10	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 (e.g. Raster, Vector). Elementary Graphics Figures: Line and Circle Drawing Algorithms. Sorting Pictures and 2D Transformations: Writing and Reading Graphics Data Files, Pictures Translation, Pictures Rotation, Pictures Scaling. Clipping and Windowing: Point and Line Clipping, Clipping Algorithms, Polygon Clipping. Curves: Polynomial Curves, Spline Curves. Elementary 3D Graphics: Introduction, Coordinates System, Transformations, Orthogonal Projection, Multiple Views, Hidden Lines and Surfaces, Shading and Coloring. Animation Techniques.

References:

1. J. D. Foley, Van Dam, "Introduction to Computer Graphics", 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:

3. Principles of Compiler Design ,Alfred V. Aho, Jeffrey 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, Database system concepts Henry K. Korth 1991, Database system using Oracle. 2E shah, Distributed system concepts couloirs 2005.

References:

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

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:

- 3- M.M Mano "Computer System Architecture " third Edition, Prentice Hall, 1993.
- 4- 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).

References:

5. Elian Rich, Artificial Intelligence, Prentice Hall 1991.

6- Software Engineering (Optional):

Introduction to Software Engineering, Computer System Engineering, Types of S/W E, Role of S/W E in system design, S/W system, General phases of S/W E, S/W E Tools, Characteristic of S/w E, S/W Process, S/W Process Models, Classical Model, Prototype Model, Spiral Model, Incremental Model, Iterative Model, RAD Model, Half-year Break, Requirement analysis and principles, Requirement analysis and Definition, Function Oriented Approach, Data Oriented Approach, System Modeling, Object Oriented Approach, Normalization, Jackson Method, Finite State Machine, Requirement Document, CORE Approach, Data Flow Diagram, Testing Technology, Stare Transmission diagram, Decision Tree, Decision Table.

References:

7. Software Engineering by Roger Press Man
8. Introduction to Software Engineering by Sommer Ville

7- Advance Information Technology (Optional).

8- Operation Research:

Operating Research and the Art of Problem solving 0, Linear Programming, Formulation and Graphical Solution, Algebraic Solution, Duality and Sensitivity Analyses. Transportation Model .Networking Analyses .Decision Theory and Games, Inventory Model, Queuing Theory, Simulation.

References:

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

Elective Subjects for Third Year

المواضيع الاختيارية للمرحلة الثالثة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Software Engineering	هندسة البرمجيات	1
2	1	-	2	Moulding and Simulation	النمذجة والمحاكاة	2
3	1	2	2	Distributed Databases	قواعد البيانات الموزعة	3
2	1	-	2	Decision Making Systems	نظم اتخاذ القرار	4



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	Management Information Systems	نظم ادارة المعلومات	1
3	1	2	2	Communication and Computer Networks	الاتصالات وشبكات الحاسبة	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	برمجة مواقع (اختياري)	6
3	1	2	2	Image Processing	معالجة الصور (اختياري)	7
3	-	4	1	Project	مشروع	8
22	7	14	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- 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.

2- Communication 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:

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

3- 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 + Kohonen)), 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

4- 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, Pohlig 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 Stallings , 2003

5- Operating System:

Introduction to Operating Systems, User view and system view of OS, OS for mainframe, Desktop computer systems, OS for multiprocessor and distributed systems, OS for clustered, real-time and handheld computer systems, Introduction to computer system structure, Hardware Protection, Operating system structure, System components1, System components2, Operating system services, System calls and System Programs, System Design, System implementation, Half-year Break, Introduction to Processes, Process Concepts, Process Control Block, Process Scheduling, Operation on Processes, Cooperating Processes, Intercrosses Communication, Introduction to CPU Scheduling, CPU Scheduling concepts, Scheduling Criteria, Scheduling Algorithms, First Come First Served and Shortest

Job First, Priority Scheduling algorithm and Round Robin Algorithm, Introduction to Deadlocks and handling.

References:

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

6- Internet Architecture (Optional):

Internet organization, internet engineering task force (IETF), internet architecture board(IAB), internet assigned numbers authority (IANA), internet corporation for assign names and numbers (ICANN), internet engineering steering group (IESG), internet society(ISOC),world wide web consortium (W3C),Application layer, presentation layer, session layer, transport layer, Network layer, Data-Link layer, physical layer, The DOD Model, Application/process layer protocols, Hypertext transfer protocol(HTTP), File transfer protocol(FTP), Trivial file transfer protocol(TFTP), network file system(NFS), Domain name system (DNS),Host-to-Host Layer or transport Layer Protocol(TCP,UDP,DCCP, SCTP, RTP, RSVP, IGMP), Network or internet layer protocols(IP,OSPF,IS-IS,BGP,IPSec,ARP,RARP,RIP,ICMP,ICMPv6),Data link layer protocols(802.11(WLAN),802.16,Wi-Fi,WiMAX,ATM,DTM,Token ring, Ethernet, FDDI, Frame Relay, PPP,PPTP, L2TP, ISDN), Ethernet Physical layer, Modems, Coaxial cable, twisted Pair, Internet, Extranet, World Wide Web, Internet Explorer Browser, Opera Browser, Firer fox Browser, Internet Spider, Internet Search Engine, Yahoo Search Engine, Google Search Engine Alta Vista Search Engine, End-User Tools.

7- Image Processing (Optional):

Introduction to Image Processing, Compression between Computer Image and Computer Vision, Major topics for Computer Vision, Major topic for image processing, Image restoration, Image Enhancement, Image Compression, Image Representation, Digitization, Type of digital image, Binary Image, Gray Image, Color Image, HSL, Digital Image File Format, Spatial Domain, Frequency Domain, Region of interest image geometry (Crop, enlarge , shrinking , translate , rotate), Zoom algorithm, Zero order hold, First order hold, Convolution, Image Analysis: Image analysis steps, Preprocessing, Data reduction, Feature Analysis, Image algebra operation, Arithmetic operation, Logical operation, Spatial Filters, Mean Filters, Median Filters, Enhancement filters, Laplacian Filter, Difference Filter, Image Equalization, Gray level reduction, Spatial reduction, Edge line detection technique, Robert operator (Sobel operator, Prewitt operator, Krisch compass, Robinson compass mask, Laplacian operator, Frei chen mask), Segmentation, Region growing, Clustering methods, Boundaries detects, Combined approach, Histogram (Histogram features, Histogram Equalization, Histogram advantage, Image enhancement: Introduction, Gray scale modification, Histogram modification, Adaptive contrast enhancement, Color, Image sharpening (High pass filter, High frequency emphasis, Homomorphism filter), Image smoothing (Mean and median filters, Low pass filter, Image Restoration), Image Compression: Discrete transformation, Fourier transform (Walsh Hadamard transform, Wavelet transform).

8- 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	1	2	2	Neural Network	الشبكات العصبية	1
2	1	-	2	Management Information System	نظم المعلومات الادارية	2
2	1	-	2	Internet Architecture	معمارية الانترنت	3
3	-	2	2	Image Processing	معالجة الصور	4
2	1	-	2	Distributed Systems	الانظمة الموزعة	5



Artificial Intelligent Branch فرع الذكاء الاصطناعي

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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 الهيكلية	1
2	1	-	2	Mathematics	الرياضيات	2
2	1	-	2	Discrete Structures	الهيكل المتقطعة	3
3	1	2	2	Computer Organization and Logic Design	تركيب الحاسبة 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

مجموعة الوحدات للفصل الدراسي الواحد: (16) وحدة

Total No. of Unit for Year: (32) Units

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	Advance Mathematics and numerical analysis	الرياضيات المتقدمة والتحليل العددي	6
2	1	-	2	Computation Theory	النظرية الاحتمالية	7
Pass	-	-	2	Human Rights and Democracy	حقوق الإنسان والديمقراطية	8
19	7	10	16	Total		

Total No. of Unit for One Semester: **(19)**Units

مجموعة الوحدات للفصل الدراسي الواحد: (19) وحدة

Total No. of Unit for Year: **(38)** Units

مجموعة الوحدات لسنة دراسية: (38) وحدة

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	Compilers	المتجمات	2
3	1	2	2	Data warehouse	مخازن البيانات	3
2	1	-	2	Computer Architecture	معمارية الحاسبة	4
3	1	2	2	Natural Language Processing	معالجة اللغات الطبيعية	5
3	1	2	2	Expert Systems	النظم الخبيرة	6
3	1	2	2	Machine learning	تعليم الماكنة	7
2	1	-	2	Operation Research	بحوث عمليات	8
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

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	Advanced Artificial Intelligence	ذكاء اصطناعي متقدم	1
3	1	2	2	Communication and Computer Networks	الاتصالات وشبكات الحاسبة	2
2	1	-	2	Computer and Data Security	امنية الحاسبات والبيانات (أختياري)	3
3	1	2	2	Operating Systems	نظم التشغيل	4
2	1	-	2	Fuzzy Logic	المنطق المضبب	5
3	1	2	2	Web programming	برمجة مواقع الانترنت (أختياري)	6
3	1	2	2	Image Processing	معالجة الصور	7
3	-	4	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

University of Technology

Computer Sciences Department



Artificial Intelligence Branch

2012-2011

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 المهيكلية	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 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

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:

1. 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:

1. 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 konnissberg, 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:

8. Discrete mathematics by Seymour Lipschutz
9. 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:

3. Computer System Architecture, M. Morris Mano, Third Edition, 1993.
4. Digital Fundamental, Floyd, Eight Edition, 2003.
5. Principle Of Computer Architecture, Murdocca. M. J., Heuring .V.P., Prentice-Hall, Inc.
6. 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. George F. Luger, "Artificial Intelligence Structures and Strategies for Complex Problem Solving, fifth edition, Addison Wesley, 2005.
2. Elin Rich and Kevin knight, "Artificial Intelligence", second edition, McGrew Hill, 1991.

3. Matt Carter , "Mind and Computers" "An Introduction to the Philosophy of Artificial Intelligence " , Edinbwhg University press , 2007.
4. Max Bramer, " Logic Programming with prolog " , Springer ,2005.
 5. زينب الزرقاء وايمى عودة ، الذكاء الصناعي 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 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

University of Technology

Computer Sciences Department



Artificial Intelligence Branch

2012-2011

مناهج فرع الذكاء الاصطناعي

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 الاصطناعي	4
3	1	2	2	Micro-Processors and Assembly Programming	المعالجات الميكروية و البرمجة بلغة التجميع	5
3	1	2	2	Advance Mathematics and Numerical Analysis	الرياضيات المتقدمة والتحليل العددي	6
2	1	-	2	Computation Theory	النظرية الاحتمالية	7
Pass	-	-	2	Human Rights and Democracy	حقوق الإنسان والديمقراطية	8
19	7	10	16	Total		

Total No. of Unit for One Semester: **(19)**Units

مجموعة الوحدات للفصل الدراسي الواحد: (19) وحدة

Total No. of Unit for Year: **(38)** Units

مجموعة الوحدات لسنة دراسية: (38) 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- Fuzzy Logic

Fuzzy sets, the operations of fuzzy sets, fuzzy relations and 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 ,Guanrony 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 and Kevin Knight, "Artificial Intelligence", second edition, McGraw Hill, 1991.
2. Luger E.George,"Artificial Intelligence Structure and Strategies for complex Problem Solving", fifth edition, Addison Wesley, 2005.
3. Stuart J. Russell and Peter Norvig , "Artificial Intelligent, A Modern Approach", second edition, Prentice Hall, 2003.
4. Amit Konar, "Artificial Intelligence and Soft Computing, Behavior and Cognitive Modeling of the Human Brain", CRC Press ,1999.
5. Dimitris Varkas and Ioannis Pl. Vlashavos, "Artificial Intelligence for Advanced Problem Solving Techniques", 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, Orthogonality, 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:

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

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 t^n , 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-linear 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 Wesley, 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 Chomsky's, 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:

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

8. Democracy and Human Rights.

مفهوم حقوق الانسان، مفهوم الديمقراطية، خصائص وفئات حقوق الانسان، خصائص الديمقراطية، موقف الحضارات القديمة من حقوق الانسان/حضارة وادي الرافدين، وسائل تطبيق الديمقراطية ، الحضارة الرومانية ، الحضارة الاغريقية ، صور الديمقراطية/الديمقراطية المباشرة، موقف الشرائع السماوية من حقوق الانسان، الديمقراطية النيابية، الديانة المسيحية والديانة الاسلامية، المصادر القانونية لحقوق الانسان في بريطانيا، المدرسة الطبيعية ونظية العقد الاجتماعي، الديمقراطية شبه المباشرة، اعلان حقوق الانسان والمواطن الفرنسي ، الحكومة وانواعها، منظمة الامم المتحدة وحقوق الانسان ، تقسيم الحكومة من حيث مصدر السلطة واحترام القانون ، الاعلان العالمي لحقوق الانسان، تقسيم الحكومة من حيث توزيع السلطة ومن حيث الشخص الاعلى في الحكم ، المواثيق والاتفاقيات/الاتفاقية الاوربية والاتفاقية الامريكية، النظام البرلماني واركانه، الميثاق الافريقي لحقوق، الانسان ومشروع الميثاق العربي، النظام البرلماني في بريطانيا، المنظمات غير الحكومية، المؤسسات الدستورية في بريطانيا.

المصادر:

3. محاضرات في الديمقراطية د.فيصل شطناوي.
4. محاضرات في الحرية والديمقراطية د.ولاء مهدي الجبوري.

University of Technology

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Artificial Intelligence Branch

2012 - 2011

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	المتجمات	2
3	1	2	2	Data Warehouse	مخازن البيانات	3
2	1	-	2	Computer Architecture	معمارية الحاسبة	4
3	1	2	2	Natural Language Processing	معالجة اللغات الطبيعية	5
3	1	2	2	Expert Systems	النظم الخبيرة	6
3	1	2	2	Machine Learning	تعليم الماكنة	7
2	1	-	2	Operation Research	بحوث عمليات	8
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 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 effector (e.g.,hand) will be if all joint variables are known , E.g.,(x,y,z) coordinate of end effector, Inverse kinematics,Calculate joint variables if we want the end effect or to be located at particular place ,e.g,(x,y,z) coordinate.

References:

4. computer graphics mathematics, first steps , P. A. Egerton and W.S. Hall, 1998.
5. 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:

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

3- Data Warehouse:

Introduction (What is data warehouse , 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, Microprogram 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), Model Based Expert Systems (Design, Architecture and characteristics), Classification Systems(Backward Chaining , Forward Chaining, Prediction System (Weather Forecasting System), Case Based Expert System (Design and Architecture), Heuristic Rule (principles and Used), (Embedded Systems based on heuristic rule, Student Advisor system,- Traffic light system).

References:

5. Daniel H. Marcellus, "Expert Systems Programming in Turbo Prolog", Prentice Hall (New Jersey) 1992.
6. George F. Luger, "Artificial Intelligence (Structures and Strategies for Complex Problem Solving)", fifth edition, Addison Wesley, 2005.
7. Daniel Borrajo, "Current Topics in Artificial Intelligence", Springer, 2007.
8. 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 bias), 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, Quadratic 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. Elia Rich, "Artificial Intelligence", 1989.
8. William A. Stubblefield & Luger E. George, "Artificial Intelligence and the Design of Expert Systems", 1998.

8- 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:

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

University of Technology

Computer Sciences Department



Artificial Intelligence Branch

2012-2011

مناهج فرع الذكاء الاصطناعي

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	Advanced Artificial Intelligence	ذكاء اصطناعي متقدم	1
3	1	2	2	Communication and Computer Networks	الاتصالات وشبكات الحاسبة	2
2	1	-	2	Computer and Data Security	امنية الحاسبات والبيانات	3
3	1	2	2	Operating Systems	نظم التشغيل	4
2	1	-	2	Fuzzy Logic	المنطق المضبب	5
3	1	2	2	Web Programming	برمجة مواقع الانترنت	6
3	1	2	2	Image Processing	معالجة الصور	7
3	-	4	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

1- Advanced Artificial Intelligence:

Planning: (P-A-D Algorithm, Non-linear Constraint Planning, Means Ends Algorithm), Symbolic Learning: (Framework, Candidates Elimination Algorithms, ID3 Algorithm), Reinforcement Learning, Non- Monotonic Logic, Tabu Search, Simulated Annealing, Introduction to Data Mining: (Association Rules Extraction, A priori Algorithm), Introduction to Swarm intelligent.

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), Pearson Education Asia (Singapore), 2002.
3. Laurene Fausett, Fundamentals of neural Networks: Architecture, Algorithms, and Applications, 1994.
4. David E. Goldberg, Genetic Algorithms in Search optimization, and Machine Learning, 1993.

2- Communication 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- Fuzzy Logic:

Introduction: why we need fuzzy theory , advantages and applications, Fuzzy set: definition , comparison between the crisp set and fuzzy set, examples, Operations on fuzzy sets and comparison to the crisp operations with examples, Fuzzy logic and compatriot to logic rule with examples, Fuzzy number with example, Definition of fuzzification, fuzzification functions, and examples, Definition of de-fuzzification, de-fuzzification functions, examples, Rules, rule structures, rule firing, confides and rules Inference engine, Knowledge base, database, Big picture of fuzzy logic system structure, Preprocessing and post-processing, Review of fuzzy logic system, Data, conclusions to be reached, purpose, Mapping out the reasoning process, Turbine controller, fuzzy stream, Fuzzy logic controller, Comparison between fuzzy

system and fuzzy controller, Working one-line real time constraint, On-line real time data input and output and processing algorithms, Memory storage requirement and response time, Introduction to fuzzy hybrid systems, Feature detection , c-mean, Fuzzy c-mean with example, Introduction to NN, Fuzzy NN with example, Introduction to wavelet transform, wavenet, Fuzzy wavenet with example, Review of the hybrid systems, Application of hybrid systems.

References:

1. Fuzzy system hand book, Byearl Cox, 1999.
2. Fuzzy controllers by; Leonid Reznik, 1997.

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:

“Operating System Concepts” by Silberschatz, Galvin and Gagne, 2003.

5- 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, Pohlig 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 Stallings , 2003

6- Image Processing:

Introduction to Image Processing, Comparison between Computer Image and Computer Vision, Major topics for Computer Vision, Major topic for image processing, Image restoration, Image Enhancement, Image Compression, Image Representation, Digitization, Type of digital image, Binary Image, Gray Image, Color Image, HSL, Digital Image File Format, Spatial Domain, Frequency Domain, Region of interest image geometry (Crop, enlarge, shrinking, translate, rotate), Zoom algorithm, Zero order hold, First order hold, Convolution, Image Analysis: Image analysis steps, Preprocessing, Data reduction, Feature Analysis, Image algebra operation, Arithmetic operation, Logical operation, Spatial Filters, Mean Filters, Median Filters, Enhancement filters, Laplacian Filter, Difference Filter, Image Equalization, Gray level reduction, Spatial reduction, Edge line detection technique, Robert operator (Sobel operator, Prewitt operator, Krissch compass, Robinson compass mask, Laplacian operator, Frei chen mask), Segmentation, Region growing, Clustering methods, Boundaries detects, Combined approach, Histogram (Histogram features, Histogram Equalization, Histogram advantage, Image enhancement: Introduction, Gray scale modification, Histogram modification, Adaptive contrast enhancement, Color, Image sharpening (High pass filter, High frequency emphasis, Homomorphic filter), Image smoothing (Mean and median filters, Low pass filter, Image Restoration), Image Compression: Discrete transformation, Fourier transform (Walsh Hadamard transform, Wavelet transform).

7-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](http://www.w3.org/People/Berners-Lee/Weaving/Overview.html)

4. Web Site Engineering ... “Book”

http://www.geocities.com/website_engineering/chapter01.htm.

8- Project.



Computer Security Branch

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Computer Sciences Department



Computer Security Branch

2011-2012

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	مبادئ 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

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	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 الأرقام	6
2	1	-	2	Computation Theory	النظرية الاحتمالية	7
Pass	-	-	2	Human Rights and Democracy	حقوق الإنسان والديمقراطية	8
17	7	6	16	Total		

Total No. of Unit for One Semester: **(17)**Units

مجموعة الوحدات للفصل الدراسي الواحد: (17) وحدة

Total No. of Unit for Year: **(34)** Units

مجموعة الوحدات لسنة دراسية: (34) وحدة

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	المنترجمات	1
3	1	2	2	Databases	قواعد البيانات	2
2	1	-	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
2	1	-	2	Security Network	امنية شبكات	7
3	1	2	2	multimedia	تعدد الوسائط	8
21	7	12	16	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

Forth Year Syllabus

منهج المرحلة الرابعة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	-	2	2	Intelligence Systems	أنظمة ذكية	
2	-	-	2	Networks Security	أمنية الشبكات	
3	-	-	2	Cryptanalysis	تحليل شفرة	
3	-	2	2	Operating System	نظم التشغيل	
2	-	-	2	Advanced Cryptography	تشفير متقدم	
3	-	2	2	Web Programming	برمجة مواقع	
3	-	2	2	Image Processing	معالجة الصور	
3	-	4	1	Project	المشروع	
22	-	12	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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Computer Security Branch

2011-2012

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	.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	مبادئ 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):

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- 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- 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 & 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:

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

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(Booleen Algebra), Simplification by K-map, Combinational logic circuits Using (NAND, NOR Gates), Half-Adder, Full-Adder, 4-Bit Parallel Adder, 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:

7. Computer System Architecture, M. Morris Mano, Third Edition, 1993.
8. Digital Fundamental, Floyd, Eight Editions, 2003.
9. Principle Of Computer Architecture, Murdocca. M. J., Heuring .V.P., Prentice-Hall, Inc.
10. Computer Communications and Information, Hutchinson .S.E., Sawyer .S.C., with Contribution by Courtyard G.J. .

5- Principals of security:

Concepts of security, importance of security, balance the security with cost, data protection methods (cryptography, authentication, integration, validation), Attackers, hackers, crackers, intruders, systems protection (protect files& database),viruses (virus, bacteria, Trojan Horse, worm malicious code),Antivirus protection systems, network security(secure channel ,cryptography SSL & STL),firewalls, intrusion detection, Cryptography foundations(Terminology, steganography, substitution ciphers and transposition ciphers), simple XOR, one-time pads , introduction to cryptography protocols(communication using symmetric and public-key cryptography), Digital signatures, authentication.

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: (equality of sets, subset , binary operations on set, Venn diagram, finite set and countable sets) , cardinality, Cartesian product, Relations , inverse relation, functions:(type of function, inverse function, equality of function, composite function) , Permutation and combination, binomial theorem, Probability theory, Basic probability definition and rules, sample space, event, type of sample space, complement rule, addition theorem, multiplication theorem , Conditional probability, the general multiplication rule, Independent of events, random variable, the probability density function , cumulative probability , introduction to the theory of statistics: (measure of central tendency, measure of dispersion, probability distribution, binomial distribution, exponential distribution, normal distribution).

References:

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

7 English course:

University of Technology

Computer Sciences Department

Computer Security Branch

2011-2012



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
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 الاتسبابي	5
2	1	-	2	Number Theory	نظرية الأرقام	6
2	1	-	2	Computation Theory	النظرية الاحتمالية	7
Pass	-	-	2	Human Rights and Democracy	حقوق الإنسان والديمقراطية	8
17	7	6	16	Total		

Total No. of Unit for One Semester: **(17)**Units

مجموعة الوحدات للفصل الدراسي الواحد: (17) وحدة

Total No. of Unit for Year: **(34)** Units

مجموعة الوحدات لسنة دراسية: (34) وحدة

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

An Introduction: (The Evolution of OOP, Encapsulation and Data Hiding, Inheritance and Reuse, Polymorphism, Short History, C++ Program Development Process (PDP)), Classes: (Introduction, Declaration of classes, Class Constructors and Destructors, Overloading Constructors, Class Templates, Case Study1(Guessing Password Game)), Inheritance: (Introduction, Declaration of Inheritance, An Example – Single Inheritance, Inheritance based on access-specifier (Inheritance with Public access-specifier, Inheritance with Private access-specifier), Parent Constructors and Destructors), Polymorphism: (Introduction, Pointer to Classes, Static and Dynamic Binding, Types of Polymorphism (Polymorphism of Variables, Polymorphism of Functions, Polymorphism of Objects), Virtual Functions, Override Function, Constructor and Virtual Destructor, Abstract Base Class (ABC) and Pure Virtual Function), Operator Overloading: (Introduction, Operators that can't be overloaded, Operator Functions, Operator Overloading with the Member Operator Functions, Operator Overloading with the Non-member Operator Functions (Friend Function), The Flexibility of Friend Operator Functions, Overload the Output Operator), Selected Advance OOP Topics: (Custom Header Files, Selected Problems: Program's Self-Protection, Simple Virus and its Anti-Virus)).

References:

12. "Mastering C++", Prof. Oqeili Saleh and others, Dar Al-Shorok, Amman-Jordan, 2004.
13. "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: (C Queue Operations, Applications of CQueue), Linked List, Linked-Stack, Linked-Queue, Linked-C Queue, 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 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 t^n , 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-linear equation, numerical differentiation and numerical integration, numerical solution of ordinary differential equations, curve-fitting and approximations.

References:

- 3- Thomas, G. Calculus and Analytic Geometry, 5th Edition, Addison Wesley, 1999.
- 4- 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, mutual 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 , \mathbb{Z}_m and Complete Residue Systems , Addition and Multiplication in \mathbb{Z}_m , 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 Grammars, 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, Kleene theorem, Two way finite automata with output (mealy machine, moore machine), The equivalence of mealy and moore machine, Push down automata, Top down –bottom up derivation, Turing machine.

References:

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

8- حقوق الإنسان والديمقراطية :

مفهوم حقوق الإنسان، خصائص وفئات حقوق الإنسان، موقف الحضارات القديمة من حقوق الإنسان/حضارة وادي الرافدين، الحضارة المصرية، الحضارة اليونانية، صور، موقف الشرائع السماوية من حقوق الإنسان، الديانة المسيحية، اليهودية و الإسلامية، المصادر القانونية لحقوق الإنسان، مصادر دولية، مصادر وطنية، ضمانات حقوق الإنسان- على الصعيد الداخلي، على الصعيد الدولي، دور المنظمات الإقليمية في حماية حقوق الإنسان، العولمة وحقوق الإنسان.

المصادر:

1. حقوق الإنسان والنظ والديمقراطية, د. ماهر صالح الجبوري , د. رعد ناجي الجدة ، د. رياض عزيز هادي, 2009.

University of Technology

Computer Sciences Department

2011-2012



Computer Security Branch

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	المتجمات	1
3	1	2	2	Databases	قواعد البيانات	2
2	1	-	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
2	1	-	2	Security Network	امنية شبكات	7
3	1	2	2	multimedia	تعدد الوسائط	8
21	7	12	16	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- 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:

6. Principles of Compiler Design ,Alfred V. Aho, Jeffrey 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:

- 5- M.M Mano "Computer System Architecture " third Edition, Prentice Hall, 1993.
- 6- 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, 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).

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, Knapasck 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, message authentication,...).

References:

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

7- Security Network:

Introduction of network security(definition , computing systems, ISO-OSI reference model, IP addresses,.....), Threats in networks(reasons for network security problems, network security threats, security involving, Trojan Horse application), Net security controls(introduction, encryption, virtual private networks,..), port protection(automatic call-back, differential access rights, silent modem), authentication (user authentication, non-human authentication), traffic control (pad traffic, routing control), data integrity, network security solutions (Kerberos authentication system, firewalls, window firewalls), intrusion detection systems(introduction, types of IDSs, stealth mode, goals for intrusion detection systems,....), secure E-mail (security of E-mail , threats , requirements and confidentiality of E-mail)

References:

- 4- Security in computing ,3 edition -2003.
- 5- Cryptography and network security by William Stalling ,1999.

8-: multimedia

Elementary Graphics: (Drawing Algorithms, 2D Transformations: Pictures Translation, Pictures Rotation, Pictures Scaling. Clipping and Windowing: Clipping Algorithms, Polygon Clipping. Curves: Polynomial Curves, Spline Curves. Elementary 3D Graphics: Introduction, Coordinates System, Animation Techniques , Introduction to the nature of text, image, audio, video, 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.



Forth Year Syllabus

منهج المرحلة الرابعة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	-	2	2	Intelligence Systems	أنظمة ذكية	
2	-	-	2	Networks Security	أمنية الشبكات	
3	-	-	2	Cryptanalysis	تحليل شفرة	
3	-	2	2	Operating System	نظم التشغيل	
2	-	-	2	Advanced Cryptography	تشفير متقدم	
3	-	2	2	Web Programming	برمجة مواقع	
3	-	2	2	Image Processing	معالجة الصور	
3	-	4	1	Project	المشروع	
22	-	12	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

1- Intelligence Systems:

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:

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

2- Networks Security:

Introduction to network security, Network security definition, computing systems, IOS-OSI Reference Model, TCP/IP Model, IP Address, ports, networks are system, too, security attacks, active and passive attacks, methods of defense, threats in Networks, Reasons for network security problems, Network security threats, wiretapping, impersonation, message confidentiality violations, message integrity violations, hacking, code integrity violations, denial of service, protocol flaws, spoofing, web site defacement, distributed denial of service, threats to active or mobile code, complex attacks, security involving programs, information access problems, service problems, Trojan horse applications, the Trojan horse applications work, Trojan and the port numbers, examples of Trojan horse application, Network Security Control, encryption, encryption methods, link encryption method, end-to-end encryption method, comparison of encryption methods, virtual private network, PKI and certificates, SSH encryption, SSL encryption, IP sec, signed code, key distribution, secure key distribution protocol, key server, secure cryptographic facility, port protection, Authentication, Traffic control, Data integrity, Network security solutions, Kerberos Authentication System, Firewalls, intrusion detection Systems, Secure E-Mail, Multilevel Security on Networks, Advance Network Security Topics.

References:

- 1- Security in Computing, 3rd Edition, By Charles P. Pfleeger, Shari Lawrence Pfleeger. Prentice Hall-2003.
- 2- Cryptography and Network Security, By William Stallings. Prentice Hall-1999.
- 3- Several Papers Published on the Web.

3- Cryptanalysis:

Definition of Cryptanalysis and Cryptanalyst, Cryptanalyst position is some, simple cryptosystems, Requirements of Cryptosystems, Type of Attacks on Cryptosystems, Shannon's Theory: Entropy, Cryptanalysis of the Classical cryptography "Methods" Steps in Cryptanalysis and old tools, Cryptanalysis of the Classical cryptography "Methods" transition cipher, Cryptanalysis of the Classical cryptography "Substitution cipher", Cryptanalysis of the Classical cryptography "Affine Cipher", Cryptanalysis of the Classical cryptography "Vigenere Cipher" of the Classical cryptography "Beaufort Cipher" of the Classical cryptography Hill Cipher", Cryptanalysis of the Classical cryptography "Playfair Ciphers".

References:

- 1- Applied Cryptography, Bruce Schneier, 1996.
- 2- Cipher Systems: The protection of communication, H.Beker, F.Piper, 1998.
- 3- Cryptography & Data Security, D.E.R. Denning, Purdue University, 1983.
- 4- A new Dimension in computer Data Security, C.H. Meyer, S.M. Matyas.

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, 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

5- Advanced cryptography:

Block Cipher Principles, The Data Encryption Standard, Differential and Linear Cryptanalysis, Groups, Rings, and Fields, Modular Arithmetic, The Euclidean Algorithm, Finite Fields of the Form $GF(p)$, Polynomial Arithmetic, Finite Fields of the Form $GF(2^n)$, 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, Random Number Generation

Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms, Principles of Public-Key Cryptosystems, The RSA Algorithm, Proof of the RSA Algorithm, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Arithmetic.

References:

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

6- Image Processing:

Introduction to Image Processing, Compression between Computer Image and Computer Vision, Major topics for Computer Vision, Major topic for image processing, Image restoration, Image Enhancement, Image Compression, Image Representation, Digitization, Type of digital image, Binary Image, Gray Image, Color Image, HSL, Digital Image File Format, Spatial Domain, Frequency Domain, Region of interest image geometry (Crop, enlarge, shrinking, translate, rotate), Zoom algorithm, Zero order hold, First order hold, Convolution, Image Analysis: Image analysis steps, Preprocessing, Data reduction, Feature Analysis, Image algebra operation, Arithmetic operation, Logical operation, Spatial Filters, Mean Filters, Median Filters, Enhancement filters, Laplacian Filter, Difference Filter, Image Equalization, Gray level reduction, Spatial reduction, Edge line detection technique, Robert operator (Sobel operator, Prewitt operator, Krisch compass, Robinson compass mask, Laplacian operator, Frei chen mask), Segmentation, Region growing, Clustering methods, Boundaries detects, Combined approach, Histogram (Histogram features, Histogram Equalization, Histogram advantage, Image enhancement: Introduction, Gray scale modification, Histogram modification, Adaptive contrast enhancement, Color, Image sharpening (High pass filter, High

frequency emphasis, Homomorphic filter), Image smoothing (Mean and median filters, Low pass filter, Image Restoration), Image Compression: Discrete transformation, Fourier transform (Walsh Hadamard transform, Wavelet transform).

References:

- 1- Computer Vision and Image Processing, Scotte Eumbaugh,PH.D.
- 2- Digital Image Processing, Second edition
Rafael C.Gonzalez University of Tennessee.

Richard E. Woods UedData interactive.
- 3- Image processing Algorithms.

7-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

8- Project.



Network Management Branch

فرع إدارة الشبكات

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مناهج فرع إدارة الشبكات

First Year Syllabus

منهج المرحلة الاولى

No. of Units	Tutorial	No. of Lab hour	No. of Theory hour	Subject	أسم المادة	ت
4	-	2	3	Structure Programming	البرمجة المهيكلية	1
2	1	-	2	Mathematics	الرياضيات	2
2	-	-	2	Principles of Network & Application	مبادئ وتطبيقات الشبكات	3
2	-	-	2	Discrete Structures	الهياكل المتقطعة	4
2	-	-	2	Principles of Network Algorithms	مبادئ خوارزميات الشبكات	5
3	-	2	2	Computer Organization and Logic Design	تركيب الحاسبة والتصميم المنطقي	6
15	1	4	13	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	-	2	2	Object Oriented Programming	البرمجة الشيئية	1
3	-	2	2	Data Structure & Algorithms	هياكل البيانات والخوارزميات	2
3	-	2	2	Network Architecture	معمارية الشبكات	3
3	-	2	2	Database	قواعد البيانات	4
3	-	2	2	Internet Programming	برمجة الإنترنت	5
2	1	-	2	Advanced Mathematics & Numerical Analysis	الرياضيات المتقدمة والتحليل العددي	6
2	-	-	2	Coding & Information Theory	الترميز ونظرية المعلومات	7
Pass	-	-	2	Human Rights and Democracy	حقوق الانسان والديمقراطية	8
19	1	10	16	Total		

Total No. of Unit for One Semester: **(19)**Units

مجموعة الوحدات للفصل الدراسي الواحد: (19) وحدة

Total No. of Unit for Year: **(38)** Units

مجموعة الوحدات لسنة دراسية: (38) وحدة



Third Year Syllabus

منهج المرحلة الثالثة

No. of Units	Tutorial	No. of Lab hour	No. of Theory hour	Subject	أسم المادة	ت
3	-	2	2	Mobility Communication	الاتصالات المتنقلة	1
2	-	-	2	Computation Theory & Compiler	نظرية احتسابية والمترجمات	2
2	-	-	2	Principles of Security	مبادئ الأمانة	3
2	-	-	2	Computer Architecture	معمارية الحاسبة	4
3	-	-	2	Distributed Algorithms	الخوارزميات الموزعة	5
3	-	2	2	Network Programming	برمجة الشبكات	6
2	-	-	2	Advanced Communication	الاتصالات المتقدمة	7
2	1	-	2	Operation Research	* بحوث العمليات	8
19	1	4	16	Total		

Total No. of Unit for One Semester: **(19)**Units

مجموعة الوحدات للفصل الدراسي الواحد: (19) وحدة

Total No. of Unit for Year: **(38)** Units

مجموعة الوحدات لسنة دراسية: (38) وحدة



Forth Year Syllabus

منهج المرحلة الرابعة

No. of Units	Tutorial	No. of Lab hour	No. of Theory hour	Subject	أسم المادة	ت
3	-	2	2	Network Security	أمنية الشبكات	1
3	-	2	2	Distributed Operating Systems	أنظمة التشغيل الموزعة	2
3	-	2	2	Multimedia	* الوسائط المتعددة	3
3	-	2	2	* E-Society	* المجتمع الإلكتروني	4
3	-	2	2	Distributed Database	قواعد البيانات الموزعة	5
3	-	2	2	Internet Switching & Routing	تبدیل وتوجيه مسارات البيانات في الإنترنت	6
3	-	2	2	Network Management	أدارة الشبكات	7
3	-	4	1	Project	المشروع	8
24	-	18	15	Total		

Total No. of Unit for One Semester: **(24)**Units

مجموعة الوحدات للفصل الدراسي الواحد: (24) وحدة

Total No. of Unit for Year: **(48)** Units

مجموعة الوحدات لسنة دراسية: (48) 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	-	2	3	Structure Programming	البرمجة المهيكلية	1
2	1	-	2	Mathematics	الرياضيات	2
2	-	-	2	Principles of Network & Application	مبادئ وتطبيقات الشبكات	3
2	-	-	2	Discrete Structures	الهياكل المتقطعة	4
2	-	-	2	Principles of Network Algorithms	مبادئ خوارزميات الشبكات	5
3	-	2	2	Computer Organization and Logic Design	تركيب الحاسبة والتصميم المنطقي	6
15	1	4	13	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 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 konnissberg, 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:

14. Discrete mathematics by Seymour Lipschutz
15. 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:

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

5- Principles of Network & Application

6- Principles of Network Algorithms

7- English Language