



المناهج الدراسية لفرع البرامجيات



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
3	1	2	2	Computer Organization & Logic Design	تركيب الحاسوب والتصميم المنطقي	5
2	1	-	2	Introduction to statistics theory	المقدمة الى نظرية الاحصاء	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
1	-	-	1	Human Rights and Democracy	حقوق الانسان والديمقراطية	8
21	7	12	15	Total		

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

مجموعة الوحدات للفصل الدراسي الواحد: (21) وحدة

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

مجموعة الوحدات لسنة دراسية: (42) وحدة



Third Year Syllabus

منهاج المرحلة الثالثة

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

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

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

Forth Year Syllabus

منهاج المرحلة الرابعة

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

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

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



First Year Syllabus

منهاج المرحلة الاولى

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
4	1	2	3	Structured Programming	البرمجة المهيكلة	1
2	1	-	2	Mathematics	الرياضيات	2
2	1	-	2	Fundamental of Programming Technique	اساسيات تقنيات البرمجة	3
2	1	-	2	Discrete Structures	الهياكل المتقطعة	4
3	1	2	2	Computer Organization & Logic Design	تركيب الحاسوب والتصميم المنطقي	5
2	1	-	2	Introduction to statistics theory	المقدمة الى نظرية الاحصاء	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
- Getting Started with C++, Character set, Identifiers, Variables and Variables Declaration, Constants, Arithmetic Operations, Assignment Operators, Relational Operators, Logical Operators, Bitwise Operator.
- The compiler directives (define and include).
- Unary Minus, Increment and /decrement Operators.
- Selection Statements
 - The Single If Statement Structure, The If/else Statement Structure, Nested If and If/else Statements
 - The Switch Selection Statement and Conditional Statement.
 - Break and Continue Control Statements
- Iteration Statements
 - While Repetition Structure
 - Do/While Statement.
 - For Statement and Nested Loops
- Functions
 - introduction, defining a function, return statement, types of functions, actual and formal arguments, local and global variables, parameters passing, recursive functions.
- Arrays



- One dimensional array (declaration, initialization, Accessing)
- Two dimensional array (declaration, initialization, Accessing).
- String manipulation
- Structures
 - Type of Structure declaration
 - Array of Structures
 - structure within structure
 - functions and structures
- Pointers
 - pointers declaration
 - pointers and functions passing parameters
 - pointers and arrays
 - arrays of pointers
 - pointers to pointers

References:

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

2. Mathematics:

- Mathematical background
- Matrix
 - Types of matrix
 - Matrix addition, subtraction, and multiplication
 - Determinant, transpose, symmetric of matrix and rank of matrix
 - Inverse of matrix, absolute value, and polynomials
 - Grammar rule for solving system of equation.
- Functions
 - Function numbers, type of numbers, theorems'' of numbers
 - Definition of function domain and range of functions
 - Graphing of function
- Limits
 - Definition of limits
 - Theorems' of limits
 - Type of limits
 - One side and two sides limits
 - Limits as infinity
 - Sandwich theorem and continues functions



- Derivation
 - Mathematical definition of derivation, rule of derivation
 - Derivation of trigonometric, inverse trigonometric, logarithm, exponential hyperbolic, inverse of hyperbolic function.
 - Implicit derivation, chain rule, higher derivation
 - L'hospital rule
 - Application of derivation, velocity and acceleration
- Series
- Integration, indefinite integral, rules of integral, method of integration, multiple integral
- Definite integral, application of integral area under the curve
- Area between two curves

References:

1. Thomas, G. Calculus and Analytic Geometry, 5th Edition, Addison Wesley, 1999.

3. Discrete Structures

- Set theory
 - Sets and subsets
 - How to specify sets, Operations on sets
 - Algebra of sets and its proves
 - Power set, Classes of sets, Cardinality
 - Sets of numbers, Finite sets and counting principle
- Mathematical induction
- Relations
 - Computer representation of relations and Digraph
 - Manipulation of relations, Properties of relations
 - Composition of relations
- Functions
 - Type of function (one-to-one & invertible function)
 - Geometrical characterization of functions
 - Sequences of sets, Recursively defined functions
- Logic and propositions
 - Basic logical operation, Equivalency
 - Tautology and Contradiction
 - Conditional and biconditional statements
 - Argument with examples
- Graphs
 - Definition, Graphs and multigraphs, Sub graph
 - Degree of graph, Connectivity, Special graph



- Walk & length of walk, Trail, path, cycle
- The bridges of Konigsberg
- Traversable multigraphs, Labeled graphs
- Minimal path, Minimum spanning tree
- Matrices and graph
- Trees, rooted tree, ordered rooted tree
- polish notation, with examples
- Finite state machines
 - Finite automata
 - Optimistic approach to construct FSM
 - Deterministic Finite state automata

References:

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

4. Fundamental of Programming Technique

- Introduction
 - The concept of a program
 - High-level languages
 - Low-level languages
 - Pseudo code structures
 - Algorithm design
- Program Developing, Executing, Testing and Debugging
 - Separate Compilation, implementation and interface (header) files; libraries
 - The Language Translation Process , compilation vs linking
 - binding: compilation, link, execution
- The Software Development Environment
 - software development under Unix
 - basic shell skills
 - program development utilities: vi, g++, make, ar
- Data Representation
 - signed/unsigned
 - bases other than decimal
 - ASCII/Unicode
- The Runtime Model
 - scope, lifetime, linkage
 - external, stack, and heap based storage
 - activation records



- Testing and Debugging
 - unit and integration testing
 - automatic testing
 - diagnostic-based debugging
 - symbolic debuggers
- Intermediate and Advanced Programming Techniques
 - Pointers and Heap-based Programming (new/delete operators , pointer-based access)
 - Recursion (defining recursive functions, compared to iteration)
- File I/O (sequential access, random access)
- Exception Handling (throwing and catching exceptions, exception classes)
- Miscellaneous Programming Techniques
 - command line argument processing
 - dynamically resized arrays
 - data conversions: integer-to-string, string-to-integer
 - binary search
 - working with null-terminated (C-style) strings
 - two-dimensional arrays
- Abstract Data Types and Collection Frameworks
 - Introduction to Abstract Data Types
 - Introduction to STL (Standard Template Library)
 - vectors and sets
 - iterators
 - maps
 - the algorithms
- Software
 - word processing, database management
 - spreadsheets, graphics
 - communications, Multimedia
 - data-logging, publishing and web design
- Program Efficiency measurements

Reference

Peter Van Roy and Seif Haridi, "Concepts, Techniques, And Models of Computer Programming" the MIT press, 2004.

5. Computer Organization and Logic Design:

- Number system conversion
- Number system operation codes
 - binary coded
 - decimal and digital codes
- Digital system arithmetic
 - Addition
 - Subtraction



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

References:

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

6. Introduction to the statistics theory

- Set theory
 - Binary operations on set
- Permutation
- Combination
- Sample space
- Events
- random variable
- Addition theorem
- multiplication theorem
- Conditional probability
 - Bays theorem
 - Independent of events
 - Birnolli trails
- Introduction to the theory of statistics
 - Descriptive statistics
- Measure of central tendency



- Measure of dispersion
- Binominal distribution
- Exponential distribution
- Normal (Gaussian) distribution
- Correlation of Coefficient
- The Chi-square test
- the Goodness – of –Fit test
- test of homogeneity
- Regression and Regression analysis.

References:

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

7. English Language:

Technical English, Primary Course Outlines

This course aims at teaching and developing students' skill in :

- **Writing and Reading :-**
 - Parts of Speech (Noun, verb, adjective, adverb, etc)
 - Structure and kinds of sentence
 - Tenses in English
 - Active and passive voice
 - Prepositions of time and place
 - How to write and understand simple paragraphs on arrange of topics within the field of the study and interest or experience
 - Develop the extensive intensive reading skills by taking different passage
 - Write your CV in summary form
 - Expose to important technical vocabulary and Idioms
 - Write scientific papers and well-structured and
- **Listening and Speaking :-** (by listening to a selected conversations on technical topics)
 - How to understand a conversion
 - How to avoid silence in conversion
 - Focus and study the pronunciation.
 - Deal with different situations academic and non academic.
 - Express ideas and give detailed accounts of experiences, and describing feelings.
 - Engage in extended conversation on most topics
 - Give opinions by providing relevant explanations, arguments and comments.
 - Give clear, detailed description of subjects within field of study or interest.
 - Vocabulary and phrases for making presentations
 - Give clearly developed presentations on subjects in the field of study.



➤ **Translation**

- What is the translation , kinds and steps of translation
- Scientific translation nature and steps
- How to use a dictionary and machine translation.

➤ **Project Implementation**

- Choose a topic and apply the items of scientific writing.
- Make presentation by applying the rules of the four skills of the language.

References :

- a. English for computer users By Santiag R.Esteras, Fourth Edition, Cambridge University Press, 2008.
- b. English Grammar In Use By Raymond Murphy, Third Edition, Cambridge University Press, 2004.
- c. English Grammar and Composition By Wren and Martin, Revised by N.O.Prasada Rao,S.Chand,, Company Ltd., New Delhi, 2007.



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
1	-	-	1	Democracy & Human Rights	الديمقراطية وحقوق الانسان	7
21	7	12	15	Total		

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

مجموعة الوحدات للفصل الدراسي الواحد: (21) وحدة

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

مجموعة الوحدات لسنة دراسية: (42) وحدة

1- Object Oriented Programming

- Overview for functions and parameter transmission in C++
- Introduction of OOP and its main features
- Classes in OOP
 - Defining a Simple Class with Inline Member Functions
 - Constructors and destructors functions
 - Friends functions
 - Constant Members
 - Static Members
 - Default Arguments and Implicit Member Argument
- Overloading
 - Function overloading
 - Operators overloading
- Template
 - Function Template Definition
 - Function Template Instantiation
 - Class Template Definition
 - Class Template Instantiation
- Inheritance and Derived Classes



- Single inheritance and Multiple inheritances
- Virtual Functions and polymorphism.

References:

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

2- Data Structures and Algorithms:

- Introduction to Data Structures
- Types of data structure
- Memory representation for 1D and 2D arrays
- Linear list and 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
 - Binary Search Tree
- Sorting Algorithm
 - Bubble Sort



- Insertion Sort
- Quick Sort)
- 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 Numerical Analysis:

- Partial differentiation
 - Partial differentiation for first and higher order of derivative
 - Chain rule and directional derivative)
 - First order differential equations
 - Solution of differential equation by direct integration
 - Separating the variables and homogeneous equation
- Second and higher order differential equations
 - Linear second order differential equation with constant
 - Variation method
- Laplace transform for standard important function
 - Multiplication by tn, division by t
 - Inverse Laplace transform of derivatives
- Formatting of Partial differential equation
 - Types of partial differential equations
- Fourier series and periodic functions
 - Fourier series for odd and even function
 - Half range Fourier sin and cosine series
- Change of interval
- Numerical analysis and solving sets of equation
- Elimination and iterative methods
- Interpolating polynomials
- Lagrange polynomial
- Solving non-liner equation
- Numerical differentiation and numerical integration



- Numerical solution of ordinary differential equations
- Curve-fitting and approximations.
- The solution of integral equation, trapezoidal method
- Simpsons method

References:

- 1- Thomas, G. Calculus and Analytic Geometry, 5th Edition, Addison Wesley, 1999.
- 2- Numerical Methods Using Matlab, Prentice Hall.
- 3- 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 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:

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

8- Human rights and Democracy.

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

المصادر

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



Third Year Syllabus

منهاج المرحلة الثالثة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Computer Graphics	رسوم الحاسوب	1
3	-	2	2	Compilers	المتجمات	2
3	1	2	2	Advanced Databases	قواعد البيانات متقدمة	3
2	1	-	2	Computer Architecture	معمارية الحاسوب	4
3	1	2	2	Artificial Intelligent	الذكاء الاصطناعي	5
2	1	-	2	Operation Research	بحوث عمليات	6
3	1	2	2	Computer networks	شبكات الحاسوب	7
3	1	2	2	Algorithms & Complexity	الخوارزميات وتعقيدها	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, Avan Dametal, "Introduction to Computer Graphic", Addison-Wesley, 1993.
- 2- D. Hearn and M.P. Baker, "Computer Graphics ", 2nd. Ed., Prentice-Hall, 1994



2- Compilers:

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

References:

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

3- Advanced Databases:

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



References

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

4- Computer Architecture:

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

References:

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

5- Artificial Intelligent:

Introduction to Programming in Logic, Prolog Language Structure, Prolog Language Components, Facts, Simple Rules, Built in Functions in Prolog Language, backtracking in prolog, Recursion in Prolog (Tail Recursion), Non Tail Recursion, cut & Fail Structure, List Processing, String Processing, Database Structure and Properties, Files in Prolog and Applications with Database, B⁺ tree, compound data objects in Prolog, Introduction to Artificial Intelligence, Knowledge Representation, Logical Representation (propositional calculus & predicate calculus) , non logical Representation (production rules, semantic net & frames), Problem State Space Characteristics, Problem Solving, Search Technique, Blind search (depth & breadth), Heuristic Search (hill climbing, best first search, A algorithm, A* algorithm , 8-puzzle problem, tour of Hanoi, Control Strategy (Forward Chaining, Backward Chaining), expert systems fundamentals, machine translation systems fundamentals.



References:

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

6- Operation Research:

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

References:

Operation Research: An Introduction, Hamdy A. Taha.

7- Computer Networks:

- 1-Introduction to data communications (components, data rpresntation, data flow)
- 2-Networks (distributed processing, Network criteria, physical structure, Network models, Network categories)
- 3-layered tasks (sender, receiver, carrier, hierarchy, OSI MODEL, TCP Model)
Data link
protocols(ARP,FTP,TELNET,DNS,UDP,NFS,RPC,SMTP,TFTP,HTTP,WAIS,)
- 4-Transmission Media (guided media (twisted pair, coaxial cable, fiber optical cable)
(Unguided Media (Radio Waves, Microwaves, Infrared)
- 5-Error detection and correction
- 6-Network Layer/logical addressing (Address space, IPV4 Addressing, IPV6 Addressing)
- 7-Dynamic Addressing, routable and non routable protocols

References:

Data communications and Networking, fourth edition, Behrouz A. Forouzan

8- Algorithms & Complexity

- Introduction.
- Some Problems (Knapsack,4-color mapping, Traveling Salesman, Shortest Path ,Subset Sum, Scheduling, Closest Pair of Point ...).
 - Time &Space Complexity .
 - Ω , Θ and O notations.
 - Classes of Problems.
 - Greedy Algorithms.
 - Divide – and – Conquer Algorithms.



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

References:

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

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	Advance Software Engineering	هندسة البرمجيات المتقدمة	1
2	1	-	2	Operation Research	بحوث عمليات	2
3	-	-	3	Advance Information Technology	تكنولوجيا المعلومات المتقدم	3
3	-	2	2	Mathematics Applied in Computer	تطبيقات رياضية في الحواسيب	4



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	Windows Programming	برمجة نوافذ متقدمة	2
3	1	2	2	Image processing	معالجة صور	3
3	1	2	2	Operating System	نظم التشغيل	4
3	1	2	2	Intelligence Applications	تطبيقات ذكية	5
3	1	2	2	Web programming	برمجة المواقع	6
2	1	-	2	Modeling and Simulation	النمذجة والمحاكاة	7
3	-	4	1	Project	المشروع	8
22	7	14	15			

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

مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة

Total No. of Unit for Year: (44) Units

مجموعة الوحدات لسنة دراسية: (44) وحدة

1- Computer and Data Security:

1. Introduction to Data Security, Data Security Principles, Security, Confidentiality, Threats to confidentiality, Integrity, Availability, Authentication, Non-repudiation, Assuring data validity, Authorization, Security Attack, Security Service, Security Mechanism, Basic Terminology, Basic Cryptographic Algorithms, Cryptographic Random Number Generators, Strength of Cryptographic Algorithms, Cryptanalysis and Attacks on Cryptosystems.
2. Mathematical Background, Prime Numbers , Greatest Common Divisor(GCD), (LCM) Least Common Multiple, Modular, Euler Function, Inverse Algorithm (inv), Fast Exponential, Matrix inverse.
3. Classical Encryption, Codes, Ciphers, Encryption and Cryptography, Transposition Ciphers, Keyless Transposition Ciphers, Keyed Transposition Ciphers, Combining Two Approaches, Double Transposition Ciphers, Monoalphabetic Ciphers, Additive Cipher , Shift Cipher and Caesar Cipher, Multiplicative Ciphers , Affine Ciphers , Pigpen / Masonic Cipher , Polybius Square , Polyalphabetic Ciphers, Autokey Cipher, Vigenere Cipher, Beaufort Cipher , Running Key Cipher , Polygraphic Ciphers, Playfair Cipher, Hill Cipher, Bifid Cipher , Trifid Cipher , Four-square cipher , Other Ciphers and Codes, ASCII, Beale Cipher, Book Cipher, Morse Code , One-time Pad, Semaphore
4. Data Encryption Standard (DES), , Block Cipher, ECB Operation Mode , CBC Operation Mode , Output Feedback Mode (OFM), Product Cipher , Iterated Block Cipher , Feistel Cipher , DES Cipher , Data Encryption Standard (DES), DES



- (Data Encryption Standard) history, Description of DES, Outline of the Algorithm , The Initial Permutation, The Key Transformation, The Expansion Permutatio, The S-Box Substitution , The P-Box Permutation, The Final Permutation, Decrypting DES.
5. Exponential Cipher, Introduction, Public-Key Cryptography, Why Public-Key Cryptography?, Public-Key Cryptography, Public-Key Characteristics, Public-Key Applications, Security of Public Key Schemes, Exponentiation Ciphers, Pohlig-Hellman Scheme, Security Concern, Discrete Logarithm, RSA description and algorithm, Key Generation Algorithm, Encryption, Decryption, A very simple example of RSA encryption, Security Concern, More About Euler's Theorem, Public-Key Systems, Secrecy And Authenticity, Merkle-Hellman Knapsacks, Merkle-Hellman Knapsacks, MH Knapsack, Diffie-Hellman, MH Practical Implementations, Cryptanalysis Reality!
 6. Stream Cipher, One-Time Pad or Vernam Cipher, Mathematical Proof, A Practical One-Time Pad, Basic Idea comes from One-Time-Pad , cipher, Drawback , Solution , Randomness , Pseudo-randomness , .Synchronous Stream Ciphers , Self-Synchronizing Stream Ciphers , Analysis, Linear feedback shift registers, Nonlinear combination , Generators, Example (Geffe Generator) , Nonlinear Filter Generator , Clock-controlled Generators , Example : Shrinking Generator

References:

- 1- Managing Cisco Network Security: Building Rock-Solid Networks,2000
- 2- William Stallings, *Cryptography and Network Security, (Principles and Practice)*, 2003
- 3- William Stallings, *Cryptography and Network Security, (Principles and Practice)*, 2011

2- Windows Programming:

The Components of a Window, Windows NT Application Basics{WinMain(), Window Procedure, Window Classes, The Message Loop, Windows Data Types}, A Windows NT Skeleton{Define a window class. ,Register that class with Windows NT. ,Create a window of that class. ,Display the window. ,Begin running the message loop.},WM_DESTROY, Message box, Understanding Windows NT Messages, Responding to a Key press {real key, Virtual Keys},WM_CHAR, WM_KEYUP, WM_KEYDOWN, Outputting Text to a window{text out},Device Contexts, Processing the WM_PAINT Message, Generating a WM_PAINT Message, Responding to Mouse Messages, combination Mouse Messages with keyboard, Responding to a Double-Click, control to interval of time in a Double-Click, Menus Basics{Resources file, Creating a Menu, Including a Menu in Your Program (WNDCLASSEX, HWND)}, Responding to Menu Selections, Adding Menu Accelerator Keys, Loading the Accelerator Table,



Translating Accelerator Keys, Non-Menu Accelerator Keys, Overriding the Class Menu, Dialog Boxes {modal, modales}, Receiving Dialog Box Messages, Activating a Dialog Box, Deactivating a Dialog Box, The Dialog Box Window Function, Disabling or enable a Control ,Dialog Boxes Use Controls {push button, edit box, List Box, Scroll Bars (standard scroll bars, scroll bars control), Check Boxes, Radio Buttons}, Static Controls, Stand Alone Controls, bitmaps {device-dependent, device-independent}, Creating a Bitmap Resource, Displaying a Bitmap, Deleting a Bitmap, Creating a Custom Icon and Cursor { Defining Icons and Cursors, Loading Your Icons and Cursor}.

References:

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

3-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 (enlarge , shrinking), 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 quantization, Gray level reduction, Spatial reduction, Sobel operator, Prewitt operator, Krisch compass, Robinson compass mask, Segmentation, Region growing, Clustering methods, Boundaries detects, Combined approach, Histogram (histogram modification, , Histogram Equalization, Histogram features), Image Compression, Discrete transformation, Fourier transform , cosine transform.

References

1. Scotte E umbaug, "computer vision and image processing".
2. Rafael C. Gonzalez university of Tennessee, " Digital image processing".

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 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, deletefile, deletefolder, folderexistes, driverexistes, fileexists, ASP Applications, dynamic web site, online examination, simple search directory, simple Email system, simple chatting system.

References:

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

7- Modeling and Simulation (Optional):

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



- ▶ Model reduction, hierarchical control, decentralized control,
- ▶ structural properties of large scale systems

References

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

8- Project.

Description for Research Project

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

Time for Research Project

The Student given full academic year for accomplishes his study.

Exam for Research Project

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

Format for Research Projects

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

Title

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

“A protection system for an Internet site”

Abstract

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

Introduction



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

Method

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

Results

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

Discussion

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

References

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

Appendix

Any information that is relevant to the study, but not needed within the body of the paper, should be included at the end of the report. These appendices would include further



details of the research instructions, materials, results, psychological measures, etc., if needed. Your instructor may also wish you to attach the raw data of your project.

Elective Subjects for Forth Year

المواضيع الاختيارية للمرحلة الرابعة

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

Third Year Syllabus

منهاج المرحلة الثالثة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Computer Graphics	رسوم الحاسوب	1
3	-	2	2	Compilers	المتجمات	2
3	1	2	2	Advanced Databases	قواعد البيانات متقدمة	3
2	1	-	2	Computer Architecture	معمارية الحاسوب	4
3	1	2	2	Artificial Intelligent	الذكاء الاصطناعي	5
2	1	-	2	Operation Research	بحوث عمليات	6
3	1	2	2	Computer networks	شبكات الحاسوب	7
3	1	2	2	Algorithms & Complexity	الخوارزميات وتعقيدها	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:

- 3- J. D. Foley, Avan Dametal, "Introduction to Computer Graphic", Addison-Wesley, 1993.
- 4- 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, LL(1), Error Detection and Reporting, Bottom up Parsing, Operation Precedence Parser, Simple Left to Right Parser, Canonical LR Parser, Look Ahead LR, Semantic Analysis, Intermediate Code Generation, Code Optimization, Examples of Code Optimization, Code Generation.

References:

1. Principles of Compiler Design ,Alfred V. Aho, Jeffry D. Ulman.2003

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

- 4- Database system concept, fifth edition, Abraham Silberschatz and Merry F. Koth, 2006.
- 5- Distributed DB , Stefane Ceri, 2002.
- 6- 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:



- 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, backtracking in prolog, Recursion in Prolog (Tail Recursion), Non Tail Recursion, cut & Fail Structure, List Processing, String Processing, Database Structure and Properties, Files in Prolog and Applications with Database, B⁺ tree, compound data objects in Prolog, Introduction to Artificial Intelligence, Knowledge Representation, Logical Representation (propositional calculus & predicate calculus) , non logical Representation (production rules, semantic net & frames), Problem State Space Characteristics, Problem Solving, Search Technique, Blind search (depth & breadth), Heuristic Search (hill climbing, best first search, A algorithm, A* algorithm , 8-puzzle problem, tour of Hanoi, Control Strategy (Forward Chaining, Backward Chaining), expert systems fundamentals, machine translation systems fundamentals.

References:

5. Artificial Intelligence, by Elian Rich, Prentice Hall 1991.
6. Artificial Intelligence, by G. F. luger 2002
7. Artificial Intelligence, by Russel & P. nerving , 2003
8. Artificial Intelligence, by V rkas & I. pl. Vlaahavas ,2008

6- Operation Research:

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

References:

Operation Research: An Introduction, Hamdy A. Taha.

7- Computer Networks:

- 1-Introduction to data communications (components, data rresentation, data flow)
- 2-Networks (distributed processing, Network criteria, physical structure, Network models, Network categories)
- 3-layered tasks (sender, receiver, carrier, hierarchy, OSI MODEL, TCP Model)



Data link
protocols(ARP,FTP, TELNET,DNS,UDP,NFS,RPC,SMTP,TFTP,HTTP,WAIS,)
4-Transmission Media (guided media (twisted pair, coaxial cable, fiber optical cable)
(Unguided Media (Radio Waves, Microwaves, Infrared)
5-Error detection and correction
6-Network Layer/logical addressing (Address space, IPV4 Addressing, IPV6 Addressing)
7-Dynamic Addressing, routable and non routable protocols

References:

Data communications and Networking, fourth edition, Behrouz A. Forouzan

8- Algorithms & Complexity

Introduction.

- Some Problems (Knapsack,4-color mapping, Traveling Salesman, Shortest Path ,Subset Sum, Scheduling, Closest Pair of Point ...).
- Time &Space Complexity .
- Ω , Θ and O notations.
- Classes of Problems.
- Greedy Algorithms.
- Divide – and – Conquer Algorithms.
- Dynamic Programming.
- Network Flow.
- Intractability.
- Approximation Algorithms.
- Local Search.
- String Matching Algorithm
- Randomized Algorithms.

References:

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

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	Advance Software Engineering	هندسة البرمجيات المتقدمة	1
2	1	-	2	Operation Research	بحوث عمليات	2
3	-	-	3	Advance Information Technology	تكنولوجيا المعلومات المتقدم	3
3	-	2	2	Mathematics Applied in Computer	تطبيقات رياضية في الحواسيب	4



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	Windows Programming	برمجة نوافذ متقدمة	2
3	1	2	2	Image processing	معالجة صور	3
3	1	2	2	Operating System	نظم التشغيل	4
3	1	2	2	Intelligence Applications	تطبيقات ذكية	5
3	1	2	2	Web programming	برمجة المواقع	6
2	1	-	2	Modeling and Simulation	النمذجة والمحاكاة	7
3	-	4	1	Project	المشروع	8
22	7	14	15			

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

مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة

Total No. of Unit for Year: (44) Units

مجموعة الوحدات لسنة دراسية: (44) وحدة

1- Computer and Data Security:

Introduction to Data Security, Data Security Principles, Security, Confidentiality, Threats to confidentiality, Integrity, Availability, Authentication, Non-repudiation, Assuring data validity, Authorization, Security Attack, Security Service, Security Mechanism, Basic Terminology, Basic Cryptographic Algorithms, Cryptographic Random Number Generators, Strength of Cryptographic Algorithms, Cryptanalysis and Attacks on Cryptosystems.

6. Mathematical Background, Prime Numbers , Greatest Common Divisor(GCD), (LCM) Least Common Multiple, Modular, Euler Function, Inverse Algorithm (inv), Fast Exponential, Matrix inverse.
7. Classical Encryption, Codes, Ciphers, Encryption and Cryptography, Transposition Ciphers, Keyless Transposition Ciphers, Keyed Transposition Ciphers, Combining Two Approaches, Double Transposition Ciphers, Monoalphabetic Ciphers, Additive Cipher , Shift Cipher and Caesar Cipher, Multiplicative Ciphers , Affine Ciphers , Pigpen / Masonic Cipher , Polybius Square , Polyalphabetic Ciphers, Autokey Cipher, Vigenere Cipher, Beaufort Cipher , Running Key Cipher , Polygraphic Ciphers, Playfair Cipher, Hill Cipher, Bifid Cipher , Trifid Cipher , Four-square cipher , Other Ciphers and Codes, ASCII, Beale Cipher, Book Cipher, Morse Code , One-time Pad, Semaphore
7. Data Encryption Standard (DES), , Block Cipher, ECB Operation Mode , CBC Operation Mode , Output Feedback Mode (OFM), Product Cipher , Iterated Block Cipher , Feistel Cipher , DES Cipher , Data Encryption Standard (DES), DES



- (Data Encryption Standard) history, Description of DES, Outline of the Algorithm , The Initial Permutation, The Key Transformation, The Expansion Permutatio, The S-Box Substitution , The P-Box Permutation, The Final Permutation, Decrypting DES.
8. Exponential Cipher, Introduction, Public-Key Cryptography, Why Public-Key Cryptography?, Public-Key Cryptography, Public-Key Characteristics, Public-Key Applications, Security of Public Key Schemes, Exponentiation Ciphers, Pohlig-Hellman Scheme, Security Concern, Discrete Logarithm, RSA description and algorithm, Key Generation Algorithm, Encryption, Decryption, A very simple example of RSA encryption, Security Concern, More About Euler's Theorem, Public-Key Systems, Secrecy And Authenticity, Merkle-Hellman Knapsacks, Merkle-Hellman Knapsacks, MH Knapsack, Diffie-Hellman, MH Practical Implementations, Cryptanalysis Reality!
 9. Stream Cipher, One-Time Pad or Vernam Cipher, Mathematical Proof, A Practical One-Time Pad, Basic Idea comes from One-Time-Pad , cipher, Drawback , Solution , Randomness , Pseudo-randomness , .Synchronous Stream Ciphers , Self-Synchronizing Stream Ciphers , Analysis, Linear feedback shift registers, Nonlinear combination , Generators, Example (Geffe Generator) , Nonlinear Filter Generator , Clock-controlled Generators , Example : Shrinking Generator

References:

- 5- Managing Cisco Network Security: Building Rock-Solid Networks,2000
- 6- William Stallings, *Cryptography and Network Security, (Principles and Practice)*, 2003
- 7- William Stallings, *Cryptography and Network Security, (Principles and Practice)*, 2011

2- Windows Programming:

The Components of a Window, Windows NT Application Basics{WinMain(), Window Procedure, Window Classes, The Message Loop, Windows Data Types}, A Windows NT Skeleton{Define a window class. ,Register that class with Windows NT. ,Create a window of that class. ,Display the window. ,Begin running the message loop.},WM_DESTROY, Message box, Understanding Windows NT Messages, Responding to a Key press {real key, Virtual Keys},WM_CHAR, WM_KEYUP, WM_KEYDOWN, Outputting Text to a window{text out},Device Contexts, Processing the WM_PAINT Message, Generating a WM_PAINT Message, Responding to Mouse Messages, combination Mouse Messages with keyboard, Responding to a Double-Click, control to interval of time in a Double-Click, Menus Basics{Resources file, Creating a Menu, Including a Menu in Your Program (WNDCLASSEX, HWND)}, Responding to Menu Selections, Adding Menu Accelerator Keys, Loading the Accelerator Table,



Translating Accelerator Keys, Non-Menu Accelerator Keys, Overriding the Class Menu, Dialog Boxes {modal, modales}, Receiving Dialog Box Messages, Activating a Dialog Box, Deactivating a Dialog Box, The Dialog Box Window Function, Disabling or enable a Control ,Dialog Boxes Use Controls {push button, edit box, List Box, Scroll Bars (standard scroll bars, scroll bars control), Check Boxes, Radio Buttons}, Static Controls, Stand Alone Controls, bitmaps {device-dependent, device-independent}, Creating a Bitmap Resource, Displaying a Bitmap, Deleting a Bitmap, Creating a Custom Icon and Cursor { Defining Icons and Cursors, Loading Your Icons and Cursor}.

References:

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

3-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 (enlarge , shrinking), 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 quantization, Gray level reduction, Spatial reduction, Sobel operator, Prewitt operator, Krisch compass, Robinson compass mask, Segmentation, Region growing, Clustering methods, Boundaries detects, Combined approach, Histogram (histogram modification, , Histogram Equalization, Histogram features), Image Compression, Discrete transformation, Fourier transform , cosine transform.

References

- 1- Scotte E umbaugh, "computer vision and image processing", 1997.
- 2- Rafael C. Gonzalez university of Tennessee, " Digital image processing", 2002.

8- 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 Intelligence Applications:

Expert Systems Using and Applications, Forward Chaining, Backward Chaining, Systems Based on Simple Search, 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.

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.
8. David E. Goldberg, Genetic Algorithms in Search optimization, and Machine Learning, 1993.

6- Web Programming

Web Based Application, Introduction, The world wide web, The internet and web, The history and growth of the web, internet service provider , Http, The purpose of the web, web application ,The web concepts, Hypertext, web page, web site, web page address, web browsing. The classifying the web sites, environment, the general approach, range of complexity, Client side, HTML, CSS, external , internal , scripting language, Java script, create data object ,function , popup Boxes, create an array, document.getElementById ,web programming with ASP, internet information server , ASP Principles, ASP Objects, Response Object, write , clear, end, redirect, Request



Object, querystring, request, form, get ,post, external, internal, cookies, execute, ASP-File System Object, bulidpath, copyfile, copyfolder, createtextfile, deletefile, deletefolder, folderexists, driverexists, fileexists, ASP Applications, dynamic web site, Asp with ADO, insert, delete, update, online examination, simple search directory, simple Email system.

References:

Web Based Application.
Web Programming with ASP.
www.W3school.com

7- Modeling and Simulation (Optional):

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

References



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

8- Project.

Description for Research Project

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

Time for Research Project

The Student given full academic year for accomplishes his study.

Exam for Research Project

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

Format for Research Projects

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

Title

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

“A protection system for an Internet site”

Abstract

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

Introduction

The introduction includes a brief (~2-3 page) review of current theory & research in the area of your topic. In presenting this material, paraphrase it into your own words, but always cite the source of the information. Referencing must be complete & correct, or



you are plagiarizing, which is a serious academic offence. End with an introduction to your study, including your hypothesis.

Method

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

Results

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

Discussion

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

References

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

Appendix

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



Elective Subjects for Forth Year

المواضيع الاختيارية للمرحلة الرابعة

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



المناهج الدراسية لفرع النظم

First Year Syllabus

منهج المرحلة الأولى

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

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

مجموعة الوحدات للفصل الدراسي الواحد: (15) وحدة

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

مجموعة الوحدات لسنة دراسية: (30) وحدة

Second Year Syllabus

منهج المرحلة الثانية

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

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

مجموعة الوحدات للفصل الدراسي الواحد: (20) وحدة

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

مجموعة الوحدات لسنة دراسية: (40) وحدة

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	Distributed Databases	قواعد البيانات الموزعة	3
3	1	2	2	Computer Architecture and Microprocessing	معمارية الحاسبة و المعالجة المايكروية	4
3	1	2	2	Artificial Intelligent	الذكاء الاصطناعي	5
3	1	2	2	Computer Networks	شبكات الحاسبة	6
3	1	2	2	Project Management	ادارة مشاريع	7
2	1	-	2	Operation Research	بحوث عمليات	8
23	7	14	16	Total		

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

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

مجموعة الوحدات للفصل الدراسي الواحد: (23) وحدة

مجموعة الوحدات لسنة دراسية: (46) وحدة

Fourth Year Syllabus

منهج المرحلة الرابعة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
2	1	-	2	Management Information Systems	نظم ادارة المعلومات	1
3	1	2	2	Advanced Databases	قواعد بيانات متقدمة	2
3	1	2	2	Intelligent Systems	الانظمة الذكية	3
2	1	-	2	Computer and Data Security	امنية الحاسبات والبيانات	4
3	1	2	2	Operating System	نظم التشغيل	5
3	1	2	2	Web Programming and Ecommerce	برمجة مواقع والتجارة الالكترونية	6
3	1	2	2	Image processing	معالجة صور	7
3	-	3	1	Project	مشروع	8
22	7	13	15	Total		

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

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

مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة

مجموعة الوحدات لسنة دراسية: (44) وحدة

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 المهيكلية (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	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
- Getting Started with C++, Character set, Identifiers, Variables and Variables Declaration, Constants, Arithmetic Operations, Assignment Operators, Relational Operators, Logical Operators, Bitwise Operator.
- The compiler directives (define and include).
- Unary Minus, Increment and /decrement Operators.
- Selection Statements
 - The Single If Statement Structure, The If/else Statement Structure, Nested If and If/else Statements
 - The Switch Selection Statement and Conditional Statement.
 - Break and Continue Control Statements
- Iteration Statements
 - While Repetition Structure
 - Do/While Statement.
 - For Statement and Nested Loops
- Functions
 - introduction, defining a function, return statement, types of functions, actual and formal arguments, local and global variables, parameters passing, recursive functions.
- Arrays



- One dimensional array (declaration, initialization, Accessing)
- Two dimensional array (declaration, initialization, Accessing).
- String manipulation
- Structures
 - Type of Structure declaration
 - Array of Structures
 - structure within structure
 - functions and structures
- Pointers
 - pointers declaration
 - pointers and functions passing parameters
 - pointers and arrays
 - arrays of pointers
 - pointers to pointers

References:

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

2. Mathematics:

- Mathematical background
- Matrix
 - Types of matrix
 - Matrix addition, subtraction, and multiplication
 - Determinant, transpose, symmetric of matrix and rank of matrix
 - Inverse of matrix, absolute value, and polynomials
 - Grammar rule for solving system of equation.
- Functions
 - Function numbers, type of numbers, theorems'' of numbers
 - Definition of function domain and range of functions
 - Graphing of function
- Limits
 - Definition of limits
 - Theorems' of limits
 - Type of limits
 - One side and two sides limits
 - Limits as infinity
 - Sandwich theorem and continues functions
- Derivation
 - Mathematical definition of derivation, rule of derivation



- Derivation of trigonometric, inverse trigonometric, logarithm, exponential hyperbolic, inverse of hyperbolic function.
- Implicit derivation, chain rule, higher derivation
- L'hospital rule
- Application of derivation, velocity and acceleration
- Series
- Integration, indefinite integral, rules of integral, method of integration, multiple integral
- Definite integral, application of integral area under the curve
- Area between two curves

References:

- 1- Thomas, G. Calculus and Analytic Geometry, 5th Edition, Addison Wesley, 1999.

3. Discrete Structures

- Set theory
 - Sets and subsets
 - How to specify sets, Operations on sets
 - Algebra of sets and its proves
 - Power set, Classes of sets, Cardinality
 - Sets of numbers, Finite sets and counting principle
- Mathematical induction
- Relations
 - Computer representation of relations and Digraph
 - Manipulation of relations, Properties of relations
 - Composition of relations
- Functions
 - Type of function (one-to-one & invertible function)
 - Geometrical characterization of functions
 - Sequences of sets, Recursively defined functions
- Logic and propositions
 - Basic logical operation, Equivalency
 - Tautology and Contradiction
 - Conditional and biconditional statements
 - Argument with examples
- Graphs
 - Definition, Graphs and multigraphs, Sub graph
 - Degree of graph, Connectivity, Special graph
 - Walk & length of walk, Trail, path, cycle
 - The bridges of Konigsberg
 - Traversable multigraphs, Labeled graphs
 - Minimal path, Minimum spanning tree
 - Matrices and graph



- Trees, rooted tree, ordered rooted tree
- polish notation, with examples
- Finite state machines
 - Finite automata
 - Optimistic approach to construct FSM
 - Deterministic Finite state automata

References:

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

4. Logic Design:

- Number system
 - Decimal.
 - Binary.
 - Octal.
 - Hexadecimal.
- Addition and subtraction
 - binary,
 - octal
 - Hexadecimal.
- Logic gats.
- Boolean algebra and simplification and demerger's.
- K-map.
- Combinational universal NAND and NOR logic.
 - Half-adder, full-adder, 4- bit parallel adder, and Subtract adder.
- Decoder, encoder, multiplexer, and demultiplexer.
- Sequential logic circuits and Flip-flop, SR, D, and JK flip-flop.
- Shift register 3-bit and 4- bit.
- Binary counter 3-bit and 4- bit.
- State diagram FSA, ROM and RAM.

References:

1. Computer System Architecture M. Morris Mano
2. Digital fundamentals by Floyd, 2009
3. Fundamental of digital logic and Microcomputer design, fifth addition.

5. Principles of Information Technology

- Introduction to information technology
- Introduction to computer architecture computer hardware
 - Computer hardware
 - Central processing unit and its components



- Memory and its components
- Computer software
 - Application software
 - Programming languages types
 - Input technologies
 - Output technologies)
- Managing organizational data and information
 - Introduction
 - Traditional file environment problems
- Data base
 - The modern approach centralized database
 - Distributed database
 - Data base management system and its components
- Telecommunications and networks
 - Introduction
 - Telecommunications system and its processes
 - Communications media and channels
- Networks
 - Introduction
 - Local area networks
 - Wide area network
 - Network communications software application
- Internet and intranets
 - Introduction
 - The evolution of the Internet
 - The operation of the internet
 - Services provided by the Internet
 - Intranets and the difference between the internet and intranet
- Information security
- Purpose and value of blocking up data.

References:

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

6. Principles of Information Systems

- Information systems overview
 - Information system hardware
 - Information system software
- Database management
- Telecommunication



- Electronic commerce and the internet
- Organizational information system
 - Emerging Information System
 - Information System Development
 - Information system processes
 - Information system development approaches
 - Information system management
 - Managing Information system as an organizational resources
- Making business case for a system
- Organizing the information system function

Reference

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

7. English Language:

Technical English, Primary Course Outlines

This course aims at teaching and developing students' skill in :

- **Writing and Reading :-**
 - Parts of Speech (Noun, verb, adjective, adverb, etc)
 - Structure and kinds of sentence
 - Tenses in English
 - Active and passive voice
 - Prepositions of time and place
 - How to write and understand simple paragraphs on arrange of topics within the field of the study and interest or experience
 - Develop the extensive intensive reading skills by taking different passage
 - Write your CV in summary form
 - Expose to important technical vocabulary and Idioms
 - Write scientific papers and well-structured and
- **Listening and Speaking :-** (by listening to a selected conversations on technical topics)
 - How to understand a conversion
 - How to avoid silence in conversion
 - Focus and study the pronunciation.
 - Deal with different situations academic and non academic.
 - Express ideas and give detailed accounts of experiences, and describing feelings.
 - Engage in extended conversation on most topics
 - Give opinions by providing relevant explanations, arguments and comments.
 - Give clear, detailed description of subjects within field of study or interest.
 - Vocabulary and phrases for making presentations
 - Give clearly developed presentations on subjects in the field of study.
- **Translation**
 - What is the translation , kinds and steps of translation
 - Scientific translation nature and steps



- How to use a dictionary and machine translation.
- **Project Implementation**
 - Choose a topic and apply the items of scientific writing.
 - Make presentation by applying the rules of the four skills of the language.

References

- a. English for computer users By Santiag R.Esteras, Fourth Edition, Cambridge University Press, 2008.
- b. English Grammar In Use By Raymond Murphy, Third Edition, Cambridge University Press, 2004.
- c. English Grammar and Composition By Wren and Martin, Revised by N.O.Prasada Rao,S.Chand,, Company Ltd., New Delhi, 2007.

Second Year Syllabus

منهج المرحلة الثانية

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

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

مجموعة الوحدات للفصل الدراسي الواحد: (20) وحدة

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

مجموعة الوحدات لسنة دراسية: (40) وحدة

1- Object Oriented Programming

- Overview for functions and parameter transmission in C++
- Introduction of OOP and its main features
- Classes in OOP
 - Defining a Simple Class with Inline Member Functions
 - Constructors and destructors functions
 - Friends functions
 - Constant Members
 - Static Members
 - Default Arguments and Implicit Member Argument
- Overloading
 - Function overloading
 - Operators overloading
- Template
 - Function Template Definition
 - Function Template Instantiation
 - Class Template Definition
 - Class Template Instantiation
- Inheritance and Derived Classes



- Single inheritance and Multiple inheritances
- Virtual Functions and polymorphism.

References:

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

2- Data Structures and Algorithms:

- Introduction to Data Structures
- Types of data structure
- Memory representation for 1D and 2D arrays
- Linear list and 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
 - Binary Search Tree
- Sorting Algorithm
 - Bubble Sort
 - Insertion Sort
 - Quick Sort)
- 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 Numerical Analysis:

- Partial differentiation
 - Partial differentiation for first and higher order of derivative
 - Chain rule and directional derivative)
 - First order differential equations
 - Solution of differential equation by direct integration
 - Separating the variables and homogeneous equation
- Second and higher order differential equations
 - Linear second order differential equation with constant
 - Variation method
- Laplace transform for standard important function
 - Multiplication by tn , division by t
 - Inverse Laplace transform of derivatives
- Formatting of Partial differential equation
 - Types of partial differential equations
- Fourier series and periodic functions
 - Fourier series for odd and even function
 - Half range Fourier sin and cosine series
- Change of interval
- Numerical analysis and 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.
- The solution of integral equation, trapezoidal method
- Simpsons method

References:

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



4- Database:

- Centralized database system
 - Introduction and the purpose of database
 - Comparing between a file processing system and DBMS
- Data Abstraction and file system disadvantage
- Entity relationship model
 - Entities and entity sets
 - Relationships and relationship set
 - Attributes and mapping
 - Constraints and keys
- Relational model
 - Data representation in relational model (Tables, Records, and keys)
- Tables joining and Instant and schema
- Database Administrator and database design process
- Data base cardinality
- Weak entity in ER model
- ER model and relational model examples
- Indexing
 - Primary indexing
 - Secondary indexing
 - Index update
 - Hash index
- Normalization
- System architecture
- Transaction
- Database security
 - Access control
 - encryption

References:

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

5. Information Systems Analysis and Design

Overview (System Concepts), Introduction to Information Systems (Information System Definition, Information General Model, Information System Computer Hardware, Information System Software, Information System and Data Management, Information System Telecommunications, Information System People), The Role of System Analysis (Sake Holders, System Analysts, Skills of Successful System Analysis, The Analysis Responsibilities, Variations on the System Analysts Title, The



System Analysts as a Facilitator), The System Development Life Cycle (Definition, Phase1(Primary Investigation and Planning, Problem Recognition, Feasibility Study), Phase2 (Analysis Concept, Information Gathering Techniques (Interviewers, Questionnaires, Written Materials, Samples, Observations), Data Analysis Methods (Data Flows, Flow Charts, Decision Tables)), Phase3 (Initial Design, Prototyping, Detailed Design (Output Design, Input Design, Database Design, Coding Systems)), Phase4 (Implementation), Phase5 (Maintenance), Case Study (IS Development), Information, Decision, Management, Information System Types (Transaction Processing System, Management Information System, Decision Support System, Expert Systems, Executive Information System), Online Analytical Processing (OLAP), Geographic Information System (GIS)).

References:

“Introduction to Information System”, O’Bran.

“Systems Analysis and Design”, Elias M. Awad.

6- Software Engineering:

Introduction to SW engineering, Computer software, What is software engineering, The evolving role of software, Software characteristics, Software engineering principles, The Characteristic of software engineer, Software applications, Software systems, Software development, A crisis on the horizon, The attribute of good software, Software lifecycle. Software Engineering-A Layered technology, Software process models, The waterfall model, The prototype model , The RAD model, Evolutionary software process models, The incremental model, The spiral model, Component based development, Introduction to Software process and project metrics, Measures , Metrics and Indicators, Metrics in the process and project domains, Process metrics, Project metrics, Software measurement, size oriented metrics, function oriented metrics, computing function point, Software Quality Metrics, Defect removal efficiency ,Integration metrics with software process, Statistical process control, Metrics for small organization, Establishing a software metrics program, Introduction to Software project planning, Estimation reliability factors, Project planning objective, Software Scope, Estimation of resources, Software project estimation options, Decomposition techniques, Estimation models, The structure of estimation models, The COCOMO Model, The software equation model, Automated estimation tools, introduction to risk analysis and management, reactive versus proactive risk strategies, software risks, risk projection, risk refinement, project scheduling and tracking, basic concepts, scheduling principles, software quality, quality concepts, Statistical software quality, software reliability, Introduction to analysis concepts and principles, requirement analysis, Software requirement analysis phases, Software requirements elicitation, Facilitated action specification technique, Quality function deployment, Use case, Analysis principles, Software prototyping, Specification principles.

References:

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



7. Computation Theory

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

References:

- *Introduction to computer theory by cohen*

8- حقوق الانسان والديمقراطية:

- مفهوم حقوق الإنسان وحقوق الإنسان في الشرائع السماوية (الشريعتين اليهودية والمسيحية)
- فئات حقوق الانسان وحقوق الانسان في الاسلام
- مصادر حقوق الإنسان
- اوليا المصادر الدولية (الاعلان العالمي لحقوق الانسان وقيمه القانونية)
- الحقوق التي يتضمنها الاعلان العالمي لحقوق الانسان
- العهدان الدوليان الخاصان بحقوق الانسان لسنة 1966
- ثانيا المصادر الوطنية (اعلان حقوق الانسان والمواطن الفرنسي 1789)
- ضمانات حقوق الانسان
 - الضمانات على الصعيد الداخلي
 - اوليا الضمانات الدستورية
 - ثانيا الضمانات القضائية
- الرقابة بطريق الدعوى الاصلية (رقابة الالغاء)
- الرقابة بطريق الدفع بعدم الدستورية (رقابة الامتناع)-الرقابة القضائية على اعمال الادارة
- ضمانات حقوق الانسان على الصعيد الدولي-ميثاق الامم المتحدة
- الجمعية العامة للامم المتحدة-المجلس الاقتصادي والاجتماعي
- مجلس حقوق الانسان
- التقدم التكنولوجي واثره على الحقوق والحريات
 - اوليا الاحزاب السياسية وحقوق الانسان
 - ثانيا العولمة وحقوق الانسان

المصادر

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

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	Distributed Databases	قواعد البيانات الموزعة	3
3	1	2	2	Computer Architecture and Microprocessing	معمارية الحاسبة و المعالجة المايكروية	4
3	1	2	2	Artificial Intelligent	الذكاء الاصطناعي	5
3	1	2	2	Computer Networks	شبكات الحاسبة	6
3	1	2	2	Project Management	ادارة مشاريع	7
2	1	-	2	Operation Research	بحوث عمليات	8
23	7	14	16	Total		

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

مجموعه الوحدات للفصل الدراسي الواحد: (23) وحدة

Total No. of Unit for Year: (46) Units

مجموعه الوحدات لسنة دراسية: (46) وحدة

1-Computer Graphics

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

References:

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

2-Compilers

Programming Language, Introduction to Compiler, Type of Errors, One Pass Compiler, Syntax Definition, Context Free Grammar, Parsing Tree & leftmost and rightmost derivations, Transition Graph, Lexical analysis, Syntax of Analysis, Problems of Compiler, First and Follow, Top down Parsing, Predictive Parsing Method, LL(1), Error Detection and Reporting, Bottom up Parsing, Operation Precedence Parser, Simple Left to Right Parser, Canonical LR Parser, Look Ahead



LR, Semantic Analysis, Intermediate Code Generation, Code Optimization, Examples of Code Optimization, Code Generation.

References:

1. Principles of Compiler Design ,Alfred V. Aho, Jeffrey D. Ulman.2003

3-Distributed Databases

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

References:

- مفاهيم ومعماريات مستودعات البيانات -د. علاء الحامي
- Hersry K. Korth, Database System Concepts, 1991.
- Kroenke, Database Concept 2005.
- Silbersch, Database System Concepts, 2006.

4-Computer Architecture and Microprocessing

- Introduction to microprocessor
- An overview of microcontroller
- Types of microprocessor
- Serial data transfer scheme
- Interrupt structure of microprocessor 80286
- Advanced microprocessor 80286
(introduction to 80286, features of 80286, real and protected mode ,segmentation & paging)
- Microcontroller architecture

5-Artificial Intelligent

Introduction to Programming in Logic, Prolog Language Structure, Prolog Language Components, Facts, Simple Rules, Built in Functions in Prolog Language, Recursion in Prolog (Tail Recursion), Non Tail Recursion, Fail Structure, List Processing, String Processing, Database Structure and Properties, Files in Prolog and Applications with Database, Introduction to Artificial Intelligence, Knowledge Representation, Logical Representation (propositional calculus & predicate logic) , non logical Representation



(production rules, semantic net & frames), Problem State Space Characteristics, Problem Solving, Search Technique, Blind search (depth & breadth), Heuristic Search (hill climbing, best first search, A algorithm, A* algorithm minmax and alpha-beta), The 8_Puzzle Problem, Tic tac toe problem, tour of Hanoi, Control Strategy (Forward Chaining, Backward Chaining), Hybrid Method (Rule Cycle), expert system fundamentals.

References:

- Elian Rich, Artificial Intelligence, Prentice Hall 1991.

6-Computer Networks

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

References:

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

7-Project Management

Introduction, Defining a Project:-Sequence of Activities, Unique Activities, Complex Activities, Connected Activities, One Goal, Project Management and Project Selection, **Organization**: Structure and Culture, **Project Classifications**:-Classification by Project Characteristics, Classification by Project Type. **Project Parameters**: Scope, Quality, Cost , Time, Resources, Estimating Project Times and Costs, **Developing a Project Plan**:- Planning Identify Project Activities, Estimate Activity Duration, Contents, Determine Resource Requirements, Construct/Analyze the Project Network, Prepare the Project Proposal, Launching, Managing **Risk**:- Risk Management, Identifying Risk, Risk Categories, Assessing Risk, Qualitative Assessment, Dynamic Risk Assessment, Planning Risk Response, Risk Monitoring and Control, **Scheduling Resources and Costs**:- Estimating Duration, Resource Requirements, and Cost, Estimating Duration, Resource Loading versus Task



Duration, Variation in Task Duration, Reducing Project Duration, Progress and Performance Measurement and Evaluation, Monitor Project Progress Versus Plan, Project Audit and Closure, Establish Progress Reporting System, **Managing Project Teams**:-Leadership, Being an Effective Project Manager, Recruit and Organize the Project Team, Establish Team Operating Rules. **Variations to Project Management Approaches**:- Traditional Project Management Approaches, Linear Project Management Approaches, Incremental Project Management Approaches, Adaptive Project Management Approaches, Iterative Project Management Approach, Adaptive Project Management Approach, Extreme Project Management Approach, INSPIRE Project Management Approach, Variations within the Traditional Project, Management Approach.

References

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

8- Operation Research:

- 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

References:

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

Fourth Year Syllabus

منهج المرحلة الرابعة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
2	1	-	2	Management Information Systems	نظم ادارة المعلومات	1
3	1	2	2	Advanced Databases	قواعد بيانات متقدمة	2
3	1	2	2	Intelligent Systems	الانظمة الذكية	3
2	1	-	2	Computer and Data Security	امنية الحاسبات والبيانات	4
3	1	2	2	Operating System	نظم التشغيل	5
3	1	2	2	Web Programming and Ecommerce	برمجة مواقع والتجارة الالكترونية	6
3	1	2	2	Image processing	انظمة الوسائط المتعددة	7
3	-	3	1	Project	مشروع	8
22	7	13	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-Management Information Systems

What is information systems, Perspectives on Information Systems, Organizations and Information Systems, What Is an Organization? Common Features of Organizations, Unique Features of Organizations. Contemporary approaches to Information Systems : Technical approaches, Behavioral approaches, sciotechnical approaches. The new role of information system in organization, The widening scope of information system, The network revolution And internet. New options for organization design: Flattening structure, Separating work from location, Increasing flexibility of organization, Redefining organizational boundaries and E- commerce, Reorganizing work flow, Changing management process, New people requirement, Information architecture, The five key management for building information system. The strategic role of information system, Key system application in the organization, the six major types of systems, The relationship between the six types of systems, Systems from a Functional Perspective, Sales and Marketing Systems, Manufacturing and Production Systems, Finance and Accounting Systems, Human Resources Systems. information system in an organization, Information as a strategic information resource, What is strategic information system, Changing the concepts of information and information system, How information can be used for competitive advantage ,Business level strategy and value chain analysis model, Firm level strategy and information technology ,Industry level strategy and information, system competitive force and network economics . Information management and management schools, Three schools of management, The technical rational perspective, The behavior



perspective, The cognitive perspective. Introduction to decision making, Levels of decision making, Decision making process model stages, Decision making basic elements, Decision making methods, Pay off matrix method ,Decision trees method. Information value, Computing information value for single condition & for multiple condition. Planning and control, Planning support for each management org level, Planning process model, Simple planning model, Planning basic elements. Understanding Ethical and Social Issues Related to Systems, A Model for Thinking About Ethical, Social, and Political Issue, five Moral Dimensions of the Information Age, Key Technology Trends That Raise Ethical Issues, The Moral Dimensions of Information Systems, Information Rights: Privacy and Freedom in the Internet Age, Property Rights: Intellectual Property, Accountability, Liability, and Control, System Quality: Data Quality and System Errors, Quality of Life: Equity, Access, and Boundaries. Redesign organization with information system.

References

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

2- Advanced Databases

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

References

- Jiawei Han, Micheline Kamber, “Data Mining Concept and Techniques”,2001.
- Robert wrembel, "data warehouses and OLAP-2007.
- John wang, encyclopedia of data warehousing and mining-2006.

3-Intelligent Systems

Expert Systems Using and Applications, Forward Chaining, Backward Chaining, Systems Based on Simple Search, 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.

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.

4- Computer and Data Security:

1. Introduction to Data Security, Data Security Principles, Security, Confidentiality, Threats to confidentiality, Integrity, Availability, Authentication, Non-repudiation, Assuring data validity, Authorization, Security Attack, Security Service, Security Mechanism, Basic Terminology, Basic Cryptographic Algorithms, Cryptographic Random Number Generators, Strength of Cryptographic Algorithms, Cryptanalysis and Attacks on Cryptosystems.
2. Mathematical Background, Prime Numbers , Greatest Common Divisor(GCD), (LCM) Least Common Multiple, Modular, Euler Function, Inverse Algorithm (inv), Fast Exponential, Matrix inverse.
3. Classical Encryption, Codes, Ciphers, Encryption and Cryptography, Transposition Ciphers, Keyless Transposition Ciphers, Keyed Transposition Ciphers, Combining Two Approaches, Double Transposition Ciphers, Monoalphabetic Ciphers, Additive Cipher , Shift Cipher and Caesar Cipher, Multiplicative Ciphers , Affine Ciphers , Pigpen / Masonic Cipher , Polybius Square , Polyalphabetic Ciphers, Autokey Cipher, Vigenere Cipher, Beaufort Cipher , Running Key Cipher , Polygraphic Ciphers, Playfair Cipher, Hill Cipher, Bifid Cipher , Trifid Cipher , Four-square cipher , Other Ciphers and Codes, ASCII, Beale Cipher, Book Cipher, Morse Code , One-time Pad, Semaphore
4. Data Encryption Standard (DES), , Block Cipher, ECB Operation Mode , CBC Operation Mode , Output Feedback Mode (OFM), Product Cipher , Iterated Block Cipher , Feistel Cipher , DES Cipher , Data Encryption Standard (DES), DES (Data Encryption Standard) history, Description of DES, Outline of the Algorithm , The Initial Permutation, The Key Transformation, The Expansion



- Permutatio, The S-Box Substitution , The P-Box Permutation, The Final Permutation, Decrypting DES.
5. Exponential Cipher, Introduction, Public-Key Cryptography, Why Public-Key Cryptography?, Public-Key Cryptography, Public-Key Characteristics, Public-Key Applications, Security of Public Key Schemes, Exponentiation Ciphers, Pohlig-Hellman Scheme, Security Concern, Discrete Logarithm, RSA description and algorithm, Key Generation Algorithm, Encryption, Decryption, A very simple example of RSA encryption, Security Concern, More About Euler's Theorem, Public-Key Systems, Secrecy And Authenticity, Merkle-Hellman Knapsacks, Merkle-Hellman Knapsacks, MH Knapsack, Diffie-Hellman, MH Practical Implementations, Cryptanalysis Reality!
 6. Stream Cipher, One-Time Pad or Vernam Cipher, Mathematical Proof, A Practical One-Time Pad, Basic Idea comes from One-Time-Pad , cipher, Drawback , Solution , Randomness , Pseudo-randomness , .Synchronous Stream Ciphers , Self-Synchronizing Stream Ciphers , Analysis, Linear feedback shift registers, Nonlinear combination , Generators, Example (Geffe Generator) , Nonlinear Filter Generator , Clock-controlled Generators , Example : Shrinking Generator

References:

- 1- Managing Cisco Network Security: Building Rock-Solid Networks,2000
- 2- William Stallings, *Cryptography and Network Security, (Principles and Practice)*, 2011

5- 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, 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.

6- Web Programming and E-Commerce

- E-commerce

Introduction to Web, Introduction to the Internet, The World Wide Web, The Internet and Web, The History and Growth of the Web, The Purpose of the Web, The Web Concepts, The Web Site Generations, Classifying the Web Sites, Programming Technologies E-commerce, E-commerce fundamentals , E-commerce type B2B, B2C, B2G, C2C , , E-commerce Benefits ,E-commerce Limitations, E-Commerce content and framework, E-



commerce – consumer buying behaviour model, E-commerce capability ,non-cash and online payments , smart cards ,credit card payments , E-checking, E-checking process, Electronic bill , presentment and payment , E-commerce application ,E-commerce security .
- Web programming

web programming with ASP, IIS, ASP Objects, Response Object, write , clear, end, flush, redirect, Request Object, query string, request, form, post, get , mappath, URLEncode, ASP-File System Object, copyfile, copyfolder, createtextfile, deletetextfile, deletefolder, folderexists, driverexists, fileexists, ASP Applications, dynamic web site, online examination, simple search directory, connection asp with database , ADO ,insert record , delete record , update database , simple search directory , simple E-commerce system.

References:

Web Based Application.

Web Programming with ASP.

7- 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 (enlarge , shrinking), 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 quantization, Gray level reduction, Spatial reduction, Sobel operator, Prewitt operator, Krisch compass, Robinson compass mask, Segmentation, Region growing, Clustering methods, Boundaries detects, Combined approach, Histogram (histogram modification, , Histogram Equalization, Histogram features), Image Compression, Discrete transformation, Fourier transform , cosine transform.

References

Scotte E umbaugh, "computer vision and image processing",1997.

Rafael C. Gonzalez university of Tennessee, " Digital image processing",2002

8- Project.

Description for Research Project

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

Time for Research Project

The Student given full academic year for accomplishes his study.



Exam for Research Project

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

Format for Research Projects

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

Title

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

“A protection system for an Internet site”

Abstract

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

Introduction

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

Method

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

Results

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



Discussion

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

References

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

Appendix

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



المناهج الدراسية لفرع الذكاء

مناهج فرع الذكاء الاصطناعي

First Year Syllabus

منهج المرحلة الاولى

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

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

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 المصطب	3
3	1	2	2	AI Strategies and Algorithms	استراتيجيات وخوارزميات الذكاء الاصطناعي	4
3	1	2	2	Micro-Processors and Assembly Programming	المعالجات الميكروية و البرمجة بلغة التجميع	5
3	1	2	2	Advanced Mathematics and Numerical Analysis	الرياضيات المتقدمة والتحليل العددي	6
2	1	-	2	Computation Theory	النظرية الاحتمالية	7
1	-	-	1	Human Rights and Democracy	حقوق الإنسان والديمقراطية	8
20	7	10	15	Total		

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

مجموعة الوحدات للفصل الدراسي الواحد: (20) وحدة

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

مجموعة الوحدات لسنة دراسية: (40) وحدة

Third Year Syllabus

منهج المرحلة الثالثة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Computer Graphics	رسوم الحاسوب	1
3	1	2	2	Compilers	المتجمات	2
3	1	2	2	Databases	قواعد بيانات	3
2	1	-	2	Computer Architecture	معمارية الحاسوب	4
3	1	2	2	Natural Language Processing	معالجة اللغة الطبيعية	5
3	1	2	2	Expert Systems & Metaheuristic Methods	النظم الخبيرة والطرق الاستكشافية	6
3	1	2	2	Machine learning	تعلم الماكنة	7
2	1	-	2	Operations Researches	بحوث عمليات	8
22	8	12	16	Total		

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

مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة

Total No. of Unit for Year: (44) Units

مجموعة الوحدات لسنة دراسية: (44) وحدة

Forth Year Syllabus

منهج المرحلة الرابعة

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

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

مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة

Total No. of Unit for Year: (44) Units

مجموعة الوحدات لسنة دراسية: (44) وحدة



First Year Syllabus

منهج المرحلة الاولى

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

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

مجموعة الوحدات للفصل الدراسي الواحد: (16) وحدة

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

مجموعة الوحدات لسنة دراسية: (32) وحدة

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

- Introduction, Procedural Programming Principles.
- Algorithm, Algorithm properties, Examples.
- Flowcharts, Flowchart Figure, Examples.
- C++ Language Basics
- Getting Started with C++, Character set, Identifiers, Variables and Variables Declaration, Constants, Arithmetic Operations, Assignment Operators, Relational Operators, Logical Operators, Bitwise Operator.
- The compiler directives (define and include).
- Unary Minus, Increment and /decrement Operators.
- Selection Statements
 - The Single If Statement Structure, The If/else Statement Structure, Nested If and If/else Statements
 - The Switch Selection Statement and Conditional Statement.
 - Break and Continue Control Statements
- Iteration Statements
 - While Repetition Structure
 - Do/While Statement.
 - For Statement and Nested Loops
- Functions
 - introduction, defining a function, return statement, types of functions, actual and formal arguments, local and global variables, parameters passing, recursive functions.
- Arrays



- One dimensional array (declaration, initialization, Accessing)
- Two dimensional array (declaration, initialization, Accessing).
- String manipulation
- Structures
 - Type of Structure declaration
 - Array of Structures
 - structure within structure
 - functions and structures
- Pointers
 - pointers declaration
 - pointers and functions passing parameters
 - pointers and arrays
 - arrays of pointers
 - pointers to pointers

References:

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

2. Mathematics:

- Mathematical background
- Matrix
 - Types of matrix
 - Matrix addition, subtraction, and multiplication
 - Determinant, transpose, symmetric of matrix and rank of matrix
 - Inverse of matrix, absolute value, and polynomials
 - Grammar rule for solving system of equation.
- Functions
 - Function numbers, type of numbers, theorems'' of numbers
 - Definition of function domain and range of functions
 - Graphing of function
- Limits
 - Definition of limits
 - Theorems' of limits
 - Type of limits
 - One side and two sides limits
 - Limits as infinity
 - Sandwich theorem and continues functions
- Derivation
 - Mathematical definition of derivation, rule of derivation
 - Derivation of trigonometric, inverse trigonometric, logarithm, exponential hyperbolic, inverse of hyperbolic function.
 - Implicit derivation, chain rule, higher derivation



- L'hospital rule
- Application of derivation, velocity and acceleration
- Series
- Integration, indefinite integral, rules of integral, method of integration, multiple integral
- Definite integral, application of integral area under the curve
- Area between two curves

References:

- 1- Thomas, G. Calculus and Analytic Geometry, 5th Edition, Addison Wesley, 1999.

3. Discrete Structures

- Set theory
 - Sets and subsets
 - How to specify sets, Operations on sets
 - Algebra of sets and its proves
 - Power set, Classes of sets, Cardinality
 - Sets of numbers, Finite sets and counting principle
- Mathematical induction
- Relations
 - Computer representation of relations and Digraph
 - Manipulation of relations, Properties of relations
 - Composition of relations
- Functions
 - Type of function (one-to-one & invertible function)
 - Geometrical characterization of functions
 - Sequences of sets, Recursively defined functions
- Logic and propositions
 - Basic logical operation, Equivalency
 - Tautology and Contradiction
 - Conditional and biconditional statements
 - Argument with examples
- Graphs
 - Definition, Graphs and multigraphs, Sub graph
 - Degree of graph, Connectivity, Special graph
 - Walk & length of walk, Trail, path, cycle
 - The bridges of Konigsberg
 - Traversable multigraphs, Labeled graphs
 - Minimal path, Minimum spanning tree
 - Matrices and graph
 - Trees, rooted tree, ordered rooted tree
 - polish notation, with examples
- Finite state machines



- Finite automata
- Optimistic approach to construct FSM
- Deterministic Finite state automata

References:

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

4. Computer Organization and Logic Design:

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

References:

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



5. Principles of Artificial Intelligence :

An Introduction to prolog Language, prolog Language Main Menu, prolog Language components, Facts, Simple Rules, Complex rules, built in functions in prolog Language, loop in Prolog, recursive technique, Tail Recursive in prolog, Repeat function, Fail Function, Findall function, Non Tail Recursive, List processing in prolog Language, String Processing in prolog Language.

An Introduction to A.I., A.I. Tools and Requirements, Knowledge Representation, K.R. Methods, Graphical Representation, Semantic Network, Conceptual Graph, Logical Representation, Propositional Logic, Predicate Logic, Frames K.R. Problem State Space, Problem Characteristics, Monkey & Banana Problem, 2-jug Problem, 3-rings Problem

References:

1. Luger E.George, "Artificial Intelligence Structures and Strategies ", 2005.
2. Elin Rich, "Artificial Intelligence", 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 ", Spring ,2005.
5. زينب الزرقاء وايمن 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 the statistics theory

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



- test of homogeneity
- Regression and Regression analysis.

References:

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

5. English Language:

Technical English, Primary Course Outlines

This course aims at teaching and developing students' skill in :

- **Writing and Reading :-**
 - Parts of Speech (Noun, verb, adjective, adverb, etc)
 - Structure and kinds of sentence
 - Tenses in English
 - Active and passive voice
 - Prepositions of time and place
 - How to write and understand simple paragraphs on arrange of topics within the field of the study and interest or experience
 - Develop the extensive intensive reading skills by taking different passage
 - Write your CV in summary form
 - Expose to important technical vocabulary and Idioms
 - Write scientific papers and well-structured and
- **Listening and Speaking :-** (by listening to a selected conversations on technical topics)
 - How to understand a conversion
 - How to avoid silence in conversion
 - Focus and study the pronunciation.
 - Deal with different situations academic and non academic.
 - Express ideas and give detailed accounts of experiences, and describing feelings.
 - Engage in extended conversation on most topics
 - Give opinions by providing relevant explanations, arguments and comments.
 - Give clear, detailed description of subjects within field of study or interest.
 - Vocabulary and phrases for making presentations
 - Give clearly developed presentations on subjects in the field of study.
- **Translation**
 - What is the translation , kinds and steps of translation
 - Scientific translation nature and steps
 - How to use a dictionary and machine translation.
- **Project Implementation**
 - Choose a topic and apply the items of scientific writing.
 - Make presentation by applying the rules of the four skills of the language.



References

- a. English for computer users By Santiag R.Esteras, Fourth Edition, Cambridge University Press, 2008.
- b. English Grammar In Use By Raymond Murphy, Third Edition, Cambridge University Press, 2004.
- c. English Grammar and Composition By Wren and Martin, Revised by N.O.Prasada Rao,S.Chand,, Company Ltd., New Delhi, 2007.

Second Year Syllabus

منهج المرحلة الثانية

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

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

مجموعة الوحدات للفصل الدراسي الواحد: (20) وحدة

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

مجموعة الوحدات لسنة دراسية: (40) وحدة

1- Object Oriented Programming

- Overview for functions and parameter transmission in C++
- Introduction of OOP and its main features
- Classes in OOP
 - Defining a Simple Class with Inline Member Functions
 - Constructors and destructors functions
 - Friends functions
 - Constant Members
 - Static Members
 - Default Arguments and Implicit Member Argument
- Overloading
 - Function overloading
 - Operators overloading
- Template
 - Function Template Definition
 - Function Template Instantiation
 - Class Template Definition



- Class Template Instantiation
- Inheritance and Derived Classes
 - Single inheritance and Multiple inheritances
 - Virtual Functions and polymorphism.

References:

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

2- Data Structures and Algorithms:

- Introduction to Data Structures
- Types of data structure
- Memory representation for 1D and 2D arrays
- Linear list and 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
 - Binary Search Tree
- Sorting Algorithm
 - Bubble Sort
 - Insertion Sort
 - Quick Sort)
- 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:

Database in prolog Language, Compound Objects, File processing in prolog Language, A.I. Goals (Problem Reduction and Guarantee of Solutions), More complex Search Space (More Problems Solving Approach Used), Intelligent Search Strategies (Problem state space and search space ,Problem Solving), Blind Search (Depth First Search, Breadth First Search), Heuristic Search (Heuristic Functions , Hill Climbing , Best-First – Search , A – Algorithm , A* - Algorithm), Search Space Problems, Heuristic Search Examples , 8-puzzle Problem, Salesman Problem, Tic-Tac- Toe Problem, Using Heuristics in Games, Minimax Algorithm, Alpha – Beta Algorithm, The and \ or Graph, Theorem Proving Using Resolution Technique (Predicate Logic , Clause Form), Control Strategies and Matching, Forward Chaining, Backward Chaining, Rule Cycle, Production Rules, (P.R. Example Reasoning, Matching and Response).

References:

1. Elian Rich, "Artificial Intelligence", 1991.
2. Luger E.George, "Artificial Intelligence Structures and Strategies ", 2005.
3. Stuart Russel and Peter Norvig , "Artificial Intelligent ,a Modern Approach" ,2003.
4. Amit Konar, " Artificial Intelligence and Soft Computing , Behavior and Cognitive Modeling of the Human Brain ", CRC press ,1991.
5. Dimitris Varkas and Ioannis Pl. Vlashavos, " Artificial Intelligence for Advanced Problem Solving Technique", published in the USA by Information science reference (an imprint of "IGI" Global),2008.



5- Micro-Processors and Assembly Programming:

CPU Architecture, Register Transfer, Memory, Peripheral Control Chips, Data Transfer, Fetch and Execute Cycles, Address and Data and Control Busses, Brief Introduction to Machine Code, Instruction Sets (Form, 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- Advance Mathematic and Numerical Analysis:

- Partial differentiation
 - Partial differentiation for first and higher order of derivative
 - Chain rule and directional derivative)
 - First order differential equations
 - Solution of differential equation by direct integration
 - Separating the variables and homogeneous equation
- Second and higher order differential equations
 - Linear second order differential equation with constant
 - Variation method
- Laplace transform for standard important function
 - Multiplication by tn , division by t
 - Inverse Laplace transform of derivatives
- Formatting of Partial differential equation
 - Types of partial differential equations
- Fourier series and periodic functions
 - Fourier series for odd and even function
 - Half range Fourier sin and cosine series
- Change of interval
- Numerical analysis and 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.
- The solution of integral equation, trapezoidal method
- Simpsons method

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

References:

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

8- حقوق الانسان والديمقراطية:

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

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

المصادر

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

Third Year Syllabus

منهج المرحلة الثالثة

No. of Units	Tutorial	No. of Lab. hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Computer Graphics	رسوم الحاسوب	1
3	1	2	2	Compilers	المتجمات	2
3	1	2	2	Databases	قواعد بيانات	3
2	1	-	2	Computer Architecture	معمارية الحاسوب	4
3	1	2	2	Natural Language Processing	معالجة اللغة الطبيعية	5
3	1	2	2	Expert Systems & Metaheuristic Methods	النظم الخبيرة و الطرق الاستكشافية	6
3	1	2	2	Machine learning	تعلم الماكنة	7
2	1	-	2	Operations Researches	بحوث عمليات	8
22	8	12	16	Total		

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

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

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:

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

2- Compilers:

Programming Language, Introduction to Compiler, Type of Errors, One Pass Compiler, Syntax Definition, Context Free Grammar, Parsing Tree & leftmost and rightmost derivations, Transition Graph, Lexical analysis, Syntax of Analysis, Problems of Compiler, First and Follow, Top down Parsing, Predictive Parsing Method, LL(1), Error Detection and Reporting, Bottom up Parsing, Operation Precedence Parser, Simple Left to Right Parser, Canonical LR Parser, Look Ahead LR, Semantic Analysis, Intermediate Code Generation, Code Optimization, Examples of Code Optimization, Code Generation.

References: Principles of Compiler Design ,Alfred V. Aho, Jeffrey D. Ulman 2003.



3- Databases :

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

References

1. Database system concepts, Abraham sillberchatsz & Henry F. Korth, 6th Edition.

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., hardwired 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- 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 & Metaheuristic Methods:

Introduction to Expert System (- Expert System Components, - Expert System Architecture, Expert System Life cycle), Rule Based Expert Systems (Design and Architecture) (Chemical Synthesis System, Forward Chaining,- Backward Chaining, Pattern Recognition System, Text Recognition), System that depend under uncertainty (Probability method, Approximation method, Fuzzy net method), Systems that Explain their Actions (How Facility, Why Facility, Shell Facility, Method Based Expert Systems (Design, Architecture and characteristics), Classification Systems (Backward Chaining, Forward Chaining, Prediction System (Weather Forecasting System), Case Based Expert System (Design, Architecture and Expert System), Heuristic Rule (Principles and Used), (Embedded Systems based on heuristic rule, Student Advisor system). Concept of Metaheuristic, Some Problems, Single Solution Metaheuristic (Local Search, Simulated Annealing, Tabu Search, Iterated Local Search, Variable Neighborhood Search, Guided Local Search, GRASP), Population Solution Metaheuristic



(Evolutionary Strategy, Evolutionary Algorithm, Scatter Search, Cultural Algorithm, Memetic Algorithm), Swarm Intelligent (Bees Colony Algorithm, Particle Swarm Optimization).

References:

- 1- Daniel H. Marcellus, Expert Systems Programming in Turbo Prolog, Prentice Hall (New Jersey) 1992.
- 2- George F. Luger, Artificial Intelligence (structures and strategies for complex problem solving), 2005.
- 3- Daniel Borrajo , " Current Topics in Artificial Intelligence ", Springer ,2007.
- 4- Joseph C. Giarratano and Gray D. Riley, "Expert systems, principles and programming ", Thomson, 2005.
- 5- Computational Intelligent by Andries P. Engelbrecht
- 6- Metaheuristic by Talibi Elghazali, 2006.
- 7- Clever Algorithms by Bronili K., 2010.

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 basis), 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.

References:

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



- 8- William A. Stubblefield & Luger E. George, "Artificial Intelligence and the Design of Expert Systems", 1998.

8- Operations Researches:

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

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	Moulding and Simulation	النمذجة والمحاكاة	1
2	1	-	2	Predicted and Decision Making	التنبؤ واتخاذ القرار	2

Forth Year Syllabus

منهج المرحلة الرابعة

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

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

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

1- Planning & Robotics:

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

References:

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



2- Communications and Computer Networks

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

References:

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

3- Computer and Data Security:

1. Introduction to Data Security, Data Security Principles, Security, Confidentiality, Threats to confidentiality, Integrity, Availability, Authentication, Non-repudiation, Assuring data validity, Authorization, Security Attack, Security Service, Security Mechanism, Basic Terminology, Basic Cryptographic Algorithms, Cryptographic Random Number Generators, Strength of Cryptographic Algorithms, Cryptanalysis and Attacks on Cryptosystems.
2. Mathematical Background, Prime Numbers , Greatest Common Divisor(GCD), (LCM) Least Common Multiple, Modular, Euler Function, Inverse Algorithm (inv), Fast Exponential, Matrix inverse.
3. Classical Encryption, Codes, Ciphers, Encryption and Cryptography, Transposition Ciphers, Keyless Transposition Ciphers, Keyed Transposition Ciphers, Combining Two Approaches, Double Transposition Ciphers, Monoalphabetic Ciphers, Additive Cipher , Shift Cipher and Caesar Cipher, Multiplicative Ciphers , Affine Ciphers , **Pigpen / Masonic Cipher** , **Polybius Square** , Polyalphabetic Ciphers, Autokey Cipher, Vigenere Cipher, Beaufort Cipher , Running Key Cipher , Polygraphic Ciphers, Playfair Cipher, Hill Cipher, Bifid Cipher , Trifid Cipher , **Four-square cipher** , Other Ciphers and Codes, ASCII, Beale Cipher, Book Cipher, Morse Code , One-time Pad, Semaphore
4. Data Encryption Standard (DES), , Block Cipher, ECB Operation Mode , CBC Operation Mode , Output Feedback Mode (OFM), Product Cipher , Iterated Block Cipher , Feistel Cipher , DES Cipher , Data Encryption Standard (DES), DES (Data Encryption Standard) history, Description of DES, Outline of the Algorithm , The Initial Permutation, The Key Transformation, The Expansion Permutatio, The S-Box Substitution , The P-Box Permutation, The Final Permutation, Decrypting DES.



5. Exponential Cipher, Introduction, Public-Key Cryptography, Why Public-Key Cryptography?, Public-Key Cryptography, Public-Key Characteristics, Public-Key Applications, Security of Public Key Schemes, Exponentiation Ciphers, Pohlig-Hellman Scheme, Security Concern, Discrete Logarithm, RSA description and algorithm, Key Generation Algorithm, Encryption, Decryption, A very simple example of RSA encryption, Security Concern, More About Euler's Theorem, Public-Key Systems, Secrecy And Authenticity, Merkle-Hellman Knapsacks, Merkle-Hellman Knapsacks, MH Knapsack, Diffie-Hellman, MH Practical Implementations, Cryptanalysis Reality!
6. Stream Cipher, One-Time Pad or Vernam Cipher, Mathematical Proof, A Practical One-Time Pad, Basic Idea comes from One-Time-Pad , cipher, Drawback , Solution , Randomness , Pseudo-randomness , .Synchronous Stream Ciphers , Self-Synchronizing Stream Ciphers , Analysis, Linear feedback shift registers, Nonlinear combination , Generators, Example (Geffe Generator) , Nonlinear Filter Generator , Clock-controlled Generators , Example : Shrinking Generator

References:

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

William Stallings, *Cryptography and Network Security, (Principles and Practice)*, 2011

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- Data Warehouse & Data Mining

History of Data, History of data warehousing, Data warehouse Concepts, Granularity, The Benefits of Granularity, Data of Data Warehouse, Data Warehouse Definition, Subject Orientation, Data Integration, Non-volatility, Time Variant, Reasons for building Data warehouse, General Reasons, Design of data warehouses, Data warehouse Constructions, Data Acquisition/Collection, Metadata, Metadata types, Data mart, Trustworthiness/Security, Data Warehouse Architecture, Architecture components, Type of Architecture, Structuring Data in the Data Warehouse, Data Homogeneity and Heterogeneity, Types of Distributed Data Warehouses, Data Warehouse and the Web, Detecting Intrusions by Data



Mining, Distributed Data Warehouse, Reduction in costs of Data warehouse, Unstructured Data and the Data Warehouse, The Data Warehouse and the ODS, Data Mining philosophy, What motivated to Data Mining, Why is data mining important?, Why data mining now?, Why is data mining Necessary?, Data Mining Definition, Alternative names of DM, Data Mining Objectives, Data Mining Application, Advantages of Data Mining, Disadvantages of data mining, Data Mining Techniques, Data Mining: On What Kind of Data? General Data Mining Functionalities, Data Mining Activities or tasks, Trends that Effect Data Mining, Data Mining Algorithms, Database Vis Data Mining, Data Mining Process, KDD Process, Data Mining Development, Overview of association rules algorithms, Classification based on Association rules, Mining Association rules with Multiple Min-supports, Cyclic Association Rules, FP-growth method, Some areas which are related to data mining, Cube view of Data, Data cub technology, OLAM and OLAP architecture, Classification by decision tree, Multidimensional data model, Mining multimedia database, Mining the World Wide Web, Visual and audio data mining, Detecting Intrusions by Data Mining.

References

1. W. H. Inmon "**Building the Data Warehouse**", Fourth Edition. Published by Wiley Publishing, Inc, Indianapolis, Indiana, 2005
2. Bhansali, Neera. "**Strategic Data Warehousing: Achieving Alignment with Business**". CRC Press. United States of America. 2010.
3. Wang, John. "**Encyclopedia of Data Warehousing and Mining**". Second Edition. Published by Information Science Reference. United States of America. 2009.
4. Prabhu, S., and N. Venkatesan. "**Data Mining and Warehousing**". Published by New Age International (P) Ltd., Publishers. 2007.

6- Web Programming :

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

References:

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

7- Machine Vision

Image Acquisition (Image representation, Image Processing, Image Analysis, Image Classification), Machine Vision Techniques (Elementary Image processing Functions, Monadic Point – by – point operators, Intensity histogram, Look-up-table (LUT), Dyadic, point- by – point ,Local operator (Neighborhood operation), Linear local operator, non-linear local operator, Edge Detections, N- tuple



operators (templates), Gray Scale Corner Detection, Segmentation, Non-contextual technique –thresholding, Contextual technique, Pixel Connectivity, Region Similarity, Region growing, The split and merge algorithm), Mathematical Morphology (Dilation and Erosion, Opening and Closing, Skeletonisation), Pattern Recognition (Pattern Recognition System Design, Feature Selection, Boolean Operators, Binary object features (object measurements), Size management,- Shape measurement, Location measurement, Pattern Classification, Template matching, Distance measure, Similarity measures, Optical character Recognition (OCR),Content Based Image Retrieval (CBIR)

References:

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

8- Project.

Description for Research Project

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

Time for Research Project

The Student given full academic year for accomplishes his study.

Exam for Research Project

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

Format for Research Projects

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

Title

Title would normally include the major variables of student study. For example:
“A protection system for an Internet site”

Abstract

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

Introduction

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

Method

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



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

Results

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

Discussion

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

References

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

Appendix

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

Elective Subjects for Forth Year

المواضيع الاختيارية للمرحلة الرابعة

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



المناهج الدراسية لفرع الأمنية



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 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 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

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

مجموعة الوحدات للفصل الدراسي الواحد: (15) وحدة

مجموعة الوحدات لسنة دراسية: (30) وحدة

Second Year Syllabus

منهج المرحلة الثانية

No. of Units	Tutorial	No. of Lab. hour	No. Of 2 Theory hour	Subject	اسم المادة	ت
3	1	2	2	Object Oriented programming	البرمجة الشيئية	1
3	1	2	2	Data Structures and Algorithms	هياكل البيانات والخوارزميات	2
3	1	2	2	Advance Mathematic and Numeric Analysis	الرياضيات المتقدمة والتحليل العددي	3
2	1	-	2	Information Theory	نظرية معلومات	4
3	1	2	2	Stream cipher and public Key Cryptography	التشفير الانسيابي والمفتاح العام	5
2	1	-	2	Number Theory	نظرية الارقام	6
2	1	-	2	Computation Theory	النظرية الاحتمالية	7
1	-	-	1	Human rights and Democracy	حقوق الانسان وديمقراطية	8
19	7	8	15	Total		

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

Total No. of Unit for Year: (36) Units

مجموعة الوحدات للفصل الدراسي الواحد: (18) وحدة

مجموعة الوحدات لسنة دراسية: (36) وحدة



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
3	1	2	2	Computer Architecture and microprocessor	معمارية الحاسبة و المعالجة المايكروية	3
2	1	-	2	Secure software design	أمنية تصميم البرمجيات	4
3	1	2	2	Artificial Intelligent	الذكاء الاصطناعي	5
3	1	2	2	Block cipher Cryptography	التشفير الكتلي	6
3	1	2	2	Computer Network s	شبكات الحاسوب	7
3	1	2	2	multimedia	تعدد الوسائط	8
23	7	14	16	Total		

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

مجموعة الوحدات للفصل الدراسي الواحد: (23) وحدة

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

مجموعة الوحدات لسنة دراسية: (46) وحدة

Forth Year Syllabus

منهج المرحلة الرابعة

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

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

مجموعة الوحدات للفصل الدراسي الواحد: (20) وحدة

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

مجموعة الوحدات لسنة دراسية: (40) وحدة



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 المهيكلية	.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
- Getting Started with C++, Character set, Identifiers, Variables and Variables Declaration, Constants, Arithmetic Operations, Assignment Operators, Relational Operators, Logical Operators, Bitwise Operator.
- The compiler directives (define and include).
- Unary Minus, Increment and /decrement Operators.
- Selection Statements
 - The Single If Statement Structure, The If/else Statement Structure, Nested If and If/else Statements
 - The Switch Selection Statement and Conditional Statement.
 - Break and Continue Control Statements
- Iteration Statements
 - While Repetition Structure
 - Do/While Statement.
 - For Statement and Nested Loops
- Functions
 - introduction, defining a function, return statement, types of functions, actual and formal arguments, local and global variables, parameters passing, recursive functions.
- Arrays
 - One dimensional array (declaration, initialization, Accessing)
 - Two dimensional array (declaration, initialization, Accessing).



- String manipulation
- Structures
 - Type of Structure declaration
 - Array of Structures
 - structure within structure
 - functions and structures
- Pointers
 - pointers declaration
 - pointers and functions passing parameters
 - pointers and arrays
 - arrays of pointers
 - pointers to pointers

References:

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

2. Mathematics:

- Mathematical background
 - Matrix
 - Types of matrix
 - Matrix addition, subtraction, and multiplication
 - Determinant, transpose, symmetric of matrix and rank of matrix
 - Inverse of matrix, absolute value, and polynomials
 - Grammar rule for solving system of equation.
 - Functions
 - Function numbers, type of numbers, theorems'' of numbers
 - Definition of function domain and range of functions
 - Graphing of function
 - Limits
 - Definition of limits
 - Theorems' of limits
 - Type of limits
 - One side and two sides limits
 - Limits as infinity
 - Sandwich theorem and continues functions
 - Derivation
 - Mathematical definition of derivation, rule of derivation
 - Derivation of trigonometric, inverse trigonometric, logarithm, exponential hyperbolic, inverse of hyperbolic function.
-



- Implicit derivation, chain rule, higher derivation
- L'hospital rule
- Application of derivation, velocity and acceleration
- Series
- Integration, indefinite integral, rules of integral, method of integration, multiple integral
- Definite integral, application of integral area under the curve
- Area between two curves

References:

- 1- Thomas, G. Calculus and Analytic Geometry, 5th Edition, Addison Wesley, 1999.

3. Discrete Structures

- Set theory
 - Sets and subsets
 - How to specify sets, Operations on sets
 - Algebra of sets and its proves
 - Power set, Classes of sets, Cardinality
 - Sets of numbers, Finite sets and counting principle
 - Mathematical induction
 - Relations
 - Computer representation of relations and Digraph
 - Manipulation of relations, Properties of relations
 - Composition of relations
 - Functions
 - Type of function (one-to-one & invertible function)
 - Geometrical characterization of functions
 - Sequences of sets, Recursively defined functions
 - Logic and propositions
 - Basic logical operation, Equivalency
 - Tautology and Contradiction
 - Conditional and biconditional statements
 - Argument with examples
 - Graphs
 - Definition, Graphs and multigraphs, Sub graph
 - Degree of graph, Connectivity, Special graph
 - Walk & length of walk, Trail, path, cycle
 - The bridges of Konigsberg
 - Traversable multigraphs, Labeled graphs
 - Minimal path, Minimum spanning tree
-



- Matrices and graph
- Trees, rooted tree, ordered rooted tree
- polish notation, with examples
- Finite state machines
 - Finite automata
 - Optimistic approach to construct FSM
 - Deterministic Finite state automata

References:

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

4. Computer Organization and Logic Design:

Number system conversion

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

References:

1. *Computer System Architecture, M. Morris Mano, Third Edition, 1993.*
-



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

5.Principals of security:

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

References:

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



6. Probability Theory:

- Counting Techniques (Permutation and combination)
- Probability theory
 - Definition
 - sample space
 - kind of event
 - probability rules
 - simple probability
 - compound probability
 - addition and multiplication rules
 - tree diagram
 - venn diagram, condition probability)
- probability distributions
 - {discrete= binomial, multinomial, poisson, hypergeometric}
 - {continues = normal, exponential}
 - test of hypothesis {normal curve, chi-square}

References:

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

7- English language:

This course aim at teaching and developing students' skills in:
Technical English, Primary Course Outlines

- **Writing and Reading :-**
 - Parts of Speech (Noun, verb, adjective, adverb, etc)
 - Structure and kinds of sentence
 - Tenses in English
 - Active and passive voice
 - Prepositions of time and place
 - How to write and understand simple paragraphs on arrange of topics within the field of the study and interest or experience
 - Develop the extensive intensive reading skills by taking different passage
 - Write your CV in summary form
 - Expose to important technical vocabulary and Idioms
 - Write scientific papers and well-structured and
 - **Listening and Speaking :-** (by listening to a selected conversations on technical topics)
 - How to understand a conversion
 - How to avoid silence in conversion
-



- Focus and study the pronunciation.
 - Deal with different situations academic and non academic.
 - Express ideas and give detailed accounts of experiences, and describing feelings.
 - Engage in extended conversation on most topics
 - Give opinions by providing relevant explanations, arguments and comments.
 - Give clear, detailed description of subjects within field of study or interest.
 - Vocabulary and phrases for making presentations
 - Give clearly developed presentations on subjects in the field of study.
- **Translation**
- What is the translation , kinds and steps of translation
 - Scientific translation nature and steps
 - How to use a dictionary and machine translation.
- **Project Implementation**
- Choose a topic and apply the items of scientific writing.
 - Make presentation by applying the rules of the four skills of the language.

References

- a. English for computer users By Santiag R.Esteras, Fourth Edition, Cambridge University Press, 2008.
 - b. English Grammar In Use By Raymond Murphy, Third Edition, Cambridge University Press, 2004.
 - c. English Grammar and Composition By Wren and Martin, Revised by N.O.Prasada Rao,S.Chand,, Company Ltd., New Delhi, 2007.
-



Second Year Syllabus

منهج المرحلة الثانية

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

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

- Overview for functions and parameter transmission in C++
- Introduction of OOP and its main features
- Classes in OOP
 - Defining a Simple Class with Inline Member Functions
 - Constructors and destructors functions
 - Friends functions
 - Constant Members
 - Static Members
 - Default Arguments and Implicit Member Argument
- Overloading
 - Function overloading
 - Operators overloading
- Template
 - Function Template Definition
 - Function Template Instantiation
 - Class Template Definition



- Class Template Instantiation
- Inheritance and Derived Classes
 - Single inheritance and Multiple inheritances
 - Virtual Functions and polymorphism.

References:

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

2- Data Structures and Algorithms:

- Introduction to Data Structures
 - Types of data structure
 - Memory representation for 1D and 2D arrays
 - Linear list and 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
 - Binary Search Tree
 - Sorting Algorithm
 - Bubble Sort
 - Insertion Sort
-



- Quick Sort)
- 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 Numerical Analysis:

- Partial differentiation
 - Partial differentiation for first and higher order of derivative
 - Chain rule and directional derivative)
 - First order differential equations
 - Solution of differential equation by direct integration
 - Separating the variables and homogeneous equation
 - Second and higher order differential equations
 - Linear second order differential equation with constant
 - Variation method
 - Laplace transform for standard important function
 - Multiplication by tn , division by t
 - Inverse Laplace transform of derivatives
 - Formatting of Partial differential equation
 - Types of partial differential equations
 - Fourier series and periodic functions
 - Fourier series for odd and even function
 - Half range Fourier sin and cosine series
 - Change of interval
 - Numerical analysis and 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.
-



- The solution of integral equation, trapezoidal method
- Simpsons method

References:

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

4-Information Theory.

basic concept of probability 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, error detection and correction code.

References:

- 1- Coding and Information Theory , Richard W.Hamming.
- 2- an introduction to information theory, Fazlollah M. Reza.

5- Public key and Stream cipher Cryptography:

Public Key Cryptography: Introduction of Cryptography, Types, Principles of Public-Key Cryptosystem, Diffie and Hellman, Applications for Public-Key Cryptosystems, Key exchange, RSA public-Key cryptosystem for encryption/decryption, RSA Signature Scheme, RSA security, ElGamal Public-Key encryption/decryption, security of ElGamal, ElGamal Signatures, Merkle-Hellman Knapsack, McEliece public-key encryption.

Stream Cipher_structure, Important element for design a stream cipher, Types of stream ciphers, Polynomial Arithmetic, Primitive polynomial, Irreducible Polynomial Introduction SR, key stream generator, Feedback Function , TAP Sequence, Maximal Length Tap Sequences, Linear Equivalence, Nonlinear Shift Register, Nonlinear combination generators, Five Basic Tests.

References:

1. Schneider,B., " Applied Cryptography: Protocols, Algorithms and Source code in C", Second Edition , New York©John Wiley & Sons, 1996.
 2. Beker, H. and Piper, F., "Cipher Systems", Wiley, 1982
 3. William Stallings, " Cryptography and network security Principle and Practice". by ,2011
-



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:

languages, 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, transition graph, Kleen theorem, Two way finite automata with output (mealy machine, moor machine), The equivalence of mealy and moor machine, Push down automata, Top down –bottom up derivation, Turing machine.

References:

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



8- Human rights and Democracy.

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

المصادر

- 1- حقوق الانسان والطفل والديمقراطية
د ماهر صالح علاوي الجبوري وآخرون
- 2- محاضرات في الديمقراطية- د فيصل شطناوي
- 3 – الموقع www.saaaid.net والموقع ejjabat.google.com



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
3	1	2	2	Computer Architecture and microprocessor	معمارية الحاسوب و المعالجة المايكروية	3
2	1	-	2	Secure software design	أمنية تصميم البرمجيات	4
3	1	2	2	Artificial Intelligent	الذكاء الاصطناعي	5
3	1	2	2	Block cipher Cryptography	التشفير الكتلي	6
3	1	2	2	Computer Networks	شبكات الحاسوب	7
3	1	2	2	multimedia	تعدد الوسائط	8
23	7	14	16	Total		

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

مجموعة الوحدات للفصل الدراسي الواحد: (23) وحدة

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

مجموعة الوحدات لسنة دراسية: (46) وحدة

1- Compilers:

Programming Language, Introduction to Compiler, Type of Errors, One Pass Compiler, Syntax Definition, Context Free Grammar, Parsing Tree & leftmost and rightmost derivations, Transition Graph, Lexical analysis, Syntax of Analysis, Problems of Compiler, First and Follow, Top down Parsing, Predictive Parsing Method, LL(1), Error Detection and Reporting, Bottom up Parsing, Operation Precedence Parser, Simple Left to Right Parser, Canonical LR Parser, Look Ahead LR, Semantic Analysis, Intermediate Code Generation, Code Optimization, Examples of Code Optimization, Code Generation.

References:

1. Principles of Compiler Design ,Alfred V. Aho, Jeffrey D. Ulman.2003

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,..),database system architecture (centralized, client server architecture, distributed systems, database security, organization in physical database model (sequential file, indexed connected files, hash indexing ,spars index, dense index, primary and secondary indices).



References:

1. Database system concepts, Abraham sillberchatsz & Henry F. Korth, 4th Edition.
2. Database system concepts, Abraham sillberchatsz & Henry F. Korth, 6th Edition.

3- Computer Architecture and processor:

- Introduction to microprocessor
- An overview of microcontroller
- Types of microprocessor
- Serial data transfer scheme
- Interrupt structure of microprocessor 80286
- Advanced microprocessor 80286
(introduction to 80286, features of 80286, real and protected mode ,segmentation & paging)
- Microcontroller architecture.

4- Secure software design

- Introduction to Software Security

Software Security Goals, Problems of Producing Secure Software, Overview of Software Development Stages, Secure Software Development Model (SSDM), Software Project Goals, The Notion of Software Security, Software Security Vs Application Security, Software Security Vs Information Security, Hackers, Crackers, and Attackers.

- Selecting Technologies

Choosing a Language, Choosing an Operating System, Authentication Technologies

- **The Ten Best Practices for Secure Software Development**
- Open Source and Closed Source
- Buffer Overflows

Buffer Overflows is a Security Problem, Defending Against Buffer Overflows, Stack Overflows.

- Random Numbers

Pseudo-random Number Generator (PRNG), Determining What Kind of Random Numbers to Use, Getting Random Integers, Getting a Random Integer in a Range

- Race Conditions

The Critical Section Problem, Peterson's Solution to Critical Section Problem, Semaphore Solution to Critical Section Problem.

- Input/ Data Validation

Source of Input, Approaches to Validate Input Data

- Password Authentication
-



Password Selection, Password Authentication

- Access Control

Understanding the Unix Access Control Model, Understanding the Windows Access Control Model, Determining Whether a User Has Access to a File, Determining Whether a Directory Is Secure, Erasing Files Securely

- Database Security
- Copyright & Copy Protection
- Secure Session Management

Session hijacking

- Thread Modeling
- Attack tree, Use case, Misuse case, Thread Modeling Tools

References:

1. J. Viega, G. McGraw, "Building Secure Software", Addison Wesley, 2002.
2. J. Viega, M. Messier, "Secure Programming Cookbook", O'Reilly, 2003.
3. A. S. Sodiya, S. A. Onashoga, and O. B. Ajayi, "Towards Building Secure Software Systems", University of Agriculture, Nigeria, 2006.
4. Silberschats A., Galvin P. and Gagne G., "Operating System Concepts", 7th Edition 2005.

5- Artificial Intelligent:

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

References:

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



6- Block cipher Cryptography

Historically, Symmetric Cipher Model, Feistel Mode, Confusion and Diffusion, S-Boxes, P-Boxes, Data Encryption standard DES, The criteria for the P-Box, Multiple DES, DESX, CAST, GOST, RC5, Blowfish, Twofish FEAL, Rijndael.

References:

4. Schneider,B.," Applied Cryptography: Protocols, Algorithms and Source code in C", Second Edition , New York©John Wiley & Sons, 1996.
5. Beker, H. and Piper, F.,"Cipher Systems", Wiley, 1982
6. WilliamStallings," Cryptography and network security Principle and Practice". by ,2011.

7- Computer Network:

1. Introduction to data communications (components, data rresentation, data flow)
2. Networks (distributed processing, Network criteria, physical structure, Network models, Network categories)
3. layered tasks (sender, receiver, carrier, hierarchy, OSI MODEL, TCP Model)
4. Data link Protocols
(ARP,FTP,TELNET,DNS,UDP,NFS,RPC,SMTP,TFTP,HTTP,WAIS,)
5. Transmission Media (guided media (twisted pair, coaxial cable, fiber optical cable)
 1. (Unguided Media (Radio Waves, Microwaves, Infrared)
6. Error detection and correction
7. Network Layer/logical addressing (Address space, IPV4 Addressing, IPV6 Addressing)
8. Dynamic Addressing, routable and non routable protocols

References:

1. Data communications and Networking, fourth edition, Behrouz A.Forouzan

8- Multimedia

- 1- Introduction to multimedia, component of multimedia, multimedia applications, hypermedia and multimedia, Internet Technology, multimedia authoring.
 - 2- computer Graphics: Drawing lines, simple algorithms, DDA (digital differential analyzer) Algorithms, circle drawing algorithms, bresenham's circle algorithms, 2D Transformations (Pictures Translation, Pictures Scaling, Pictures Rotation, Pictures reflection).
-



- 3- Digital image, digitization (sampling and quantization). type and format of images, images geometry. arithmetic and logical spatial filters, mean filter, daof image, histogram equalization.
- 4- introduction to analogue and digital audio, format of digital audio, multimedia system sound, introduction to analogue and digital video, format of digital video.
- 5- multimedia data compression, sound and video compression, animation techniques,, virtual realty.

References:

1. Ze-Nian Li and Mark S Drew, "Fundamentals of Multimedia", Prentice Hall, 2004.
2. Gaurav Bhatnagar, Shikha Mehta and Sugata Mitra, "Introduction to Multimedia Systems", Academic Press, 2002.
3. Tay Vaughan, "Multimedia: Making It Work", 8th Edition, The McGraw-Hill companies, 2010.

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
2	-	-	2	Intrusion Detection	تعقب المتطفلين	1
3	-	2	2	Neural Networks + Genetic Algorithms	الشبكات العصبية و الخوارزميات الجينية	2
3	-	2	2	Internet and Intranet	أنترنت وانترانيت	3
3	-	2	2	Compilers	المتجمات	4
3	-	2	2	Databases	قواعد البيانات	5



Forth Year Syllabus

منهج المرحلة الرابعة

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

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

مجموعة الوحدات للفصل الدراسي الواحد: (20) وحدة

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

مجموعة الوحدات لسنة دراسية: (40) وحدة

1- Intelligent Systems:

Expert Systems Using and Applications, Forward Chaining, Backward Chaining, Systems Based on Simple Search, 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.

References:

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



2- Mobile and networks Security:

1.Introduction to Network and Mobile Security

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

2: Vulnerabilities

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

3: Fundamental Security Mechanizes

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

4: Security in Network

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

5:Security in Mobile Telecommunication Networks

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

6: Security in Next Generation Mobile Networks

- 6.1. Introduction
 - 6.2. The SIP
-



- 6.3. VoIP
- 6.4. IP Multimedia Subsystem (IMS)
- 6.5. 4G security
- 6.6. Confidentiality

References:

1. Wireless and Mobile Network Security, Hakima Chuouchi, Maryline Laurent_ Makharicius, Wiley, 2009.
2. Mobile Computing Principles, Reza R. Far, 2005.

3- Cryptanalysis:

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

References:

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

4- Secure Operating System :

Introduction, What is an operating system? Operating system operations: (dual mode operation and timer) Batch systems, Multiprogramming, Time-sharing system, Distributed systems, Real-time systems, Multimedia systems, Handheld systems, Operating system services, User operating system interface, System calls, Types of system calls, System programs, Operating system structures, Simple structure, Layered approach, Microkernels, Modules, Process concept, Process scheduling Interprocess communication, CPU scheduling, Basic concepts, Scheduling criteria, Scheduling algorithms, Multilevel queue scheduling, Multilevel feedback queue scheduling, Goals of protection, Principles of protection, Domain of protection, Access matrix, Access control, UNIX example for operating system protection, Deadlocks, System model, deadlock characteristics, Methods for handling deadlocks: Deadlock prevention, deadlock avoidance, deadlock detection,



Recovery from deadlock, Security problems, Program threats, System and network threats, Implementing security defenses, Firewalls to protect system and networks, Windows XP example for operating system security, Memory management, Background, swapping, continuous memory allocation, Memory management, Paging and Segmentation, Virtual Memory ,Demand paging, Page replacement ,real time system.

Reference:

1. **OPERATING SYSTEM CONCEPTS -7th Edition By: Silberschats A., Galvin P. and Gagne G; 2008**

5- Advanced cryptography:

Polynomial Arithmetic, reducible and irreducible polynomials, Quadratic residues and quadratic reciprocity ,Finite Fields Of the Form $GF(2^n)$, Evaluation Criteria For AES, The AES Cipher, Polynomials with Coefficients in $GF(2^8)$, Simplified AES, Multiple Encryption and Triple DES, Placement of Encryption Function, Key Distribution, Discrete Logarithms, Principles of Public-Key Cryptosystems, Elliptic Curve ,Introduction, Elliptic Curve Arithmetic(Elliptic curves over finite fields , elliptic curve discrete logarithm problem , Elliptic curve cryptography , elliptic curve factorization algorithm , Elliptic curves over F_2 and over F_{2^k}),Menezes-Vanstone Elliptic curve ,ElGamal, Massey-Omura ,Elliptic Curve Digital Signature Algorithm .

References:

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

6- Web Programming

Web Based Application, Introduction, The world wide web, The internet and web, The history and growth of the web, internet service provider , Http, The purpose of the web, web application ,The web concepts, Hypertext, web page, web site, web page address, web browsing, The classifying the web sites, environment, the general approach, range of complexity, Client side, HTML, CSS, external , internal , scripting language, Java script, create data object ,function , popup Boxes, create an array, document.getElementById ,web programming with ASP, internet information server , ASP Principles, ASP Objects, Response Object, write , clear, end, redirect, Request Object, querystring, request, form, get ,post, external, internal, cookies, execute, ASP-File System Object, bulidpath, copyfile, copyfolder, createtextfile, deletefile, deletefolder, folderexistes, driverexistes, fileexists, ASP Applications, dynamic web site,



Asp with ADO, insert, delete, update, online examination, simple search directory, simple Email system.

References:

Web Based Application.
Web Programming with ASP.
www.W3school.com

7- Multimedia Security

Main Subdisciplines of Information Hiding, A Brief History of Information Hiding, Some Applications of Information Hiding, Frameworks for Secret Communication, Security of information hiding, Information Hiding in Noisy Data, Information Hiding in Written Text, Examples of Invisible Communication, Least Significant Bit Substitution, active and malicious attackers, watermarking and copyright protection, basic watermarking principles, watermarking applications, requirements and algorithmic design issues, finger printing, examples, classification of fingerprint, Cover-Regions and Parity Bits, Palette-Based Images, Information Hiding in Binary Images, Steganography in the DCT Domain, Information Hiding and Data Compression, Statistical Steganography, Encoding Information in Formatted Text, Distortion of Digital Images.

References:

- 1- Information Hiding Techniques for Steganography and Digital Watermarking By Stefan Katzenbesser, Fabien Pericolos, 2000.
- 2- Steganography and watermarking attacks and countermeasure / 2000

8- Project.

Description for Research Project

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

Time for Research Project

The Student given full academic year for accomplishes his study.

Exam for Research Project

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



Format for Research Projects

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

Title

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

“A protection system for an Internet site”

Abstract

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

Introduction

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

Method

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

Results

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



Discussion

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

References

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

Appendix

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

Elective Subjects for Forth Year

المواضيع الاختيارية للمرحلة الرابعة

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



المناهج الدراسية لفرع
ادارة شبكات الحاسوب
2013-2014



First Year Syllabus

منهج المرحلة الاولى

No. of Units	Tutorial	No. of Lab hour	No. of Theory hour	Subject	أسم المادة	ت
4	1	2	3	Structure Programming	البرمجة المهيكلة	1
2	1	-	2	Mathematics	الرياضيات	2
3	1	2	2	Principles of Network	مبادئ الشبكات	3
2	1	-	2	Discrete Structures	الهياكل المنقطعة	4
3	1	2	2	Logic Design	تصميم منطقي	5
2	1	-	2	Computer and Network Organization	تركيب الحاسوب و الشبكات	6
Pass	-	-	2	English Language	اللغة الانكليزية	7
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	أسم المادة	ت
3	1	2	2	Object Oriented Programming	البرمجة الشيئية	1
3	1	2	2	Data Structure & Algorithms	هياكل البيانات والخوارزميات	2
2	-	-	2	Network Protocols	بروتوكولات الشبكة	3
3	1	2	2	Database	قواعد البيانات	4
3	1	2	2	Computation Theory and compiler	نظرية احتسابية ومترجمات	5
3	1	2	2	Advanced Mathematics & Numerical Analysis	الرياضيات المتقدمة والتحليل العددي	6
2	1	-	2	Coding & Information Theory	الترميز و نظرية المعلومات	7
1	-	-	1	Human Rights and Democracy	حقوق الانسان والديمقراطية	8
20	6	10	15	Total		

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

مجموعة الوحدات للفصل الدراسي الواحد: (20) وحدة

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

مجموعة الوحدات لسنة دراسية: (40) وحدة



Third Year Syllabus

منهج المرحلة الثالثة

No. of Units	Tutorial	No. of Lab hour	No. of Theory hour	Subject	أسم المادة	ت
3	1	2	2	Wireless Techniques	تقنيات لاسلكية	1
3	1	2	2	Computation Theory and compiler	نظرية احتسابية ومترجمات	2
3	-	2	2	Computer and Data Security	امنية الحاسبات والبيانات	3
2	-	-	2	Computer Architecture	معمارية الحاسوب	4
3	1	2	2	Digital Signal Processing (DSP)	معالجة الاشارة الرقمية	5
3	1	2	2	Distributed data base	قواعد البيانات الموزعة	6
3	1	2	2	Artificial intelligent Techniques	تقنيات الذكاء الاصطناعي	7
2		-	2	Operation Research	بحوث العمليات	8
22	5	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	أسم المادة	ت
3	1	2	2	Network Security	أمنية الشبكات	1
3	1	2	2	Distributed Operating system	انظمة التشغيل الموزعة	2
3	1	2	2	Multimedia	الوسائط المتعددة	3
2	-	-	2	Communication	الاتصالات	4
3	1	2	2	Web Programming	برمجة المواقع	5
3	1	2	2	Switching and Routing in Network	التبديل والتوجيه في الشبكة	6
2	1	-	2	Networks Management	ادارة الشبكات	7
3	-	4	1	The Project	المشروع	8
22	6	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



مناهج فرع إدارة الشبكات

First Year Syllabus

منهج المرحلة الأولى

No. of Units	Tutorial	No. of Lab hour	No. of Theory hour	Subject	أسم المادة	ت
4	1	2	3	Structure Programming	البرمجة المهيكلية	1
2	1	-	2	Mathematics	الرياضيات	2
3	1	2	2	Principles of Networks	مبادئ الشبكات	3
2	1	-	2	Discrete Structures	الهياكل المتقطعة	4
3	1	2	2	Logic Design	تصميم منطقي	5
2	1	-	2	Computer and Network Organization	تركيب الحاسوب و الشبكات	6
Pass	-	-	2	English Language	اللغة الانكليزية	7
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
- Getting Started with C++, Character set, Identifiers, Variables and Variables Declaration, Constants, Arithmetic Operations, Assignment Operators, Relational Operators, Logical Operators, Bitwise Operator.
- The compiler directives (define and include).
- Unary Minus, Increment and /decrement Operators.
- Selection Statements
 - The Single If Statement Structure, The If/else Statement Structure, Nested If and If/else Statements
 - The Switch Selection Statement and Conditional Statement.
 - Break and Continue Control Statements
- Iteration Statements
 - While Repetition Structure
 - Do/While Statement.
 - For Statement and Nested Loops
- Functions
 - introduction, defining a function, return statement, types of functions, actual and formal arguments, local and global variables, parameters passing, recursive functions.

**Network Management
Branch**



- Arrays
 - One dimensional array (declaration, initialization, Accessing)
 - Two dimensional array (declaration, initialization, Accessing).
- String manipulation
- Structures
 - Type of Structure declaration
 - Array of Structures
 - structure within structure
 - functions and structures
- Pointers
 - pointers declaration
 - pointers and functions passing parameters
 - pointers and arrays
 - arrays of pointers
 - pointers to pointers

References:

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

2. Mathematics:

- Mathematical background
- Matrix
 - Types of matrix
 - Matrix addition, subtraction, and multiplication
 - Determinant, transpose, symmetric of matrix and rank of matrix
 - Inverse of matrix, absolute value, and polynomials
 - Grammar rule for solving system of equation.
- Functions
 - Function numbers, type of numbers, theorems'' of numbers
 - Definition of function domain and range of functions
 - Graphing of function
- Limits
 - Definition of limits
 - Theorems' of limits
 - Type of limits
 - One side and two sides limits
 - Limits as infinity
 - Sandwich theorem and continues functions
- Derivation
 - Mathematical definition of derivation, rule of derivation
 - Derivation of trigonometric, inverse trigonometric, logarithm, exponential hyperbolic, inverse of hyperbolic function.

**Network Management
Branch**



- Implicit derivation, chain rule, higher derivation
- L'hospital rule
- Application of derivation, velocity and acceleration
- Series
- Integration, indefinite integral, rules of integral, method of integration, multiple integral
- Definite integral, application of integral area under the curve
- Area between two curves

References:

- 1- Thomas, G. Calculus and Analytic Geometry, 5th Edition, Addison Wesley, 1999.

3. Principles of Networks

- Introduction to Computer Networks
- Network Classification:
 - LAN,MAN and WAN
- Network topologies:
 - Mesh, Star, Bus and Ring
- The advantages and disadvantages of each topology.
- Transmission Media:
 - Magnetic Media, Twisted Pair, Baseband Coaxial Cable, Broadband Coaxial Cable and Fiber Optics, Cabling Summary,
- Wireless Transmission
 - Radio Transmission,
 - Microwave Transmission
 - Infrared and Milimeter waves
 - Light wave transmission and Wireless LAN Media Summary
 - internetwork (Internet)
- The advantages and disadvantages of computer Network Components:
 - NIC, Repeater HUB, Bridge, Router, BRouter ,GATEWAY Data Flow
- Design Issues For The Layer
 - Reference Model
 - The OSI Reference model
 - The Relationship of Services to Protocols
 - The Physical Layer, The Data Link Layer, The Network Layer, The Transport Layer, The Session Layer The Presentation Layer, The Application Layer, Data Transmission in the OSI Model,
- The TCP/IP Reference Model,
- Comparison of the OSI and TCP Reference Models,

References:

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



4. Discrete Structures

- Set theory
 - Sets and subsets
 - How to specify sets, Operations on sets
 - Algebra of sets and its proves
 - Power set, Classes of sets, Cardinality
 - Sets of numbers, Finite sets and counting principle
- Mathematical induction
- Relations
 - Computer representation of relations and Digraph
 - Manipulation of relations, Properties of relations
 - Composition of relations
- Functions
 - Type of function (one-to-one & invertible function)
 - Geometrical characterization of functions
 - Sequences of sets, Recursively defined functions
- Logic and propositions
 - Basic logical operation, Equivalency
 - Tautology and Contradiction
 - Conditional and biconditional statements
 - Argument with examples
- Graphs
 - Definition, Graphs and multigraphs, Sub graph
 - Degree of graph, Connectivity, Special graph
 - Walk & length of walk, Trail, path, cycle
 - The bridges of Konigsberg
 - Traversable multigraphs, Labeled graphs
 - Minimal path, Minimum spanning tree
 - Matrices and graph
 - Trees, rooted tree, ordered rooted tree
 - polish notation, with examples
- Finite state machines
 - Finite automata
 - Optimistic approach to construct FSM
 - Deterministic Finite state automata

References:

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



5. Logic Design:

- Number system
 - Decimal.
 - Binary.
 - Octal.
 - Hexadecimal.
- Addition and subtraction
 - binary,
 - octal
 - Hexadecimal.
- Logic gats.
- Boolean algebra and simplification and demerger's.
- K-map.
- Combinational universal NAND and NOR logic.
 - Half-adder, full-adder, 4- bit parallel adder, and Subtract adder.
- Decoder, encoder, multiplexer, and demultiplexer.
- Sequential logic circuits and Flip-flop, SR, D, and JK flip-flop.
- Shift register 3-bit and 4- bit.
- Binary counter 3-bit and 4- bit.
- State diagram FSA, ROM and RAM.

References:

1. Computer System Architecture M. Morris Mano
2. Digital fundamentals by Floyd, 2009
3. Fundamental of digital logic and Microcomputer design, fifth addition.

6. Computer and Network Organization:

- Introduction to computer architecture
- Computer definition, History of computer
- Application with computer system
- Computer classification [analog, digital, hybrid]
- Main parts of a personal computer
- Hardware: the structure of computer system
 - Input units, Output units
 - Central processing units [CPU] , CPU components [ALU,RS,CU], CPU operations
 - Main memory, Primary storage, Type of main memory [RAM,ROM]
 - Instruction format with memory
 - Secondary storage , Type of secondary storage
- Software Programs and application programs and utilities
- System software and operating system and utilities
- Application packages.
- Data and Signals
 - Analog and Digital, Analog and Digital Data, Analog and Digital Signals

**Network Management
Branch**



- Periodic and Nonperiodic Signals
- Periodic Analog Signals
 - Sine Wave, Phase , Wavelength
 - Time and Frequency Domains
 - Composite Signals, Bandwidth
- Digital Signals
 - Bit Rate, Bit Length
 - Digital Signal as a Composite Analog Signal
 - Transmission of Digital Signals
- Transmission Impairment
 - Attenuation, Distortion, Noise
- Data Rate Limits
 - Noiseless Channel: Nyquist Bit Rate
 - Noisy Channel: Shannon Capacity
 - Using Both Limits
- Performance
 - Bandwidth, Throughput
 - Latency (Delay), Bandwidth-Delay Product

References :

1. Computer System Architecture, M. Morris Mano, Third Edition, 1993.
2. “Data Communication and Networking”, Behrouz A. Forouzan, 2007.

7. English Language:

Technical English, Primary Course Outlines

This course aims at teaching and developing students’ skill in :

- **Writing and Reading :-**
 - Parts of Speech (Noun, verb, adjective, adverb, etc)
 - Structure and kinds of sentence
 - Tenses in English
 - Active and passive voice
 - Prepositions of time and place
 - How to write and understand simple paragraphs on arrange of topics within the field of the study and interest or experience
 - Develop the extensive intensive reading skills by taking different passage
 - Write your CV in summary form
 - Expose to important technical vocabulary and Idioms
 - Write scientific papers and well-structured and
- **Listening and Speaking :-** (by listening to a selected conversations on technical topics)
 - How to understand a conversion
 - How to avoid silence in conversion
 - Focus and study the pronunciation.
 - Deal with different situations academic and non academic.



- Express ideas and give detailed accounts of experiences, and describing feelings.
 - Engage in extended conversation on most topics
 - Give opinions by providing relevant explanations, arguments and comments.
 - Give clear, detailed description of subjects within field of study or interest.
 - Vocabulary and phrases for making presentations
 - Give clearly developed presentations on subjects in the field of study.
- **Translation**
- What is the translation , kinds and steps of translation
 - Scientific translation nature and steps
 - How to use a dictionary and machine translation.
- **Project Implementation**
- Choose a topic and apply the items of scientific writing.
 - Make presentation by applying the rules of the four skills of the language.

References :

- a. English for computer users By Santiag R.Esteras, Fourth Edition, Cambridge University Press, 2008.
- b. English Grammar In Use By Raymond Murphy, Third Edition, Cambridge University Press, 2004.
- c. English Grammar and Composition By Wren and Martin, Revised by N.O.Prasada Rao,S.Chand,, Company Ltd., New Delhi, 2007.



Second Year Syllabus

منهج المرحلة الثانية

No. of Units	Tutorial	No. of Lab hour	No. of Theory hour	Subject	أسم المادة	ت
3	1	2	2	Object Oriented Programming	البرمجة الشيئية	1
3	1	2	2	Data Structure & Algorithms	هياكل البيانات والخوارزميات	2
2	-	-	2	Network Protocols	بروتوكولات الشبكة	3
3	1	2	2	Database	قواعد البيانات	4
3	1	2	2	Computation Theory and compiler	نظرية احتسابية ومترجمات	5
3	1	2	2	Advanced Mathematics & Numerical Analysis	الرياضيات المتقدمة والتحليل العددي	6
2	1	-	2	Coding & Information Theory	الترميز و نظرية المعلومات	7
1	-	-	1	Human Rights & Democracy	حقوق الانسان والديمقراطية	8
20	6	10	15	Total		

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

مجموعة الوحدات للفصل الدراسي الواحد: (20) وحدة

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

مجموعة الوحدات لسنة دراسية: (40) وحدة

1- Object Oriented Programming

- Overview for functions and parameter transmission in C++
- Introduction of OOP and its main features
- Classes in OOP
 - Defining a Simple Class with Inline Member Functions
 - Constructors and destructors functions
 - Friends functions
 - Constant Members
 - Static Members
 - Default Arguments and Implicit Member Argument
- Overloading
 - Function overloading
 - Operators overloading
- Template
 - Function Template Definition
 - Function Template Instantiation
 - Class Template Definition
 - Class Template Instantiation
- Inheritance and Derived Classes
 - Single inheritance and Multiple inheritances
 - Virtual Functions and polymorphism.



References:

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

2- Data Structures and Algorithms:

- Introduction to Data Structures
- Types of data structure
- Memory representation for 1D and 2D arrays
- Linear list and 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
 - Binary Search Tree
- Sorting Algorithm
 - Bubble Sort
 - Insertion Sort
 - Quick Sort)
- Searching algorithm
 - Sequential Search
 - Binary Search

References:

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



4. Data Structures using C and C++, Yedidyah language, Moshe J. augenstein, Aaeon M. Tenenbaum, Brooklyn College.

3- Network Protocols

- Physical Layer
 - EIA/TIA-232
 - EIA/TIA-449
 - ITU-T-V-Series
 - DSL
 - IEEE 802.3
 - IEEE 802.11
 - IEEE 802.15
 - IEEE 802.16
 - Bluetooth
 - RS-232
- Network Layer
 - IP (v4 ,and v6)
 - ARP
 - ICMP
 - IPSec
 - IPX (Internetwork Packet Exchange)
- Transport layer
 - TCP (Transmission Control Protocol)
 - UDP (User Datagram Protocol)
 - SPX (Sequenced Packet Exchange)
- Application Layer
 - NNTP (Network News Transfer Protocol)
 - SSI
 - DNS (Domain Name System)
 - FTP (File Transfer Protocol)
 - HTTP
 - NFS (Network File System)
 - NTP (Network Time Protocol)
 - SMTP (Simple Mail Transfer Protocol)
 - SNMP (Simple Network Management Protocol)
 - Telnet
 - DHCP (Dynamic Host Configuration Protocol).

References:

- 1-"Network Protocols Handbook", 2nd Edition, Javvin Technologies Inc,2005.



4- Database:

- Centralized database system
 - Introduction and the purpose of database
 - Comparing between a file processing system and DBMS
- Data Abstraction and file system disadvantage
- Entity relationship model
 - Entities and entity sets
 - Relationships and relationship set
 - Attributes and mapping
 - Constraints and keys
- Relational model
 - Data representation in relational model (Tables, Records, and keys)
- Tables joining and Instant and schema
- Database Administrator and database design process
- Data base cardinality
- Weak entity in ER model
- ER model and relational model examples
- Indexing
 - Primary indexing
 - Secondary indexing
 - Index update
 - Hash index
- Normalization
- System architecture
- Transaction
- Database security
 - Access control
 - encryption

References:

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

5- Computation Theory and Compiler

- 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

**Network Management
Branch**



- Chomsky Normal Form
- Greibach Normal Form
- 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)
- Push down automata
- Top down –bottom up derivation
- Turing machine.
- Programming Language
- Introduction to Compiler
- One Pass Compiler
- Syntax Definition
- 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
- Computer and data security

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

6- Advance Mathematic and Numerical Analysis:

- Partial differentiation
 - Partial differentiation for first and higher order of derivative
 - Chain rule and directional derivative)
 - First order differential equations
 - Solution of differential equation by direct integration
 - Separating the variables and homogeneous equation
- Second and higher order differential equations
 - Linear second order differential equation with constant
 - Variation method

**Network Management
Branch**



- Laplace transform for standard important function
 - Multiplication by tn , division by t
 - Inverse Laplace transform of derivatives
- Formatting of Partial differential equation
 - Types of partial differential equations
- Fourier series and periodic functions
 - Fourier series for odd and even function
 - Half range Fourier sin and cosine series
- Change of interval
- Numerical analysis and 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.
- The solution of integral equation, trapezoidal method
- Simpsons method

References:

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

7- Coding and Information theory:

- Mode of the signal system
- Encoding a source alphabet
- Some particular code: ASCII code & more code
- The measure of information
 - Self information
 - Average information
 - Binary source and ternary source
 - Mutual information
- Normal noisy channel
 - Noiseless channel
 - Total noisy channel
- Channel capacity
 - Channel efficiency
 - Channel redundancy
- Source efficiency
- Symmetric channel
 - Capacity of symmetric channel
- Cascade channel
- Source coding technique



- Average length of coding
 - Code efficiency and redundancy
 - Fixed length coding
 - Variable length coding
 - Source coding for special source
 - Shannon-fano method
 - Huffman binary coding method
 - Huffman ternary coding
- Extension of source

References

1. “Coding and Information Theory“,Richard Hamming ,1986

-8- حقوق الإنسان و الديمقراطية

- مفهوم حقوق الإنسان وحقوق الإنسان في الشرائع السماوية (الشريعتين اليهودية والمسيحية)
- فئات حقوق الإنسان وحقوق الإنسان في الاسلام
- مصادر حقوق الإنسان
- اول المصادرات الدولية (الاعلان العالمي لحقوق الإنسان وقيمه القانونية)
- الحقوق التي يتضمنها الاعلان العالمي لحقوق الإنسان
- العهدان الدوليان الخاصان بحقوق الإنسان لسنة 1966
- ثانيا المصادرات الوطنية (اعلان حقوق الإنسان والمواطن الفرنسي 1789)
- ضمانات حقوق الإنسان
 - الضمانات على الصعيد الداخلي
 - اول الضمانات الدستورية
 - ثانيا الضمانات القضائية
- الرقابة بطريق الدعوى الاصلية (رقابة الالغاء)
- الرقابة بطريق الدفع بعدم الدستورية (رقابة الامتناع)-الرقابة القضائية على اعمال الادارة
- ضمانات حقوق الإنسان على الصعيد الدولي-ميثاق الامم المتحدة
- الجمعية العامة للامم المتحدة-المجلس الاقتصادي والاجتماعي
- مجلس حقوق الإنسان
- التقدم التكنولوجي واثره على الحقوق والحريات
 - اول الاحزاب السياسية وحقوق الإنسان
 - ثانيا العولمة وحقوق الإنسان

المصادر

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



Third Year Syllabus

منهج المرحلة الثالثة

No. of Units	Tutorial	No. of Lab hour	No. of Theory hour	Subject	أسم المادة	ت
3	1	2	2	Wireless Techniques	تقنيات لاسلكية	1
3	1	2	2	Computation Theory and compiler	نظرية احتسابية و مترجمات	2
3	-	2	2	Computer and Data Security	امنية الحاسبات والبيانات	3
2	-	-	2	Computer architecture	معمارية الحاسوب	4
3	1	2	2	Digital Signal Processing (DSP)	معالجة الاشارة الرقمية	5
3	1	2	2	Distributed data base	قواعد البيانات الموزعة	6
3	1	2	2	Artificial intelligent Techniques	تقنيات الذكاء الاصطناعي	7
2	-	-	2	Operation Research	بحوث العمليات	8
22	5	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

جموعه الوحدات لسنة دراسية: (44) وحدة

1. Wireless Techniques

Applications and requirements of wireless service:

- GSM and worldwide cellular revolution
- New wireless systems
- Type of services
 - Broadcast
 - Paging
 - Cellular telephony
 - Trunking radio
 - Cordless telephony
 - Wireless local area networks and PAN
 - Satellite cellular communication
- Requirements for the wireless services
 - Data Rate
 - Range and number of users
 - Mobility
 - Use of spectrum
 - Direction of transmission
 - Service quality
- Wireless propagation channels
 - Wireless communication service (WCS)
 - Propagation mechanism
 - Channel specification
 - Link calculation
- Antennas : characteristics antenna quantities
 - Antenna for mobile stations



- Monopole and dipole antennas
- Helical antennas
- Microstrip antennas
- Planar invert-F antenna
- Multiband antenna
- Antenna for base stations
 - Types of antennas
 - Array antennas
- Multiband access and advanced transceiver schemes
 - Frequency division multiple access
 - Multiple access via frequency
 - Trunking gain
 - Time division multiple access
 - Packet Radio
 - ALOHA
 - Carrier-sense multiple access
 - Principle of cellular networks
 - Reuse distance
 - Cell shape
 - Spread spectrum systems
 - Frequency-hopped multiple access
 - Code division multiple access
 - Cellular code-division multiple access
 - Multiuser detection
 - Time hopping impulse radio
- Orthogonal frequency division multiplexing (OFDM)
- Wireless systems
 - Global system for mobile communication(GSM)
 - System overview
 - Air interface
 - Logical and physical channels
 - Coding
 - Voice encoding
 - Channel encoding
 - cryptography
- Wireless local area network (WLAN) : Applications
 - 802.11a
 - 802.11b
 - 802.11g
 - 802.11n
- Ad-hoc network
- Ad hoc Network Types
- There are several types of ad hoc networks, such as Wireless Body Area Networks (WBANs), Wireless Personal Area Networks (WPANs), Wireless Local Area Networks (WLANs), Wireless Sensor Networks (WSNs), etc.,
- Advantages of Ad hoc Networks
- Limitations of Ad hoc Networks
- Understanding WLAN Signal Strength
 - Transmitter power



- Cable losses between the transmitter and its antenna and cable losses between the receiver and its antenna
- Antenna gain of the transmitter and receiving antenna gain
- Localization of the two antennas
- Receiver sensitivity

Reference:

- 1- Wireless communication: principles and practice by Theodore 2002
- 2- Wireless communication by Andreas F. 2nd 2011
- 3- Wireless by Hap Hapner 2012.
- 4- "RF Power Values", Cisco Systems Inc., 2008.
- 5- http://www.cisco.com/en/US/tech/tk722/tk809/technologies_tech_note09186a00800e90fe.shtml
- 6- Lisa Phifer; "Understanding WLAN Signal Strength", Core Competence Inc., 2005.

2-Computation Theory and Compiler

- 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
 - 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)
- Push down automata
- Top down –bottom up derivation
- Turing machine.
- Programming Language
- Introduction to Compiler
- One Pass Compiler
- Syntax Definition
- 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
- Computer and data security

References :

6. H.R.Lewis And G.H Papadimitiou, "Elements Of The Theory Of Computation", Prentig-Hall, 1981.
7. R.W.Floyd And R.Beigel, "The Languae Of Machine:An Introduction To Computability And Formal Languages"Computer Science Press, Network, 1994.
8. M.Sipser. "Introduction To The Theory Of Computation" ,Boston Pws Pub ,1996.
9. Principles of Compiler Design ,Alfred V. Aho, Jeffry D. Ulman.
Basics of Compiler design ,Torben Mogenes 2000-2008.

3. Computer and Data Security:

- Introduction of Data security:-terminology and 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
 - 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 LFSR sand A5.
- Public Key Algorithms
 - Background
 - knapsack algorithm
 - RSA
 - Pohlig Hellman
 - Rabin
 - ElGamal
 - McEliece and Elliptic Curve Cryptosystems.
- Public key Digital Signature Algorithm
 - Digital Signature Algorithm (DSA)
 - DSA variants and GOST

References:

- 1- Cryptography and Network Security, William Stalling , 2003

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., Hardwired 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-Digital Signal Processing

- **N Signal and systems**
 - introduction to DSP
 - D/A, A/D and sampling rate
 - basic types of digital signals
 - periodic and periodic signal
 - Even and odd signal.
- **Discrete time system**
 - System proprieties
 - Block diagram representation of LTIS
 - Difference equation
 - Step and impulse response of LTIS
 - Convolutions sum correlation.
- **Fourier analysis**
 - Discrete time FT and its properties
 - Frequency response
 - DFT and properties
 - FFT.
- **Z-transform**



- one side properties
- Inverse z-transform
- poles, zeros location in z-plane and the stability
- **Design of digital filter**
 - Fundamental structures of digital filters
 - Design of FIR filters by windowing
 - Design of IIR filter).

References

1. M.N. Hayes, DSP, 2007.
2. P. Lynn, Introductory DSP, 1998.

6-Distributed Databases

- Structure of Distributed Database
 - Trade-offs in Distributed Database
 - Advantages of data distribution
 - Data sharing and distributed control
 - Speeding up query processing,
- Design of distributed database
 - Data Replication, Reliability, and Availability
 - Increased parallelism
 - Increased overhead on update
- Data fragmentation
 - Horizontal fragmentation
 - vertical fragmentation
 - Mixed fragmentation
- Transparency and Autonomy
- Naming of data items
- Fragmentation of data items
- Location fragments and replicas
- Recovery in Distributed systems
- Robustness
- Commit protocols
- Concurrency controls
- Time stamping
- Deadlock Handling

References :

1. Hersry K. Korth, “Database System Concepts”, 1991.
2. Kroenke, “Database Concept”, 2005.

7-Artificial Intelligence Techniques

- Introduction
 - What means by A.I.



Network Management Branch

- Knowledge Representation Methods.
- Heuristic Search Methods.
- Neural Networks
 - Background
 - The Neuron: Biological and Simulated Neuron.
 - Types of Learning Strategies.
 - Back Propagation, Hopfield, BAM and Kohonen NN.
- Genetic Algorithms (GA)
 - Introduction & historical view.
 - Components of algorithms: Selection methods and Operators.
 - Crossover and Mutation.
 - Parameters of GA.
 - GA and search methods.
 - Genetic Programming and Applications.
- Some Metaheuristic Algorithms.
 - What means by Metaheuristic?
 - Local Search.
 - Tabu Search.
 - Simulated Annealing.
 - VNS.
 - GRASP.
 - Others.....
- Fuzzy Logic
 - Introduction.
 - Fuzzy sets: Continuous Fuzzy sets, Discrete Fuzzy sets.
 - Logical operators: Fuzzy intersection, Fuzzy implication, Fuzzy union.
 - Compositional rule of inference (continuous & discrete).
 - Fuzzification & Defuzzification.

References

1. Fundamentals of Neural Networks: Architecture, Algorithms, and application. By Laurene Fausett.
2. A.I. Strategies & Methods, George F. Luger, 2009.
3. Neural Networks. Fundamentals, Application, Examples. By Werner Kinnebrock
4. Machine Learning, Tom Mitchell, McGraw Hill, 1997.
5. Fuzzy system hand book, Byearl Cox, 1999.
6. Metaheuristics : from design to implementation, El-Ghazali Talibi, John Wile & Sons, 2009.

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

References:

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



Forth Year Syllabus

منهج المرحلة الرابعة

No. of Units	Tutorial	No. of Lab hour	No. of Theory hour	Subject	أسم المادة	ت
3	1	2	2	Network Security	أمنية الشبكات	1
3	1	2	2	Distributed Operating system	انظمة التشغيل الموزعة	2
3	1	2	2	Multimedia	الوسائط المتعددة	3
2	-	-	2	Communication	اتصالات	4
3	1	2	2	Web Programming	برمجة المواقع	5
3	1	2	2	Switching and Routing in Network	التبديل والتوجيه في الشبكة	6
2	1	-	2	Networks Management	ادارة الشبكات	7
3	-	4	1	The Project	المشروع	8
22	6	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. Network Security

- Introduction to Network and Mobile Security
 - Definition of security
 - Introductions to network
 - Mobile Internet networks
 - Security Attacks.
 - Methods of Defence.
- Vulnerabilities
 - Reasons for Security Problems.
 - Security Threats.
 - Security Involving Programs.
 - Trojan Horse Applications.
- Fundamental Security Mechanizes
 - Introduction.
 - Encryption:
 - Port Protection:
 - Traffic Control:
- Security Service
 - Message Confidentiality
 - Message Integrity
 - Message Authentication
- Point –To-Point Protocol

Network Management
Branch



- Framing
- Transition Phases
- Multiplexing
- Multilink PPP
- Message No repudiation
- Entity Authentication
- Message Confidentiality
 - Confidentiality with Symmetric-Key Cryptography
 - Confidentiality with Asymmetric-Key Cryptography
- Message Integrity
 - Document and Fingerprint
 - Message and Message Digest
 - Difference
 - Creating and Checking the Digest
 - Hash Function Criteria
 - Hash Algorithms: SHA-1
- Message Authentication
- MAC
- Digital Signature
 - Comparison
 - Need for Keys
 - Process
 - Services
 - Signature Schemes
- Entity Authentication
 - Passwords
 - Challenge-Response
- Key Management
 - Symmetric-Key Distribution
 - Public-Ke Distribution
- Security in Network
 - Kerberos Authentication System
 - Firewalls
 - Intrusion Detection Systems
 - Secure E-Mail
 - Multilevel Security on Networks
- Security in Mobile Telecommunication Networks
 - Introduction
 - Signalling
 - Security in the GSM
 - GPRS security
 - 3G security

**Network Management
Branch**



- Network interconnection
- Security in Next Generation Mobile Networks
 - Introduction
 - The SIP
 - VoIP (voice over IP)
 - IP Multimedia Subsystem (IMS)
 - 4G security

References:

1. “Data Communication and Networking”, Behrouz A. Forouzan, 2007.

2. Distributed Operating System

- Operating system overview
- Operating system History and types:- Main frame systems, Desktop systems, Multiprocessor systems, Distributed systems, Clustered systems, Real time systems, Handheld systems
- Computing environment
- Computer system structure
- Hardware protection
- operating system structure
- operating system components
- operating system services
- processes
- process concepts
- operation on processes
- cooperating process
- threads
- CPU scheduling(concepts, Scheduling Criteria, Scheduling Algorithms, First Come First Served and Shortest Job First, Priority Scheduling algorithm and Round Robin Algorithm, Multi level queue scheduling, multiprocessor scheduling, real time scheduling
- Deadlocks
- Process synchronization
- Memory Management
- Distributed file systems
 - Naming and transparency
 - Remote file access
 - Stateful versus stateless service
 - File replication
 - Event ordering
 - Mutual exclusion
 - Atomicity
 - Concurrency control
 - Deadlock handling



- Election algorithms
- Reaching agreement
- Real Time System
 - System characteristics
 - Features of real time kernel
 - Implanting real time operating system
 - Real time CPU scheduling

References

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

3. Multimedia

- Introduction to Multimedia
 - Elements of Multimedia
 - Interactivity
 - Multimedia Production
- Hypermedia and Multimedia
- Text
 - Text Compression
- Digitizing Image
 - Image file format
 - Image Compression
- Digitizing Audio and Video
 - Audio Compression
 - Video Compression
- Streaming Stored Audio/Video
 - First Approach: Using a Web Server
 - Second Approach: Using a Web Server with Metafile
 - Third Approach: Using a Media Server
 - Fourth Approach: Using a Media Server and RTSP
- Streaming Live Audio and Video
- Real- Time Interaction Audio and Video
 - Characteristics
 - RTP
 - RTP Packet Format
 - UDP Port
 - RTCP
 - Sender Report
 - Receiver Report
 - Source Description Message
 - Bye Message
 - Application-Specific Message
 - UDP Port
- Voice over IP

References:

1. “Data Compression”, David Salomon, 2007.
2. “Data Communication and Networking”, Behrouz A. Forouzan, 2007



3. “Multimedia: Making it Work “,Tay Vaughan,2011

4. Communication

- Fundamentals of Data communication, Characteristics of data communication
 - Data and Signal fundamentals
 - Analog Signals
 - Digital Signals
- Digital Transmission and Analog Transmission
 - Digital-to-Digital Conversion
 - Analog-to-Digital Conversion
 - Pulse Code Modulation, Delta Modulation, Transmission Modes.
 - Digital-to-Analog Conversion
 - ASK,FSK,PSK
 - Analog-to-Analog Conversion,
- CIRCUIT-SWITCHED NETWORKS
 - Three Phases
 - Efficiency
 - Delay
 - Circuit-Switched Technology in Telephone Networks
- DATAGRAM NETWORKS
 - Routing Table
 - Efficiency
 - Delay
 - Datagram Networks in the Internet
- VIRTUAL-CIRCUIT NETWORKS
 - Addressing
 - Three Phases
 - Efficiency
 - Delay in Virtual-Circuit Networks
 - Circuit-Switched Technology in WANs
- STRUCTURE OF A SWITCH
 - Structure of Circuit Switches
 - Structure of Packet Switches
 - Modulation Techniques Switching
 - Error Detection & Correction
 - Multiplexing, Switching:
 - Circuit switched networks, Data gram networks, Virtual circuit networks
 - Dial up modems, DSL.
 - Error Detection and Correction: Block coding
 - cyclic codes, Linear block codes, checksum
- Data Link Control and Internet
 - Framing: Flow and Error Control protocols



- Noisy and Noiseless channels
- HDLC, Point to point protocols.
- WWW, HTTP, SMTP, POP3, IMAP, FTP.

References :

1. “Data communication and networking”, Behrouz A. Forouzan.

5.Web Programming

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

References:

Web Based Application.
Web Programming with ASP.
www.W3school.com

6.Switching and Routing in Network

- **Routing and switching strategies**
 - Switching: Forwarding and Filtering Traffic
Forwarding based on MAC address
 - Routing: Finding paths
Routing devices
Static Routes
Default Routes
Dynamic Routes
Routing Protocols
Installing Routes
Routing Loops
Discard or null routing
- **Classification of Ad hoc Routing Protocols:**
 - **Routing information update mechanisms**
 1. **Proactive routing protocols**



Optimized Link-State Routing Protocol (OLSR)

2. **Reactive routing protocols**

Dynamic Source Routing (DSR) protocol (**Route Discovery, Route Maintenance, Packet Forwarding, Packet Formats**)

3. **Hybrid routing protocols**

Zone Routing Protocol (ZRP)

• **Geographical position of nodes in the network.**

1. **Greedy Forwarding**

Most Forward within distance R (MFR)

2. **Restricted directional flooding**

Distance Routing Effect Algorithm for Mobility (DREAM)

3. **Hieratical approaches**

GRID routing protocol

➤ **Spanning Tree and Rapid spanning tree**

- The structure of spanning tree
- The Comparison Algorithm
- Spanning Tree Addressing
- Port States
- Spanning Tree Timers

Spanning Tree Messages

Problems with Spanning Tree

Switch to Switch: A Special Case

➤ **Bridging and LAN switching: Cisco Improvements**

- Port fast
- Uplink fast
- Backbone fast
- VLANs and Spanning Tree
- The Rapid Spanning Tree Protocol

➤ **Quality of Service (QoS)**

- TOS and IP precedence
- Differentiates Service Code Point
- Queuing Techniques

➤ **VLANs and Trunking**

- Problem: Big Broadcast Domains
- What Is a VLAN?
- The Effect of VLANs
- VLAN Ports
- Types of VLANs
- VLANs between Switches
- What is a Trunk?
- Trunking Protocol Standards
- Pruning

➤ **Wide Area Networks**

- Implementation Point-to-Point WANs
- Understanding Fram Relay Concepts



- **Routing Information Protocol**
 - Protocol Description
 - Structure
 - Basic Operation
 - Timers
 - Addressing
 - RIP and Loops
- **Open Shortest Path First**
 - Protocol Description
 - Link State
 - Structure and Basic Operation

References

1. Bruce Hartpence “Packet guide to Routing and Switching”, 2011
2. Cisco press “Routing and Switching”, 2013
3. Unnikrishnan P.; “**Introduction and Analysis of DSR Protocol**”, Helsinki University of Technology, 2004.
4. Hamma S., Cizeron E., Issaka H., Guedon J.; “**Performance Evaluation of Reactive and Proactive Routing Protocol in IEEE 802.11 Ad Hoc Network**”, Published in “ITCom, France (2006)”.
5. David B., David A., Josh B. ; “**DSR: The Dynamic Source Routing Protocol for Multi-Hop Wireless Ad Hoc Networks**”, Carnegie Mellon University, 1999.
6. Ricard B., Eduard L., Juan M. O., Marc T.; “**Ad hoc Networks and Routing Algorithms**”, 2002.
7. Liana K. Qabajeh, Laiha M. Kiah, Mohammad M. Qabajeh; “**A Qualitative Comparison of Position-Based Routing Protocols for Ad-Hoc Networks**”, IJCSNS International Journal of Computer Science and Network Security, VOL.9 No.2, February 2009.

5. Network Management

- Data Link Control
 - FRAMING
 - Fixed-Size Framing
 - Variable-Size Framing
- FLOW AND ERROR CONTROL
 - Flow Control
 - Error Control
- PROTOCOLS
- NOISELESS CHANNELS
 - Simplest Protocol
 - Stop-and-Wait Protocol
- NOISY CHANNELS
 - Stop-and-Wait Automatic Repeat Request
 - Go-Back-N Automatic Repeat Request
 - Selective Repeat Automatic Repeat Request

**Network Management
Branch**



- Piggybacking
- HDLC
 - Configurations and Transfer Modes
 - Frames
 - Control Field
- Congestion Control and Quality
- Data Traffic
 - Traffic Descriptor
 - Traffic Profiles
- CONGESTION
 - Network Performance
- CONGESTION CONTROL
 - Open-Loop Congestion Control
 - Closed-Loop Congestion Control
- IWO EXAMPLES
 - Congestion Control in TCP
 - Congestion Control in Frame Relay
- QUALITY OF SERVICE
 - Flow Characteristics
 - Flow Classes
- TECHNIQUES TO IMPROVE QoS
 - Scheduling
 - Traffic Shaping
 - Resource Reservation
 - Admission Control
- INTEGRATED SERVICES
 - Signaling
 - Flow Specification
 - Admission
 - Service Classes
 - RSVP
 - Problems with Integrated Services
- DIFFERENTIATED SERVICES
 - DS Field
- QoS IN SWITCHED NETWORKS
 - QoS in Frame Relay
 - QoS in ATM

References:

1. “Data communication and networking”, Behrouz A. Forouzan,
2. “ Administration CISCO QoS in IP Networks”
3. “Network Management Fundamentals”, Alexander Clemm, Ph.D. , 2007 Cisco Systems, Inc.



8. Project:

Description for Research Project

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

Time for Research Project

The Student given full academic year for accomplishes his study.

Exam for Research Project

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

Format for Research Projects

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

Title

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

“A protection system for an Internet site”

Abstract

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

Introduction

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

Method

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

Results

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



& inferential statistics) & in a written description of the results. The results section should not include conclusions or interpretations; these would be in the Discussion section.

Discussion

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

References

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

Appendix

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



Multimedia Branch

فرع الوسائط المتعددة



First Year Syllabus

منهج المرحلة الأولى

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

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

مجموعة الوحدات للفصل الدراسي الواحد: (15) وحدة

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

مجموعة الوحدات لسنة دراسية: (30) وحدة



Second Year Syllabus

منهج المرحلة الثانية

No. of Units	Tutorial	No. of Lab. hour	No. of Theory 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	Mathematics and Numeric Analysis	الرياضيات والتحليل العددي	3
3	1	2	2	Digital signal processing	معالجة الإشارة الرقمية	4
2	1	-	2	Computation Theory	النظرية الاحتمالية	5
2	1	-	2	Information theory and coding	نظرية معلومات والترميز	6
3	1	2	2	Microprocessors and assembly language programming	المعالجات المايكروية والبرمجة بلغة التجميع	7
1	-	-	1	Human rights & Democracy	حقوق الانسان والديمقراطية	8
20	7	10	15	Total		

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

مجموعة الوحدات للفصل الدراسي الواحد: (20) وحدة

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

مجموعة الوحدات لسنة دراسية: (40) وحدة

University of Technology

Computer Sciences Department

Multimedia Branch

2013-2012



Third Year Syllabus

منهج المرحلة الثالثة

No. of Units	Tutorial	No. of Lab. Hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Computer graphics	رسوم الحاسبة	1
3	1	2	2	Image processing	معالجة صور	2
3	-	2	2	Compiler	المنترجمات	3
2	1	-	2	Computer architecture	معمارية الحاسبة	4
3	1	2	2	Artificial Intelligence Techniques	تقنيات الذكاء الاصطناعي	5
3	1	2	2	Computer Networks	شبكات الحاسبة	6
3	1	2	2	Databases	قواعد البيانات	7
3	1	2	2	Software engineering	هندسة البرمجيات	8
23	7	14	16	Total		

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

مجموعة الوحدات للفصل الدراسي الواحد: (23) وحدة

Total No. of Unit for Year: (46) Units

مجموعة الوحدات لسنة دراسية: (46) وحدة



Forth Year Syllabus

منهج المرحلة الرابعة

No. of Units	Tutorial	No. of Lab. hour	No. of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Data compression	ضغط البيانات	1
2	1	-	2	Pattern recognition	تمييز الأنماط	2
2	1	-	2	Modeling and simulation	نمذجة ومحاكاة	3
3	1	2	2	Multimedia Security	أمنية الوسائط المتعددة	4
3	1	2	2	Operating System	نظم التشغيل	5
3	1	2	2	Web Programming	برمجة مواقع	6
3	1	2	2	Digital sound and video	الصوت والفيديو الرقمي	7
3	-	4	1	Project	المشروع	8
22	7	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



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 المهيكلية	1
2	1	-	2	Mathematics	الرياضيات	2
2	1	-	2	Discrete Structures	الهياكل المتقطعة	3
3	1	2	2	Organization and Logic Design	التركيب والتصميم المنطقي	4
2	1	-	2	Probability and Statistic	احتمالات واحصاء	5
2	1	-	2	Fundamentals of digital media	أساسيات الوسائط الرقمية	6
Pass	-		2	English Language	لغة انكليزية	7
15	6	4	15	Total		

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

مجموعة الوحدات للفصل الدراسي الواحد: (15) وحدة

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

مجموعة الوحدات لسنة دراسية: (30) وحدة

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

- Introduction, Procedural Programming Principles.
- Algorithm, Algorithm properties, Examples.
- Flowcharts, Flowchart Figure, Examples.
- C++ Language Basics
- Getting Started with C++, Character set, Identifiers, Variables and Variables Declaration, Constants, Arithmetic Operations, Assignment Operators, Relational Operators, Logical Operators, Bitwise Operator.
- The compiler directives (define and include).
- Unary Minus, Increment and /decrement Operators.
- Selection Statements
 - The Single If Statement Structure, The If/else Statement Structure, Nested If and If/else Statements

- The Switch Selection Statement and Conditional Statement.
- Break and Continue Control Statements
- Iteration Statements
 - While Repetition Structure
 - Do/While Statement.
 - For Statement and Nested Loops
- Functions
 - introduction, defining a function, return statement, types of functions, actual and formal arguments, local and global variables, parameters passing, recursive functions.
- Arrays
 - One dimensional array (declaration, initialization, Accessing)
 - Two dimensional array (declaration, initialization, Accessing).
- String manipulation
- Structures
 - Type of Structure declaration
 - Array of Structures
 - structure within structure
 - functions and structures
- Pointers
 - pointers declaration
 - pointers and functions passing parameters
 - pointers and arrays
 - arrays of pointers
 - pointers to pointers

References:

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

2. Mathematics:

- Mathematical background
- Matrix
 - Types of matrix
 - Matrix addition, subtraction, and multiplication
 - Determinant, transpose, symmetric of matrix and rank of matrix
 - Inverse of matrix, absolute value, and polynomials
 - Grammar rule for solving system of equation.
- Functions
 - Function numbers, type of numbers, theorems'' of numbers
 - Definition of function domain and range of functions
 - Graphing of function
- Limits
 - Definition of limits
 - Theorems' of limits
 - Type of limits
 - One side and two sides limits

- Limits as infinity
- Sandwich theorem and continuous functions
- Derivation
 - Mathematical definition of derivation, rule of derivation
 - Derivation of trigonometric, inverse trigonometric, logarithm, exponential hyperbolic, inverse of hyperbolic function.
 - Implicit derivation, chain rule, higher derivation
 - L’hopital rule
 - Application of derivation, velocity and acceleration
- Series
- Integration, indefinite integral, rules of integral, method of integration, multiple integral
- Definite integral, application of integral area under the curve
- Area between two curves

References:

1- Thomas, G. Calculus and Analytic Geometry, 5th Edition, Addison Wesley, 1999.

3. Discrete Structures

- Set theory
 - Sets and subsets
 - How to specify sets, Operations on sets
 - Algebra of sets and its proves
 - Power set, Classes of sets, Cardinality
 - Sets of numbers, Finite sets and counting principle
- Mathematical induction
- Relations
 - Computer representation of relations and Digraph
 - Manipulation of relations, Properties of relations
 - Composition of relations
- Functions
 - Type of function (one-to-one & invertible function)
 - Geometrical characterization of functions
 - Sequences of sets, Recursively defined functions
- Logic and propositions
 - Basic logical operation, Equivalency
 - Tautology and Contradiction
 - Conditional and biconditional statements
 - Argument with examples
- Graphs
 - Definition, Graphs and multigraphs, Sub graph
 - Degree of graph, Connectivity, Special graph
 - Walk & length of walk, Trail, path, cycle
 - The bridges of Konigsberg
 - Traversable multigraphs, Labeled graphs

- Minimal path, Minimum spanning tree
- Matrices and graph
- Trees, rooted tree, ordered rooted tree
- polish notation, with examples
- Finite state machines
 - Finite automata
 - Optimistic approach to construct FSM
 - Deterministic Finite state automata

References:

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

4. Computer Organization and Logic Design:

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

References:

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

5- Probability and Statistic

Cardinality, Cartesian product, permutation, combination, Binomial Theorem, Sample space, event, Basic probability definition and rules, complement theorem, addition rule, multiplication rule, conditional probability, Bayes theorem, independent of events, random variables, cumulative probability, 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.

6- Fundamentals of Digital media:

Introduction to multimedia , Multimedia and Hypermedia, Internet and World Wide Web (WWW), Overview of Multimedia, Software Tools, Multimedia Authoring, Useful Editing and Authoring Tools , Making Multimedia, Multimedia Skills, Planning and Costing , Graphics and Multimedia, Introduction to digital image , Popular File Formats, Image File Format, Color spaces of Digital Image, Image Analysis and Image Enhancement , Animation, Introduction to Analogue and Digital Audio, Format of Digital Audio, Introduction to Analogue and Digital Video , Multimedia system sounds, Multimedia Data Compression, Image Sound and Video compression, Authoring Multimedia and Authoring Multimedia in Visual Basic, Virtual Reality, Multimedia and network, Multimedia Learning , Creating a Multimedia Presentation Practical Assignment .

References

- 1) Ze-Nian Li and Mark S Drew," ***Fundamentals of Multimedia***", Prentice Hall,2004.
- 2) Gaurav Bhatngar,Shikha Mehta and Sugata Mitra , "***Introduction to Multimedia Systems***" ,Academic Press,2002.
- 3) Tay Vaughan" ***Multimedia:Making it work***",Eighth Edition,The McGraw-Hill companies,2010.

5. English Language:

Technical English, Primary Course Outlines

This course aims at teaching and developing students' skill in :

- **Writing and Reading :-**
 - Parts of Speech (Noun, verb, adjective, adverb, etc)
 - Structure and kinds of sentence
 - Tenses in English
 - Active and passive voice
 - Prepositions of time and place
 - How to write and understand simple paragraphs on arrange of topics within the field of the study and interest or experience
 - Develop the extensive intensive reading skills by taking different passage
 - Write your CV in summary form
 - Expose to important technical vocabulary and Idioms
 - Write scientific papers and well-structured and
- **Listening and Speaking :-** (by listening to a selected conversations on technical topics)
 - How to understand a conversion
 - How to avoid silence in conversion
 - Focus and study the pronunciation.
 - Deal with different situations academic and non academic.
 - Express ideas and give detailed accounts of experiences, and describing feelings.
 - Engage in extended conversation on most topics
 - Give opinions by providing relevant explanations, arguments and comments.
 - Give clear, detailed description of subjects within field of study or interest.
 - Vocabulary and phrases for making presentations
 - Give clearly developed presentations on subjects in the field of study.
- **Translation**
 - What is the translation , kinds and steps of translation
 - Scientific translation nature and steps
 - How to use a dictionary and machine translation.
- **Project Implementation**
 - Choose a topic and apply the items of scientific writing.
 - Make presentation by applying the rules of the four skills of the language.

References :

- a. English for computer users By Santiag R.Esteras, Fourth Edition, Cambridge University Press, 2008.
- b. English Grammar In Use By Raymond Murphy, Third Edition, Cambridge University Press, 2004.
- c. English Grammar and Composition By Wren and Martin, Revised by N.O.Prasada Rao,S.Chand,, Company Ltd., New Delhi, 2007.

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	Mathematics and Numeric Analysis	الرياضيات والتحليل العددي	3
3	1	2	2	Digital signal processing	معالجة الإشارة الرقمية	4
2	1	-	2	Computation Theory	النظرية الاحتمالية	5
2	1	-	2	Information theory and coding	نظرية معلومات والترميز	6
3	1	2	2	Microprocessors and assembly language programming	المعالجات المايكروية والبرمجة بلغة التجميع	7
1	-	-	1	Human Rights & Democracy	حقوق الانسان والديمقراطية	8
20	7	10	15	Total		

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

مجموعة الوحدات للفصل الدراسي الواحد: (20) وحدة

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

مجموعة الوحدات لسنة دراسية: (40) وحدة

1- Object Oriented Programming

- Overview for functions and parameter transmission in C++
- Introduction of OOP and its main features
- Classes in OOP
 - Defining a Simple Class with Inline Member Functions
 - Constructors and destructors functions
 - Friends functions
 - Constant Members
 - Static Members
 - Default Arguments and Implicit Member Argument
- Overloading
 - Function overloading
 - Operators overloading
- Template
 - Function Template Definition
 - Function Template Instantiation
 - Class Template Definition
 - Class Template Instantiation
- Inheritance and Derived Classes
 - Single inheritance and Multiple inheritances
 - Virtual Functions and polymorphism.

References:

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

2- Data Structures and Algorithms:

- Introduction to Data Structures
- Types of data structure
- Memory representation for 1D and 2D arrays
- Linear list and 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
 - Binary Search Tree
- Sorting Algorithm
 - Bubble Sort
 - Insertion Sort
 - Quick Sort)
- 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 Numerical Analysis:

- Partial differentiation
 - Partial differentiation for first and higher order of derivative
 - Chain rule and directional derivative)
 - First order differential equations
 - Solution of differential equation by direct integration
 - Separating the variables and homogeneous equation
- Second and higher order differential equations
 - Linear second order differential equation with constant
 - Variation method
- Laplace transform for standard important function
 - Multiplication by tn, division by t
 - Inverse Laplace transform of derivatives
- Formatting of Partial differential equation
 - Types of partial differential equations
- Fourier series and periodic functions
 - Fourier series for odd and even function
 - Half range Fourier sin and cosine series
- Change of interval
- Numerical analysis and 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.
- The solution of integral equation, trapezoidal method
- Simpsons method

References:

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

4- Digital Signal Processing:

- Signal and systems
 - introduction to DSP, D/A, A/D and sampling rate
 - Basic types of digital signals
 - periodic and aperiodic signal
 - even and odd signal
- Discrete time system
 - System properties
 - Block diagram representation of LTIS
 - Difference equation,
 - Step and impulse response of LTIS
 - Convolution sum, correlation
- Fourier analysis
 - discrete time FT and its properties
 - frequency response
 - DFT and properties
 - FFT
- Z-transform
 - one side
 - properties
 - inverse z-transform
 - poles/zeros location in z-plane and the stability
- Design of digital filter
 - Fundamental structures of digital filters
 - Design of FIR filters by windowing
 - Design of IIR filter

References

1. M.N. Hayes, DSP, 2007.
2. P. Lynn, Introductory DSP, 1998.

5- 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.

6. Information theory and coding

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. Error detection and correction

References:

Coding and Information Theory , Richard W.Hamming.

7. Microprocessors and assembly programming language

microprocessor architecture Introduction, system bus. Personal computer (pc), the microprocessor, Memory, input and output. **addressing data memory** : execution unit and interface unit . addressing data in memory, absolute addressing, segment offset addressing, registers general purpose register, segment register, index register status and control register, **addressing mode:** register addressing mode, immediate addressing mode, direct addressing mode, indirect addressing mode, based addressing mode, indexed addressing mode, based indexed addressing mode, string addressing mode, port addressing mode, **instruction execution and addressing:** number of operand ,assembly language instruction, **introduction to assembly instruction set**, data transfer instruction. MOV and XCHG instruction, arithmetic instruction. Addition, subtraction, multiplication, division , logic instruction, AND, OR, XOR, NOT instruction, shift instruction ,rotate instruction , advanced

instruction , flag control instruction , CMP instruction , JMP instruction , conditional JUMP , unconditional JUMP , push AND pop Instruction ,string instruction , MOVS string , SCAS and CMPS instruction , LODS and STOS instruction. **interrupt interface** interrupt processing , interrupt vector table, INT type, Tools for Preparing and Debugging and Translating, Programs. **Basic input and output system, input and output device**, MS-DOS Operating System Structure: MS-DOS and BIOS Disk and Keyboard System Architecture Cache Memory. **Data transfer mode. Pipelining**

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.

8. حقوق الانسان و الديمقراطية

اولا/ الحقوق

مفهوم حقوق الانسان والخصائص وحقوق الانسان في المجتمعات القديمة والمعاصرة.

ثانيا/ الديمقراطية

مفهوم الديمقراطية والحكومة وانواعها- تطبيقات الديمقراطية- الديمقراطية المباشرة- الديمقراطية شبه المباشرة- الديمقراطية النيابية- اشكال النظام النيابي- (النظام المجلسي والرئاسي- النظام البرلماني)- المجلس النيابي (نظام المجلس الواحد والمجلسين)- آلية النظام التمثيلي (الانتخاب) مفهوم الانتخاب- تكوين هيئة الناخبين- تنظيم عملية الانتخاب (القوائم الانتخابية- الدائرة الانتخابية- المرشحون- الحملة الانتخابية- التصويت)- نظم الانتخابات (الانتخاب المباشر وغير المباشر والانتخاب الفردي والانتخاب بالقائمة نظام الاغلبية ونظام التمثيل النسبي- نظام تمثيل المصالح- نظام التصويت الاختياري والتصويت الاجباري) – مناقشة بحوث

المصادر:

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



2013-2012

Third Year Syllabus

منهج المرحلة الثالثة

No. of Units	Tutorial	No. of Lab. Hour	No. Of Theory hour	Subject	اسم المادة	ت
3	1	2	2	Computer graphics	رسوم الحاسبة	1
3	1	2	2	Image processing	معالجة صور	2
3	-	2	2	Compiler	المترجمات	3
2	1	-	2	Computer architecture	معمارية الحاسبة	4
3	1	2	2	Artificial Intelligence Techniques	تقنيات الذكاء الاصطناعي	5
3	1	2	2	Computer Networks	شبكات الحاسبة	6
3	1	2	2	Databases	قواعد البيانات	7
3	1	2	2	Software engineering	هندسة البرمجيات	8
23	7	14	16	Total		

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

مجموعة الوحدات للفصل الدراسي الواحد: (23) وحدة

Total No. of Unit for Year: (46) Units

مجموعة الوحدات لسنة دراسية: (46) وحدة

1. Computer Graphics:

Display Devices: Cathode Ray Tube (CRT) , Liquid Crystal Display (LCD) ,Frame Buffer Coordinate System, Basic Shapes Drawing (Line, Circle),

Two Dimension Transformations, Translation , Scaling, Rotation Reflection, Shearing, Three Dimension Transformations ,Translation , Scaling, Rotation, Reflection, Shearing, Curves

References:

- 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. 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 (enlarge , shrinking), 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 quantization, Gray level reduction, Spatial reduction, Sobel operator, Prewitt operator, Kriskh compass, Robinson compass mask, Segmentation, Region growing, Clustering methods, Boundaries detects, Combined approach, Histogram (histogram modification, , Histogram Equalization, Histogram features), Image Compression, Discrete transformation, Fourier transform , cosine transform.

References:

1- computer vision and image processing, Scotte E. ,1989

2- digital image processing

Rafal C. Gonzales.

3- 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, LL(1), Error Detection and Reporting, Bottom up Parsing, Operation Precedence Parser, Simple Left to Right Parser, Canonical LR Parser, Look Ahead LR, Semantic Analysis, Intermediate Code Generation, Code Optimization, Examples of Code Optimization, Code Generation.

References:

1. Principles of Compiler Design ,Alfred V. Aho, Jeffrey D. Ulman.2003

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 Intelligence Techniques:

1. Introduction

What means by A.I.
Knowledge Representation Methods.
Heuristic Search Methods.

2. Neural Networks

- Background
- The Neuron: Biological and Simulated Neuron.
- Types of Learning Strategies.
- Back Propagation, Hopfield, BAM and Kohonen NN.

3. Genetic Algorithms (GA)

- Introduction & historical view.
- Components of algorithms: Selection methods and Operators.
- Crossover and Mutation.
- Parameters of GA.
- GA and search methods.
- Genetic Programming and Applications.

4. Some Metaheuristic Algorithms.

- What means by Metaheuristic?
- Local Search.
- Tabu Search.
- Simulated Annealing.
- VNS.
- GRASP.
- Others.

5. Fuzzy Logic

- Introduction.
- Fuzzy sets: Continuous Fuzzy sets, Discrete Fuzzy sets.
- Logical operators: Fuzzy intersection, Fuzzy implication, Fuzzy union.
- Compositional rule of inference (continuous & discrete).
- Fuzzification & Defuzzification.

References

1. Fundamantals of Neural Networks: Architecture, Algorithms, and application. By Laurene Fausett.
2. A.I. Strategies & Methods, George F. Luger, 2009.
3. Neural Networks. Fundamentals, Application, Examples. By Werner Kinnebrock
4. Machine Learning, Tom Mitchell, McGraw Hill, 1997.
5. Fuzzy system hand book, Byearl Cox, 1999.

6. Metaheuristics : from design to implementation, El-Ghazali Talibi, John Wile & Sons, 2009.

6. Computer Networks:

Data Communication, Physical Topology, Basic Network Technology, LAN Devices, Collision and Collision Domains in Shared Layer Environments, Network Devices, Network Layer Addressing, Network Layer Field and 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.

7-Data bases:

Internalized 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 : Calculus of relations-SQL and algebra of relation – AQL),Hierarchical model (data representation in Hierarchical model, data manipulation language DL/1, example about DL/1),Network model (data representation in Network model, data manipulation language CODASYL, example about DML by using CODASYL language,Data and file organization in physical database model (sequential file, indexed connected files, has indexing ,inverted files).

References:

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

8- Software Engineering

Introduction to SW engineering, Computer software, What is software engineering, The evolving role of software, Software characteristics, Software engineering principles, The Characteristic of software engineer, Software applications, Software systems, Software development, A crisis on the horizon, The attribute of good software, Software lifecycle. Software Engineering-A Layered technology, Software process models, The waterfall model, The prototype model , The RAD model, Evolutionary software process models, The incremental model, The spiral model, Component based development, Introduction to Software process and project metrics, Measures , Metrics and Indicators, Metrics in

the process and project domains, Process metrics, Project metrics, Software measurement, size oriented metrics, function oriented metrics, computing function point, Software Quality Metrics, Defect removal efficiency ,Integration metrics with software process, Statistical process control, Metrics for small organization, Establishing a software metrics program, Introduction to Software project planning, Estimation reliability factors, Project planning objective, Software Scope, Estimation of resources, Software project estimation options, Decomposition techniques, Estimation models, The structure of estimation models, The COCOMO Model, The software equation model, Automated estimation tools, introduction to risk analysis and management, reactive versus proactive risk strategies, software risks, risk projection, risk refinement, project scheduling and tracking, basic concepts, scheduling principles, software quality, quality concepts, Statistical software quality, software reliability, Introduction to analysis concepts and principles, requirement analysis, Software requirement analysis phases, Software requirements elicitation, Facilitated action specification technique, Quality function deployment, Use case, Analysis principles, Software prototyping, Specification principles.

References

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



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	Data compression	ضغط البيانات	1
2	1	-	2	Pattern recognition	تمييز الأتماط	2
2	1	-	2	Modeling and simulation	نمذجة ومحاكاة	3
3	1	2	2	Multimedia Security	أمنية الوسائط المتعددة	4
3	1	2	2	Operating System	نظم التشغيل	5
3	1	2	2	Web Programming	برمجة مواقع	6
3	1	2	2	Digital sound and video	الصوت والفيديو الرقمي	7
3	-	4	1	Project	المشروع	8
22	7	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. Data Compression:

Classifying compression algorithms – What is compression?

Lossless compression algorithms (Repetitive sequence suppression) (Simple repetition suppression, Run length Encoding)

Lossless compression algorithms (pattern substitution)

Lossless compression algorithms (entropy encoding)

(Basics of information theory, The Shannon-Faco algorithm, Huffman coding, Huffman coding of images, Adaptive Huffman coding, Arithmetic Coding, Lempel-Ziv-Welch (LZW) Algorithm, Entropy encoding summary, Further Reading/Information)

Source coding Techniques

(Transform coding, A simple transform coding example, Frequency domain methods, 1D example, 2D (image) example, What do frequencies mean in an image , How can transforms into the frequency domain help, Fourier theory, 1D case, 2D case, The discrete Fourier transform, Compression,

Relationship between DCT and FFT (The discrete cosine transform, Differential encoding, Vector Quantization)

JPEG Compression (Quantization, Uniform quantization, Quantization tables, Zig-zag scan, Differential pulse code modulation (DPCM) on DC component, Run Length Encode (RLE) on AC components, Entropy coding, Summary of the JPEG bit stream, Practical JPEG

Video compression(H. 261 compression, Overview of H. 261, Intra Frame coding, Inter-frame (P-frame) coding, The H. 261 bit stream structure, Hard problems in H. 261, Motion vector search, Propagation of errors, Bit rate control)

MPEG compression (MPEG video, The MPEG video bit stream, Decoding MPEG video in SW)

Audio compression (Simple audio compression method, Psychoacoustics, PMEG audio compression, Streaming audio (and video))

2. Pattern Recognition:

Introduction, pattern types, mathematical models of patterns representation, recognition methods, one dimensional pattern recognition(spatial domain, frequency domain), two dimensional pattern recognition (spatial domain, frequency domain), using ANN to recognize patterns(pattern matching, pattern classification).

3. Modeling and Simulation (Optional):

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

References

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

4. Multimedia Security

Introduction of Data security, Mathematical Background, 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, Types traditional of ciphers systems, Introduction of transposition cipher systems, fixed pired method, Types of substitution cipher systems types, Monoalphabetic substitution cipher systems (keywords method), Homophonic substitution cipher systems(Beal cipher, Higher order homophnics), polyalphabetic substitution cipher systems(Vigener cipher, Beaufort cipher ,Running ker cipher), polygram substitution cipher systems(playfair cipher, hill cipher ,product cipher), Introduction to public key systems (secrecy and authenticity), Knapsack ciphers), Merkel-Hellman knapsacks, simple knapsack algorithm), Trapdoor knapsack algorithm, RSA algorithm (encryption and decryption processes), Public-key digital signature algorithms (RSA), DES algorithm, X-box process in DES algorithm with example, Introduction of Stream ciphers, One time Pad system (vernam system), The requirements of steam cipher, The Basic Five Randomness tests (i.e. frequency test , serial test), Poker test , run test, auto correlation test.

Introduction to Information Hiding, Principles of Steganography(Frameworks for Secret Communication, Security of Steganography Systems, Active and Malicious Attackers), Steganalysis Introduction and Terminology, Watermarking techniques, Watermarking applications.

References:

- Cryptography and Network Security, William Stalling , 2003
- Stefan Katzenbeisser & Fabien A. P. Petitcolas, "Information Hiding Techniques for Steganography and Digital Watermarking", 2000.

5. 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, 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.

6. Web Programming

Web Based Application, Introduction, The world wide web, The internet and web, The history and growth of the web, internet service provider , Http, The purpose of the web, web application ,The web concepts, Hypertext, web page, web site, web page address, web browsing, The classifying the web sites, environment, the general approach, range of complexity, Client side, HTML, CSS, external , internal , scripting language, Java script, create data object ,function , popup Boxes, create an array, document.getElementById ,web programming with ASP, internet information server , ASP Principles, ASP Objects, Response Object, write , clear, end, redirect, Request Object, querystring, request, form, get ,post, external, internal, cookies, execute, ASP-File System Object, bulidpath, copyfile, copyfolder, createtextfile, deletetextfile, deletetextfile, folderexists, driverexists, fileexists, ASP Applications, dynamic web site, Asp with ADO, insert, delete, update, online examination, simple search directory, simple Email system.

References:

Web Based Application.

Web Programming with ASP.

www.W3school.com

7. Digital sound and video:

Introduction to multimedia

Multimedia applications and requirements.

Basics of digital audio

Synthetic sounds

Introduction to MIDI (Mutual Instrument Digital interface)

Graphic/image file format

Colors in image and video

Color image and video representation

Basics of video

Video formats and quality

Capture

Color spaces

Video formats

Quality (sub., obj.)

Audio and video compression

Audio/video equipment, applications

Digital rights management

8. Project:

Description for Research Project

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

Time for Research Project

The Student given full academic year for accomplishes his study.

Exam for Research Project

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

Format for Research Projects

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

Title

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

“A protection system for an Internet site”

Abstract

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

Introduction

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

Method

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

Results

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

Discussion

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

References

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

Appendix

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