المناهج الدراسية لفرع البرامجيات
First Year Syllabus

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

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

Second Year Syllabus

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

Total No. of Unit for Year: (42) Units
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Total No. of Unit for One Semester: (22) Units
Total No. of Unit for Year: (44) Units

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Total No. of Unit for One Semester: (22) Units
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### I. Structured Programming (with C++ Programming Language):

- Algorithm, Algorithm properties, Examples.
- Flowcharts, Flowchart Figure, Examples.
- C++ Language Basics
- 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:
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’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:

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

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:
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:

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:

### Second Year Syllabus

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### 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:

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
University of Technology  
Computer Sciences Department  
Software Branch

- Insertion Sort
- Quick Sort

- Searching algorithm
  - Sequential Search
  - Binary Search

References:
3. Data Structures and algorithms in Java PDF file.

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:
3- التحليل العددي وبرمجة طرقه على الحاسبة الإلكترونية,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 cardinals, 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:

References:
6- Software Engineering:

References:
2. Introduction to Software Engineering by Shari Lawrence &Joan M. Atlee, 2006

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:

8- Human rights and Democracy.

References:
### Third Year Syllabus

<table>
<thead>
<tr>
<th>No. of Units</th>
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<th>No. of Lab. hour</th>
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Total No. of Unit for One Semester: **22** Units

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

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### 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:

2- Compilers:

References:

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
2- Distributed DB, Stefane Ceri, 2002.

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:

5- Artificial Intelligent:
References:
2. Artificial Intelligence, by G. F. luger 2002
3. Artificial Intelligence, by Russel & P. nerving, 2003

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 representation, 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

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<th>No. of Units</th>
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Forth Year Syllabus

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

1- Computer and Data Security:


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


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:

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:

3-Image Processing:

References
1. Scottie Umbaugh, "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

5 Intelligence Applications:

References:
2. George F. Luger, Artificial Intelligence (structures and strategies for complex problem solving), Pearson Education Asia (Singapore), 2002.

6- Web Programming (Optional):
Software Branch

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, URLEncoder, ASP-Error Object, ASP-File System Object, buildpath, copyfile, copyfolder, createtextfile, deletefile, deletefolder, folderexistes, drivereexistes, fileexistes, 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

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

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

1- Computer Graphics:
   - Introduction
     - Display Devices: Cathode Ray Tube (CRT), Liquid Crystal Display (LCD)
     - Frame Buffer

University of Technology
Computer Sciences Department
Software Branch
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:

2- Compilers:

References:

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, commit 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.

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:

5- Artificial Intelligent:

References:
6. Artificial Intelligence, by G. F. luger 2002

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)
University of Technology
Computer Sciences Department

Software Branch

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.
- \( \Omega, \Theta \) 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

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

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

1- Computer and Data Security:


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


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:
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, 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, modalless\}, 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:

3-Image Processing:

References
1- Scottie 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

5 Intelligence Applications:

References:

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, buildpath, 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

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

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المناهج الدراسية لفرع النظم
First Year Syllabus

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

Second Year Syllabus

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Total No. of Unit for One Semester: (20) Units
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### Third Year Syllabus

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

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

### Fourth Year Syllabus

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<th>No. of Lab. hour</th>
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Total No. of Unit for One Semester: **(22) Units**

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

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

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

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

- Algorithm, Algorithm properties, Examples.
- Flowcharts, Flowchart Figure, Examples.
- C++ Language Basics
- 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:
2- Oqeli 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’hôpital 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:

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
University of Technology  
Computer Sciences Department  
Information System Branch

- 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
  ➢ Database
    • The modern approach centralized database
    • Distributed database
    • Database 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.

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

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


Second Year Syllabus

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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:

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.
3. Data Structures and algorithms in Java PDF file.

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:
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

5. **Information Systems Analysis and Design**

References:
“Introduction to Information System”, O’Bran.

6- Software Engineering:

References:
2. Introduction to Software Engineering by Shari Lawrence &Joan M. Atlee, 2006
7. Computation Theory

References:
• Introduction to computer theory by cohen

8. حقوق الإنسان والديمقراطية:

- مفهوم حقوق الإنسان وحقوق الإنسان في الشريعة السماوية (الشريعتين اليهودية والمسيحية)
- حقوق الإنسان في الإسلام
- مصادر حقوق الإنسان
- أولا المصادر الدولية (إعلان حقوق الإنسان وقيمتها القانونية)
- الحقوق التي يتضمنها الإعلان العالمي لحقوق الإنسان
- العهدين الدوليين الخاصين بحقوق الإنسان لسنة 1966
- ثانيا المصادر الوطنية (إعلان حقوق الإنسان والمواطن الفرنسي 1789)
- ضمانات حقوق الإنسان
  - الضمانات على الصعيد الداخلي
  - أولا الضمانات الدستورية
  - ثانيا الضمانات القضائية
  - الرقابة بطريق الدعوى الإصلية (رقابة الإلغاء)
  - الرقابة بطريق التدخل بعدم الدستورية (رقابة الانتهاك).
- ضمانات حقوق الإنسان على الصعيد الدولي.
- ميثاق الأمم المتحدة.
- الجمعية العامة للأمم المتحدة.
- المجلس الاقتصادي والاجتماعي.
- مجلس حقوق الإنسان.
- التنمية المستدامة والحقوق والحرية
- أولا الأحزاب السياسية وحقوق الإنسان
- ثانيا العولمة وحقوق الإنسان

المصادر

1. حقوق الإنسان والطفل والديمقراطية - د. ماهر صالح علاوي الجبوري، وآخرون

محاضرات في الديمقراطية - د. فيصل شطناوي
Third Year Syllabus

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

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:

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

References:

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 الحمامي
- Kroenke, Database Concept 2005.

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:

6-Computer Networks

References:

7-Project Management

References

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-Management Information Systems

References


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, Online 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.
John wang, encyclopedia of data warehousing and mining-2006.

3-Intelligent Systems

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:
2. George F. Luger, Artificial Intelligence (structures and strategies for complex problem solving), Pearson Education Asia (Singapore), 2002.

4- Computer and Data Security:

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
Permutation, The S-Box Substitution, The P-Box Permutation, The Final Permutation, Decrypting DES.


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:**

**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**

**6- Web Programming and E-Commerce**
- E-commerce

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

- Web programming

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


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.
المتاهج الدراسية لفرع الذكاء
### مناهج المرحلة الأولى

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

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### Third Year Syllabus

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

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Total No. of Unit for Year: (44) Units
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**Total No. of Unit for One Semester:** (16) Units

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

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

- Algorithm, Algorithm properties, Examples.
- Flowcharts, Flowchart Figure, Examples.
- C++ Language Basics
- 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:
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’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:**

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
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 logict(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:
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.  

**References:**  
5. زينب الزرقاء وايمن عودة , الذكاء الصنعي في لغة prolog , شعاع للنشر والعلوم ، حلب ، 2005.  

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  
  - Birnollli 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
References:

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:
  - How to understand a conversation
  - 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


## Second Year Syllabus

<table>
<thead>
<tr>
<th>No. of Units</th>
<th>Tutorial</th>
<th>No. of Lab. hour</th>
<th>No. Of Theory hour</th>
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<td>Data Structures and Algorithms</td>
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Total No. of Unit for Year: (40) Units

### 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:**

**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:
3. Data Structures and algorithms in Java PDF file.

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 ,Gauanrory 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:
5- **Micro-Processors and Assembly Programming:**

**References:**

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-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:

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:

- حقوق الإنسان والديمقراطية:
    - مفهوم حقوق الإنسان، حقوق الإنسان في الشروط المساوية،مصادر حقوق الإنسان،ضمانات حقوق الإنسان،مستقبل حقوق الإنسان.
- مفهوم الديمقراطية، أشكال الديمقراطية، الديمقراطية المباشرة، الديمقراطية الشبه المباشرة،الديمقراطية الناخبية،المجلس الناخب، الهيئة التنظيمية (ال您同意)، مفهوم الانتخاب، هيئة الناخبين. تنظيم عملية الانتخاب، تطبيق.
- المصادر
  1- حقوق الإنسان والطفل والديمقراطية
  2- ماهر صالح علاوي الجبوري وآخرون
  3- محاضرات في الديمقراطية، د. فيصل شطناوي
### Third Year Syllabus

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</table>

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

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

**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:*


**2- Compilers:**


3- Databases:

References

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:

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 &


References:
4. Daniel H. Marcellus “ Artificial Intelligence and the design of expert systems” 1998

6- Expert Systems & Metaheuristic Methods:
(Evolutionary Strategy, Evolutionary Algorithm, Scatter Search, Cultural Algorithm, Memetic Algorithm), Swarm Intelligent (Bees Colony Algorithm, Particle Swarm Optimization).

References:
2- George F. Luger, Artificial Intelligence (structures and strategies for complex problem solving), 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 Grossberg
6- Introduction to neural system. by- Zurada

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:

<table>
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<th>Elective Subjects for Third Year</th>
<th>المواضيع الاختيارية للمرحلة الثالثة</th>
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</table>

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

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:
2- Communications and Computer Networks

References:

3- Computer and Data Security:

2. Mathematical Background, Prime Numbers, Greatest Common Divisor(GCD), (LCM) Least Common Multiple, Modular, Euler Function, Inverse Algorithm (inv), Fast Exponential, Matrix inverse.

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:**


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**


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

6- Web Programming :
References:
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

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:

b. computer imaging : Digital image analysis and processing, Scott E. Umbaugh, 2005.

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

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<th>No. of Lab. Hour</th>
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المناهج الدراسية لفرع الأمنية
# First Year Syllabus

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

# Second Year Syllabus

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Total No. of Unit for One Semester: (18)Units
Total No. of Unit for Year: (36) Units
### Third Year Syllabus

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

### Forth Year Syllabus

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

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

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

- Algorithm, Algorithm properties, Examples.
- Flowcharts, Flowchart Figure, Examples.
- C++ Language Basics
- 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:
2. Oqelii 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’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:

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
University of Technology
Computer Sciences Department

Computer Security Branch

- 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:
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:
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:**

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

# Second Year Syllabus

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

## 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:

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: 
3. Data Structures and algorithms in Java PDF file.  

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:

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:


References:
6- Number Theory


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 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, 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:
8- Human rights and Democracy.

- مفهوم حقوق الإنسان، حقوق الإنسان في الشروط السماوية، مصادر حقوق الإنسان، ضمانات حقوق الإنسان، مستقبل حقوق الإنسان.
- مفهوم الديمقراطية، أشكال الديمقراطية، الديمقراطية المباشرة- الديمقراطية المباشرة والمشاركة، الديمقراطية المباشرة والمشاركة. الديمقراطية. المجلس النسائي، ذاتية النظام التمثيلي (الانتخاب)، مفهوم الانتخابات، هيئة الناخبين، تنظيم عملية الانتخاب، نظم الانتخاب.

المصادر

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

الموقع www.saaid.net  الموقع ejjabat.google.com
Third Year Syllabus

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

1- Compilers:


References:

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:


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


- 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, Semaphor 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:

5- Artificial Intelligent:


References:
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:

7- Computer Network:

1. Introduction to data communications (components, data representation, 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 reality.

References:

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### Forth Year Syllabus

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</table>

### 1- Intelligent Systems:


### References:

2. George F. Luger, Artificial Intelligence (structures and strategies for complex problem solving), Pearson Education Asia (Singapore), 2002.
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:
   3.4 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:  

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, Double transposition). Substitution 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, LFSR, 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:


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 F2 and over F2k), Menezes-Vanstone Elliptic curve, ElGamal, Massey-Omura, Elliptic Curve Digital Signature Algorithm.

References:

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, JavaScript, 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, buildpath, copyfile, copyfolder, createtextfile, deletefile, deletefolder, folderexists, drivexists, 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


References:
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

| No. of Units | Tutorial | No. of Lab. Hour | No. Of Theory hour | Subject                              | اسم المادة             | نت
|--------------|----------|------------------|--------------------|--------------------------------------|------------------------|---
| 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 إدارة شبكات الحاسوب
2013-2014
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Total No. of Unit for One Semester: (16) Units
Total No. of Unit for Year: (32) Units

Second Year Syllabus

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

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

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

### Fourth Year Syllabus

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

Total No. of Unit for Year: (44) Units
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Total No. of Unit for One Semester: (16) Units
Total No. of Unit for Year: (32) Units

1. **Structured Programming (with C++ Programming Language):**
   - Algorithm, Algorithm properties, Examples.
   - Flowcharts, Flowchart Figure, Examples.
   - C++ Language Basics
   - 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:
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’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:

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:
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 gates.
   - 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
• 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:

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:

### Second Year Syllabus

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

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

### 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:

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:
3. Data Structures and algorithms in Java PDF file.

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:
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
   - Database 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

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 Grammars
     - Phrase Structure Grammar
     - Context sensitive Grammar
     - Context Free grammar
University of Technology
Computer Sciences Department

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:

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 \( t^n \), 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:

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
### Third Year Syllabus

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

### 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:
2. Wireless communication by Andreas F. 2nd 2011

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
 REFERENCES:

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
  - Pohilig Hellman
  - Rabin
  - ElGamal
  - McEliece and Elliptic Curve Cryptosystems.

- Public key Digital Signature Algorithm
  - Digital Signature Algorithm (DSA)
  - DSA variants and GOST

References:

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:

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

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:

7-Artificial Intelligence Techniques
➤ Introduction
• What means by A.I.
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.
  - Compositional rule of inference (continuous & discrete).
  - Fuzzification & Defuzzification.

References
3. Neural Networks. Fundamentals, Application, Examples. By Werner Kinnebrock

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

References:

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

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

References:

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:

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, buildpath, copyfile, copyfolder, createtextfile, deletefile, deletefolder, folderexists, drivereexists, 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. Hierarchical 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
2. Cisco press “Routing and Switching”, 2013

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
• 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:
2. “Administration CISCO QoS in IP Networks”
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

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(20) Units

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

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

(40) Units
# Third Year Syllabus

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### Forth Year Syllabus

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

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

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

1. **Structured Programming (with C++ Programming Language):**
   - Algorithm, Algorithm properties, Examples.
   - Flowcharts, Flowchart Figure, Examples.
   - C++ Language Basics
   - 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:
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’hôpital 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:


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
- l'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:

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, Binomial 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:

6- Fundamentals of Digital media:


References

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:**


# Second Year Syllabus

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

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

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:

3. Data Structures and algorithms in Java PDF file.

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:

4- Digital Signal Processing:

- 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
- Discreet time system
  - System proprieties
  - Block diagram representation of LTIS
  - Difference equation,
  - Step and impulse response of LTIS
  - Convolusion sum, correlation
- Fourier analysis
  - discrete time FT and its properties
  - frequency response
  - DFT and properties
  - FFT
- Z-transform
  - one side
  - properties
  - inverse z-transform
  - poleszeros 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
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:


6. Information theory and coding

The measure of information, self information, average information entropy, maximum entropy of a discrete source, binary source, ternary source, mutal 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, MOV 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:**

### Third Year Syllabus

<table>
<thead>
<tr>
<th>No. of Units</th>
<th>Tutorial</th>
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Total No. of Unit for One Semester: (23) Units

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

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:**

2. Image Processing:


References:

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

3. Compilers:


References:


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:


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.

   • 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

3. Neural Networks. Fundamentals, Application, Examples. By Werner Kinnebrock
6. **Computer Networks:**


**References:**


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

**References:**

1- Database Management Systems 2nd Edition, by Raghu Ramakrishnan

2- Database, design, application development, and administration 2nd edition, 2004

8- **Software Engineering**

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

2. Introduction to Software Engineering by Shari Lawrence and Joan M. Atlee, 2006
## Forth Year Syllabus

<table>
<thead>
<tr>
<th>No. of Units</th>
<th>Tutorial</th>
<th>No. of Lab. hour</th>
<th>No. of Theory hour</th>
<th>Subject</th>
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<th>مجموعة الوحدات للفصل الدراسي الواحد: (22) وحدة</th>
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### 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)
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, MPEG 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 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
4. Multimedia Security

Introduction of Data security, Mathematical Background, How Compute the Greater common deviser (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, Monalphabetic 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 to 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.


References:


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

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, buildpath, 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. 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.