تحية طيبة...


مع التقدير

المرقفات

الفقرات الدراسية لفروع القسم الأربعة

د. عبد المنعم صالح رحمة
رئيس القسم وكالة
الخطة الدراسية لمرحلة البكالوريوس في قسم علوم الحاسبات

فرع البرمجيات

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المواضيع المختارة:
فرع الذكاء الاصطناعي

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8-6
## فرع أمنية الحاسبات

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الموضوع:
- البرمجة الوثائقية
- رياضيات
- هياكل متصلة
- تصميم منطقي ونتركم حاسة
- نظرية الأرقام
- نظرية الاتصالات
- الالغزية
- تطبيقات جامدة (عملي)

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الموضوع:
- تحليل عدد
- معالجات واجهة ونتركم التجميع
- هياكل بيانات وحزم لغات
- نظرية الأعضاء
- البرمجة الكيائية
- OOP
- رياضيات مكتشفة
- نظرية المعلومات

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الموضوع:
- إخفاء المعلومات
- رسوم الحساب
- ممارسة الحساب
- مترمك (اختياري)
- تكنولوجيا
- شركات خاصة
- المجموع
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- نظرة ذكية
- امنية الشبكات
- تحليل الشجرة
- نظام تشغيل
- شفرات متقدمة
- معالجة السور والاشارة (اختباري)
- معمارية الانترنت (اختباري)
- مشروع
- المجموع

### المواد المختارة

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الموضوع:
- الانترنت والإنترنت
- الخوارزميات الجنوية والشبكات العصبية
- تعقب المنطقين
- مترجمات
- قواعد بيانات

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الموضوع:
- ضغط البيانات
- المنطق الضباب
- نسخة ومحاكاة
- معالجة السور والإشارة
- معمارية الانترنت
- الانظمة الموزعة

8-8
University of Technology
Department of Computer Sciences

2006-2005

Subject and Syllabus of
Computer Sciences Department
For Undergraduate Studies

- Software branch
- Information System branch
- Artificial Intelligence branch
- Computer Security branch
Software Branch
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الموضوع:
- البرمجة المهيئة
- رياضيات
- هياكل ملتزمة
- تركيب حاسة
- تكنولوجيا المعلومات
- تصميم منطقية
- اللغة الانكليزية
- تطبيقات جاهزة (عملي)

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الموضوع:
- تحليل عددي
- معالجات مايكرو وظيفة التجمع
- هياكل بيانات وخطوط رمزيات
- نظرية الحساسية
- البرمجة الكارية
- رياضيات متقدمة
- تحليل نظم وتخطيط قواعد البيانات

المجموع: 14

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الموضوع:
- بحوث العمليات واحتمالات
- رسوم الحاسة
- معمارية الحاسة
- مترجات
- ذكاء اصطناعي
- هندسة البرمجيات (اختيار)
- قواعد بيانات متقدمة
- تطبيقات رياضية في الحاسوب

المجموع: 12

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الموضوع:
- تطبيقات ذكية
- الاتصالات وشبكات الحاسبات
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### Subject and syllabus of Software branch
First: Syllabus of the first year

Structured programming

Algorithms. Modular programming concepts. Top-down design methodology. Structured programming concepts. Structure of Pascal programs. Expressions. I/O and assignment statements. Procedures and function. Control structures: (Sequence, selections (if-then-else, case-of) and repetitions (while – do, repeat – until, for – do)). Data structures: (arrays, sets, strings, records, and files. Recursion – simple algorithms for sorting (bubble) and searching (sequential)).

References

“Problem solving and structured programming in Pascal” by Elliot B. Koffman.

Mathematics


Discrete structures


References

1- Discrete mathematical structures with application to computer science by Trem Blay manohar 1975.
2- Introduction to discrete structures by Perpetrate and Yeh, 1973.

Computer organization

Logic design


Information technology

An introduction to information technology
1- Concepts of
  - Information technology
  - The evaluation of information age.
  - Communication networks.
  - The functions of information technology.
  - The benefits of information technology
  - The opportunities for information technology.

2- A tour of a computer system.
  - Hardware: computing, sorting and communicating.
  - Programs: in charge of the hardware.
  - Information: the reason for using information technology.

3- The central processor & memory.
  - Inside the system unit.
  - The processing sequence.
  - Processor speed.

Second: Syllabus of the second year
Numerical analysis

Binary fraction and shifting. Scientific notation machine number and computer accuracy. Computer floating point numbers. Error analysis (Absolute band relative errors; truncation; round-off and chopping errors).
The solution of non-linear equations F(X)=0. The solution of linear systems Ax=B. Interpolation and polynomial Approximation. Numerical differentiation. Numerical integration.
Solution of differential equations (Euler's method, Runge–kutta methods). Eigen values and vector.

Reference: Numerical methods using Matlab; prentice hall.

Microprocessor and assembly programming

CPU architecture register transfer, memory, peripheral control chips, data transfer, fetch and execute cycles, address and data and control busses, brief introduction to machine code, instruction sets (from, orthogonality, number of addresses), and decoding. Assembly language programming: addressing modes of the 8086, data registers, flags, the status register, implementing control structures in assembly language, structured assembly language programming using procedures, arithmetic and logic instructions, stack (concepts and applications), string processing, and tools for preparing and debugging and translating programs. MS-DOS operating system structure: MSDOS and BIOS disk and keyboard system architecture. Advanced features of processors: segments and segment registers, interrupts and interrupt service routines, I/O port addressing, instruction pipelining, and cache memory.

(Reference)

System analysis and database design


Introduction to DBMS: (concepts and architecture). The relational model: (relational concepts and relational algebra). Database design: (functional dependencies, entity–relationship model, and normalization (1NF, 2NF, 3NF, BCNF). SQL: (DDL and DML components of SQL). Query optimization: (query trees, canonical form, transformation rules and query plans). The other concepts of data base methods (hierarchical, Network systems).


Data structure and algorithm

Sorting algorithm: insertion, quick, selection, merge and heap sort. Introduction to the main file organization techniques: sequential direct, and indexed sequential.

References
1- "An introduction to data structures with application", Jean-Paul Tremblay, Paul G. Sorensen.
2- "Data structures through Pascal", Ellis horowitz and Sortaj sahni.
3- "Introduction to data structure with Pascal", Thomas L. Naos bhagat sigh.
4- "The Art of the computer", donald E.knuth vol. 1 fundamental algorithm, vol.3 sorting and rearcging.

Computational theory

Chomssky normal form.
Greibach normal form.
The empty string in context_free grammar ambiguity.
Regular grammar
  Left_linear grammar
  Right_linear grammar

References
Object oriented programming

Fundamental concept: classes, objects inheritance, generosity, and polymorphism: single, multiple and virtual inheritance, C++ programming (or any object oriented language): constants, math, operators, logic operators, conditional statements, loop statements functions, arrays, strings, files.

Advance mathematics

Formation of partial differential equations-first order linear and non-linear equations.
Boundary value problems - formation of the wave equation, equation for the one dimensional and two dimensional heats flows.
Laplace transform: Laplace transformation and inverse - properties of laplace transform.
Fourier series: periodic functions - odd and even functions - half range Fourier sine and cosine series.
Bessel's equations: beta and gamma function - series solutions of Bessel equation.

المصادر

Third: Syllabus of the third year

Software engineering

The software crisis. Software concepts: the software life cycle, the waterfall model of software development with feedback, other models of software development (including prototyping, exploratory, incremental, and spiral), and capability maturity model. Software requirements: formal requirements (structured analysis, data-flow, and control flow diagrams), behavioral requirements (state transition diagrams, state chart, decision table, and trees), object oriented analysis, and other approaches (data structure oriented methods and formal methods), and non-formal requirements.

Software design: the design process and fundamentals, structured design (top-down, bottom-up, and hybrid), abstraction of data and process, modularity, data flow-oriented design, object-oriented system design, and design of real-time systems. Software implementation: project planning (gantt charts and PERT charts), team organization and management, and testing strategies (unit, integration, system, alpha, Beta, and acceptance). Software efficiency; economies of software optimization and techniques for speeding up programs. Software documentation: documentation techniques at each stage of the software life cycle. Software quality: design, code, test and documentation quality assurance via formal technical reviews (standards: portability, ease of use, maintainability, extensibility, security, and traceability). Software maintenance and configuration management & software reliability metrics.

(Reference)

Compiler


المصادر:


Programming techniques (elective)

1- Programming Language
   - Language Grammars قواعد البيانات
   - Control السيطرة
   - Testing الاختبار
   - Repetition التكرار
   - Data abstraction تجريد المعلومات

2- Imperative Language
3- Application Language

- Functional Language
- Declaration Language

4- Declaration Language Tools

- Prolog Language Elements
- Problem Description
- Primitives
- Prolog and Pascal
- List Notation
- Files Access
- Dynamic Data Bases
- Dynamic Internal Data Bases
- Declarations
- Applications
- Expert Systems

5- An Overview of the Aspects of ADA
- ADA and Pascal

6- Functional Language Tools

- LISP Language
- Basic LISP Primitives
- Procedure Definition
- Predicates and Conditionals
- Data Abstraction
- Files
- Printing and Reading
- Arrays
- Structure

PROLOG
Programming for Artificial Intelligence by Ivan Bratko
LISP 3^rd Edition
Patrick Henry Winston
Computer Graphics


(References)


Computer Architecture


(Reference)

Artificial Intelligence


(Reference)


Statistic and Operation Research (elective)

The concept of statistics, frequency distribution, measure of central tendency, measure of dispersion or variation, the concept of probability, probability distribution, discrete probability distribution, continuous probability distribution, statistical estimation theory, test of hypotheses and significance.

Advance information technology (elective)

1- Advanced information technology.
   - Information technology: principles, practices, and opportunities.
   - A tour of computer system.

2- Tech talk.
   - The central processing and memory.
   - Secondary storage and input / output devices.
   - Distribution devices.

3- Singleuser system.
   - Electronic spreadsheets.
   - Database application for personal productivity.
   - The nature of multimedia presentation.
   - Developing signal- user systems.

4- Multiuser systems.
   - Multi-user and network computing.
   - Shared and distributed data.
   - Developing shared IT applications.
Forth: Syllabus of the forth year

Computer and data security

1- Introduction
2- Theoretical background
3- Cryptography concepts.
4- Classical methods.
5- Classical cryptanalysis.
6- Stream cipher methods.
7- Non-linear stream cipher.
8- Randomness concepts.
9- Randomness testing methods.
10- Block cipher (DES) methods.
11- Another type of block cipher.
12- Public-key methods.
13- Authentication
14- Digital signature algorithms (DSA).
15- Key managements.
16- Communication protocols.
17- Information hiding techniques

Windows programming

Communication and computer network

Introduction and the physical level: properties of a communication system transmission media, properties of signals digital transmission, multiplexing, and network types and topologies. Case studies of communication networks; public telephone network, terminal network capacity, queuing theory, error detection and correction, and coding and compression. The ISO reference model: connection oriented and connectionless communication, seven layer model, and TCP/IP model. The data link layer: error control, flow control, and case studies (x-modem, Arpanet, Hle). Medium access control: properties of contention based transmission, slotted transmission, carrier sensing and token passing and case studies (Ethernet, token bus and token ring). The network layer; switching in networks, routing, internetworking, and case studies (x-25, networks, internet). Metropolitan area networks: bridging local and wide area networks and case studies, placation oriented layers; transport layer, session layer, presentation layer, and application layer.

(Reference)


Operating system

Roles of an OS: simplified machine, resource allocator, and history and development of OSs. The rule of simplified machine; hardware, interrupt, device drivers, and virtual machines. Processes; process attributes, time sharing and process state, process dispatch, and the null process. Synchrony Dow level issues: data integrity (the producer / consumer problem), deadlock (the dining philosophers), critical sections, Peterson’s algorithm, busy wait versus process blocking, and semaphores. Layered structure in an OS: functions of the nucleus interrupt vectors, processes, semaphore, and data structure in the nucleus. Synchrony (higher level methods): monitors, massage passing and rendez-vous. Memory control:
mono programming, multi-programming, swapping virtual memory (paging, segmentation, and paging/segmentation).

I/O with devices: issues per device, handler design issues, handler structure, buffers, and spooling (usually output). Files: a file regarded as a virtual device, virtues of disk files, file names, file operations, directories, access rights allocation: policy and mechanism, deadlock (precondition and prevention), high level scheduler, and accounting and rationing. User interface: command line interpreter (input), monitor (output), and graphical user interfaces (output and input if with mouse), protection against hacking: user names, password, physical identification, encryption system loopholes, institutional loopholes. Distributed system.

(Reference)


Advance intelligence application


Simulation

The scope of simulation, concept of simulation, advantage of simulation, limitation of simulation, relationship between simulation and other science. Natural of simulation, relationship between modeling and simulation, principle of modeling, validation of model, Petri nets, methodology of simulation, types of simulation model.
Probabilities and distribution, probability law, random variable, joint probability distribution. Random number generation.

Information System Branch
فرع نظام المعلومات

السنة الأولى:

<table>
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<th>الوحدات</th>
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الموضوع:

- البرمجة المهبلكة
- الرياضيات
- هياكل متقطعة
- تصميم منطقى وتراكب حاسبة
- مبادئ تكنولوجيا المعلومات
- تحليل وتصميم نظام المعلومات
- اللغة الإنجليزية
- تطبيقات جامية (عملي)

المجموع: 18

السنة الثانية:

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الموضوع:

- تحليل عددي
- معالجات مايكروية وبرمجة التجميع
- هياكل بيانات وكوارتزيات
- نظرية احتمالية
- البرمجة الكبانية P:0.05
- رياضيات متقدمة
- قواعد بيانات

المجموع: 18

السنة الثالثة:

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الموضوع:

- بحوث العمليات والإحصاءات
- رسم الحاسبة
- معمارية الحاسبة
- مترجمات
- ديكاء الأصطناعي
- هندسة البرمجيات (اختياري)
- قواعد بيانات متوزعة (اختياري)
- تكنولوجيا معلومات متقدمة

المجموع: 22
### السنة الرابعة:

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Subject and syllabus of Information System branch

First: Syllabus of the first year

Structured programming

Algorithm, Top down design, part of Pascal program, constants, Math, Operators, Conditional statement, (If, Else, Case), loop statements (For, Repeat, While), procedures and functions, Arrays, String, Files, Records.

Mathematics


Discrete structures


Computer organization and logic design


Type Of Computer Systems And Types of Computers Application (Introduction, Types of Computer systems, Types of Computer Application).
Number Systems and Codes, Logic Gates, Boolean Algebra, Minimization Methods (K-Map & Q-M).
Combination Logic Circuits, Adders, Subtractors, Computers, Code Converters, Multiplexers, Sequential Logic Circuits, Flip-Flop, S-R F-F, J-K F-F, T F-F, Registers, Counters, State Diagram and FSA, ROM, RAM.

Reference:

Information technology

An introduction to information technology

1- Concepts of
   - Information technology
   - The evaluation of information age.
   - Communication networks.
   - The functions of information technology.
   - The benefits of information technology
   - The opportunities for information technology.

3- A tour of a computer system.
   - Hardware: computing, sorting and communicating.
   - Programs: in charge of the hardware.
   - Information: the reason for using information technology.

3- The central processor & memory.
   - Inside the system unit.
   - The processing sequence.
   - Processor speed.
Information System

1- System Concepts:-
   - General model of system.
   - Information.
   - Information system & organization.
   - Subsystems.
   - Control in system (feedback/filtering).
   - System Classification.

2- System analysis & design
   - Why system analysis necessary.
   - System life cycle.
   - Analysis tools.
   - Information gathering.

3- System Development:-
   - Problem definition.
   - Setting a project goals.
   - Feasibility study.

4- System & Modeling Concepts.
   - System model (functional model).
   - Data modeling.

5- System design:-
   - Output design.
   - Input design.
   - Data Base Design.
   - Coding systems.

6- Computing Electronically:-
   - Management information system.
   - Decision support systems.
   - Expert systems.

7- Case study

Reference:-

Second: Syllabus of the second year

Numerical analysis

Binary fraction and shifting. Scientific notation machine number and computer accuracy. Computer floating point numbers. Error analysis (Absolute band relative errors; truncation; round–off and chopping errors).


Solution of differential equations (Euler's method, Runge–kutta methods).

Eigen values and vector.

Reference: Numerical methods using Matlab; prentice hall.

Microprocessor and assembly programming

CPU architecture register transfer, memory, peripheral control chips, data transfer, fetch and execute cycles, address and data and control busses, brief introduction to machine code, instruction sets(from, othogonality, number of addresses), and decoding. Assembly language programming: addressing modes of the 8086, data registers, flags, the status register, implementing control structures in assembly language, structured assembly language programming using procedures, arithmetic and logic instructions, stack (concepts and applications), string processing, and tools for preparing and debugging and translating programs. MS-DOS operating system structure: MSDOS and BIOS disk and keyboard system architecture. Advanced features of processors: segments and segment registers, interrupts and interrupt service routines, I/O port addressing, instruction pipelining, and cache memory.

(Reference)

1- Abel, P. "IBM PC assembly language and programming", 4\textsuperscript{th} ed., prentice hall, 1998.

Information System analysis and design

1- Fundamental concepts
   - System concept & information systems.
   - Subsystem of an information system.
   - EOP / MIS / DSS.
   - Other Aspects of information.
   - General Model of a system.
   - Type of system.
   - Subsystem.
   - Control in systems.
2- System analysis & design.
3- Gathering information.
4- Starting a project.
5- Data flow diagrams (DFDs).
6- Describing data.
7- Normalization.
8- Process descriptions.
9- Documentation & computer aids.
10- Designing the new system.
11- Database design.
12- Program design.

References:-

1- Introduction to systems analysis & design
   By: I.T.Hawryszkiewycz, 1988 ---- Prentice Hall of Australia Pty Ltd.
2- Structured Analysis & Design of introduction systems.

Data structure and algorithm

Algorithm design as a problem solving activity library structure. Representation via arrays data structure: list, stack and its main applications (conversation. Evaluation of expression: postfix, prefix and infix. In addition to its use in recursion, and circular Queue). Representation via linked list data Structure: list, stack, queue, tree (binary, binary search tree and tree traversal: inorder, preorder,
postorder and insertion and deletion). Searching algorithm for arrays: sequential and binary search and hashing.
Sorting algorithm: insertion, quick, selection, merge and heap sort.
Introduction to the main file organization techniques: sequential direct, and indexed sequential.

References:
1- "An introduction to data structures with application", Jean-Paul Tremblay, Paul G. Sorenson.
2- "Data structures through Pascal", Ellis Horowitz and Sartaj Sahni.
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4- "The Art of the computer", Donald E. Knuth vol. 1 fundamental algorithm, vol. 3 sorting and rearcging.

Computational theory

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


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Boundary value problems - formation of the wave equation, equation for the one dimensional and two dimensional heats flows.
Laplace transform: Laplace transformation and inverse - properties of laplace transform.
Fourier series: periodic functions - odd and even functions - half range Fourier sine and cosine series.
Fourier transform – definition - sine cosine transforms - finite Fourier sine and cosine transforms – convolution - inverses.
Bessel’s equations: beta and gamma function - series solutions of Bessel equation.

(reference)

Third: Syllabus of the third year

Software engineering

The software crisis. Software concepts: the software life cycle, the waterfall model of software development with feedback, other models of software development (including prototyping, exploratory, incremental, and spiral), and capability maturity model. Software requirements: formal requirements (structured analysis, data-flow, and control flow diagrams), behavioral requirements (state transition diagrams, state chart, decision table, and trees), object oriented analysis, and other approaches (data structure oriented methods and formal methods), and non-formal requirements.

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(Reference)


المصادر


Programming techniques (elective)

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   - Language Grammars قواعد البيانات
   - Control السيطرة
   - Testing الاختبار
   - Repetition التكرار
   - Data abstraction تجريد المعلومات

2- Imperative Language

3- Application Language اللغات التطبيقية
   - Functional Language اللغات الدالية
   - Declaration Language اللغات التعرفية

4- Declaration Language Tools أدوات اللغات التعرفية
- Prolog Language Elements
- Problem Description
- Primitives
- Prolog and Pascal
  - List Notation
  - Files Access
  - Dynamic Data Bases
  - Dynamic Internal Data Bases
  - Declarations
  - Applications
  - Expert Systems

5. An Overview of the Aspects of ADA
   - ADA and Pascal

6. Functional Language Tools
   - LISP Language
     - Basic LISP Primitives
     - Procedure Definition
     - Predicates and Conditionals
     - Data Abstraction
     - Files
     - Printing and Reading
     - Arrays
     - Structure

PROLOG
Programming for Artificial Intelligence by Ivan Bratko
LISP 3^Rd Edition
Patrick Henry Winston
Beertbolb Klause Poul Hom

Database

1- Introduction:-
1.1 Database definition (Entity and relationship, DBA, DBMS).
1.2 Why database.
1.3 Data independence.
1.4 Databases Architecture.

2- Storage structure:-
   2.1 Access method.
   2.2 Representation for same sample data.
   2.3 Indexing techniques.

3- Data models:-
   3.1 The relational approach.
   3.2 The hierarchical approach.
   3.3 The network approach.

4- Data Languages:-
   4.1 Data definition.
   4.2 Network selection.
   4.3 Relational algebra (Traditional set operation, special relational operation).
   4.4 Data definition (CCL).
   4.5 Data manipulation (DML).

5- Normalization:-
   5.1 Functional dependence.
   5.2 First, Second & third normal forms.
   5.3 Fourth normal form.

6- Database design methods:-
   6.1 Logical design phases.
      6.1.1 Based on entity relationship concepts.
      6.1.2 Based on normalization concepts.
      6.4 Physical design phase.

7- Operational requirements:-
   7.1 Security.
   7.2 Integrity.
   7.3 Concurrency.

Reference:
- An Introduction to Database System. C. J. Date

Computer Architecture

CPU Organization: A Model CPU Architecture, Instruction Set Design Issues, And Language-Oriented Architectures. Microprogramming: Design Of CPU Control Unit, Microprogrammed vs Hardwired Control,

Reference


Advance information technology (elective)

1- Advanced information technology.
   - Information technology: principles, practices, and opportunities.
   - A tour of computer system.

2- Tech talk.
   - The central processing and memory.
   - Secondary storage and input / output devices.
   - Distribution devices.

3- Singleuser system.
   - Electronic spreadsheets.
   - Database application for personal productivity.
   - The nature of multimedia presentation.
   - Developing signal- user systems.

4- Multiuser systems.
   - Multi-user and network computing.
   - Shared and distributed data.
   - Developing shared IT applications.
Statistic and Operation Research (elective)

The concept of statistics, frequency distribution, measure of central tendency, measure of dispersion or variation, the concept of probability, probability distribution, discrete probability distribution, continuous probability distribution, statistical estimation theory, test of hypotheses and significance.


References: Operation research an introduction by Hamdy A. Taha.

Computer Graphics


References:
Forth: Syllabus of the forth year
Communication and computer network (elective)

Introduction and the physical level: properties of a communication system transmission media, properties of signals digital transmission, multiplexing, and network types and topologies. Case studies of communication networks; public telephone network, terminal network capacity, queuing theory, error detection and correction, and coding and compression. The ISO reference model: connection oriented and connectionless communication, seven layer model, and TCP/IP model. The data link layer: error control, flow control, and case studies (xmodem, Arpanet, Hle). Medium access control: properties of contention based transmission, slotted transmission, carrier sensing and token passing and case studies (Ethernet, token bus and token ring). The network layer; switching in networks, routing, internetworking, and case studies (x-25, networks, internet). Metropolitan area networks: bridging local and wide area networks and case studies, placation oriented layers; transport layer, session layer, presentation layer, and application layer.

(References)


Artificial Intelligence


(Reference)
المصادر


Computer and data security

1- Introduction
2- Theoretical background
3- Cryptography concepts.
4- Classical methods.
5- Classical cryptanalysis.
6- Stream cipher methods.
7- Non-linear stream cipher.
8- Randomness concepts.
9- Randomness testing methods.
10- Block cipher (DES) methods.
11- Anther type of block cipher.
12- Public-key methods.
13- Authentication
14- Digital signature algorithms (DSA).
15- Key managements.
16- Communication protocols.
17- Information hiding techniques

Operating system
Roles of an OS: simplified machine, resource allocator, and history and development of OSs. The rule of simplified machine; hardware, interrupt, device drivers, and virtual machines. Processes; process attributes, time sharing and process state, process dispatch, and the null process. Synchrony Dow level issues): data integrity (the producer / consumer problem), deadlock (the dining philosophers), critical sections, Peterson’s algorithm, busy wait versus process blocking, and semaphores. Layered structure in an OS: functions of the nucleus interrupt vectors, processes, semaphore, and data structure in the nucleus. Synchrony (higher level methods): monitors, massage passing and rendez-vous. Memory control: mono programming, multi-programming, swapping virtual memory (paging, segmentation, and paging/segmentation).

I/O with devices: issues per device, handler design issues, handler structure, buffers, and spooling (usually output). Files; a file regarded as a virtual device, virtues of disk files, file names, file operations, directories, access rights allocation : policy and mechanism, deadlock (precondition and prevention), high level scheduler, and accounting and rationing. User interface: command line interpreter (input), monitor (output), and graphical user interfaces (output and input if with mouse), protection against hacking: user names, password, physical identification, encryption system loopholes, institutional loopholes.

Distributed system.

(Reference)

المصادر


Distributed database

1. Distributed Databases: An Overview
   1-1. Features of Distributed versus centralized Databases.
   1-2. Why Distributed Database?
   1-3. Distributed Databases Management systems.

2. Review of Databases and computer Networks.
   2-1. Review of Databases
2-2- Review of computer Networks

3- Principles of Distributed Databases.
   3-1- Levels of Distributed Transparency
   3-2- Reference Architecture for Distributed Databases
   3-3- Types of Data fragmentation
   3-4- Distributed Transparency
   3-5- Integrity constraints in Distributed Databases

4- Distributed Database Design
   4-1- A Framework for Distributed database Design
   4-2- The design for Distributed Database fragmentation
   4-3- The Allocation of fragments

5- Translation of Global Queries to fragment Queries
   5-1- Equivalence Transformations for Queries.
   5-2- Transforming Global Queries into fragment Queries
   5-3- Database Grouping and Aggregates function Evaluation
   5-4- Parametric Queries

6- Optimization of Access strategies
   6-1- A Framework for Query Optimization
   6-2- Join Queries
   6-3- General Queries

7- The Management of Distributed Transactions
   7-1- A Framework for Transaction Management
   7-2- Supporting Atomicity of Distributed Transactions
   7-3- Concurrency control for Distributed Transactions
   7-4- Architectural Aspects of Distributed Transactions

8- Concurrency control
   8-1- Foundations of Distributed Concurrency control
   8-2- Distributed Deadlocks
8-3- Concurrency control Based on Timestamps
8-4- Optimistic Methods for Distributed Concurrency control

9- Reliability
   9-1- Basic concepts
   9-2- Nondropping commitment protocols
   9-3- Reliability and Concurrency control
   9-4- Determining a consistent view of the network
   9-5- Detection and Resolution of inconsistency
   9-6- Checkpoints and cold Restart

10- Distributed Database Administration
    10-1- Catalogue Management in Distributed Databases
    10-2- Authorization and Protection

Reference:


Management information system (MIS)

Defection of MIS, MIS as an evolving concept; subsystem of MIS; operating element of information system. MIS support for decision making, MIS structure based on management activity; MIS structure based on organization function.

Synthesis of MIS structure; some issues of MIS structure; HW, SW and communication technology for information system. Storage and retrieval of data; Physical versus logical models of data.

Neural Networks (Elective)

Back propagation - Training algorithm - network configurations - network paralysis - local minima - temporal instability.

Distributed System

Introduction to distributed system; distributed system architecture, model and design goal; inter-process communication and synchronous; concurrent programming; client-server programming distributed application development using remote procedure call; distributed file system.
Artificial Intelligence Branch
فرع الذكاء الاصطناعي

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الموضوع:
ذكاء اصطناعي متقدم
شبكات الحاسبات
المنطق المضبوب
نظام تشغيل
امنية الحاسابات والبيانات (اختياري)
معالجة الصور وتمييز الأنماط
مهمة الإنترنت (اختياري)
مشروع
المجموع

المواد المختارة

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الموضوع:
التذكوير والتخزين الطويل
نماذج ومحاكاة
شبكات عصبية وروايات جيدة (اختياري)
نظام خيبرة (اختياري)

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الموضوع:
روبوت
قروئ برميات ذكية
أنظمة ذكية متقدمة
امنية الحاسابات والبيانات
مهمة الإنترنت
Subject and syllabus of Artificial Intelligence branch

First: Syllabus of the first year

Structured programming

Algorithms. Modular programming concepts. Top-down design methodology. Structured programming concepts. Structure of Pascal programs. Expressions. I/O and assignment statements. Procedures and function. Control structures: (Sequence, selections (if-then-else, case-of) and repetitions (while – do, repeat – until, for – do)). Data structures: (arrays, sets, strings, records, and files. Recursion – simple algorithms for sorting (bubble) and searching (sequential)).

References (مصادر)

"Problem solving and structured programming in Pascal" by Elliot B. Koffman.

Mathematics


Discrete structures

1- Discrete mathematical structures with application to computer science by Trem Blay manohar 1975.
2- Introduction to discrete structures by Perpetrate and Yeh, 1973.

**Computer organization and logic design**

Instruction Formats & addressing Technique (introduction. Register Definition. Instruction Formats. Addressing Technique).


Combination Logic Circuits. Adders. Subtractors.

Reference:
Basic concepts include recursive problem solving, knowledge representation, state space search, method-logic, and deduction. Introduction to symbolic logic-propositional logic—well-formed formula. Predicate logic-predicate variable and constant-first order logic quantifiers. Forward chaining and unification. Goal trees. Resolution by refutation.

Information System

1. System Concepts:
   - General model of system.
   - Information.
   - Information system & organization.
   - Subsystems.
   - Control in system (feedback/filtering).
   - System Classification.

2. System analysis & design
   - Why system analysis necessary.
   - System life cycle.
   - Analysis tools.
   - Information gathering.

3. System Development:
   - Problem definition.
   - Setting a project goals.
   - Feasibility study.

4. System & Modeling Concepts
   - System model (functional model).
   - Data modeling.

5. System design:
   - Output design.
   - Input design.
   - Data Base Design.
   - Coding systems.

6. Computing Electronically:
   - Management information system.
   - Decision support systems.
   - Expert systems.

7. Case study

Second: Syllabus of the second year
Numerical analysis

Binary fraction and shifting, Scientific notation machine number and computer accuracy. Computer floating point numbers. Error analysis (Absoluteband relative errors; truncation; round-off and chopping errors).

Reference: Numerical methods using Matlab; prentice hall.

Microprocessor and assembly programming

CPU architecture register transfer, memory, peripheral control chips, data transfer, fetch and execute cycles, address and data and control busses, brief introduction to machine code, instruction sets(from, orthogonality, number of addresses), and decoding. Assembly language programming: addressing modes of the 8086, data registers, flags, the status register, implementing control structures in assembly language, structured assembly language programming using procedures, arithmetic and logic instructions, stack (concepts and applications), string processing, and tools for preparing and debugging and translating programs. MS-DOS operating system structure: MSDOS and BIOS disk and keyboard system architecture. Advanced features of processors: segments and segment registers, interrupts and interrupt service routines, I/O port addressing, instruction pipelining, and cache memory.

(Reference)

Prolog fundamental; prolog program; visual prolog; unification and backtracking; simple and compound object; repetition and recursion; list and recursion; internal database; string-handling; writing, reading and files; Lisp programming; lisp versus prolog.

Data structure and algorithm


(references)

1- “An introduction to data structures with application”, Jean Paul Tremblay, Paul G. Sorenson.
2- “Data structures through Pascal”, Ellis Horowitz and Sartaj Sahni.
3- “Introduction to data structure with Pascal”, Thomas L. Naos bhat Sigh.
4- “The Art of the computer”, Donald E. Knuth vol. 1 fundamemntal algorithm, vol.3 sorting and rearcng.

Computational theory

The empty string in context-free grammar ambiguity.

Regular grammar

Left-linear grammar

Right-linear grammar


Object oriented programming

Fundamental concept: classes, objects, inheritance, generality, and polymorphism: single, multiple and virtual inheritance, C++ programming (or any object oriented language): constants, math, operators, logic operators, conditional statements, loop statements, functions, arrays, strings, files.

Advance mathematics

Formation of partial differential equations-first order linear and non-linear equations. Boundary value problems - formation of the wave equation, equation for the one dimensional and two-dimensional heat flows.

Laplace transform: Laplace transformation and inverse - properties of Laplace transform.

Fourier series: periodic functions - odd and even functions - half range Fourier sine and cosine series.

Third: Syllabus of the third year

Statistic and Operation Research (elective)

The concept of statistics, frequency distribution, measure of central
tendency, measure of dispersion or variation, the concept of probability,
probability distribution, discrete probability distribution, continuous
probability distribution, statistical estimation theory, test of hypotheses
and significance.
Operation research and the art of problem solving. Linear programming,
formulation and graphical solution, algebraic solution. Duality and
sensitivity analysis. Transportation model. Networking analysis. Decision

References: Operation research an introduction by Hamdy A. Taha.

Compiler

Introduction: the need for compilers and assemblers. Assembly language
used as compiler object code: instruction set and machine code format.
Lexical Analysis: translation from character stream to symbol stream. An
Assembler; label table, back patching, assembly of individual instructions,
and a complete assembler program. Address Binding; relocation, multi
segment programs, linking, and loading. Context-Free Grammars: parse
trees, leftmost and rightmost derivation, ambiguous grammars, extended
Backus-Naur form, and bottom-up and top-down backtrack parsing.
Predictive Parsing: parse table, non recursive parsing algorithm,
construction of parse table, definition of LL(l) grammars transformation
to LL(1), recursive descent compilation of simple expressions. Semantic
Analysis: type checking, attribute grammars, and errors. Paradigmatic
Issues: compiling different language types: imperative, functional and
object-oriented.
Computer Architecture


Image processing

Image formation and acquisition; image transformation; image enhancement and restoration; image compression; morphological image processing edge detection and segmentation; architecture of image processing.

Database (elective)
Database

1- Introduction:-
   1.1 Database definition (Entity and relation ship, DBA, DBMS).
   1.2 Why database.
   1.3 Data independence.
   1.4 databases Architecture.

2- Storage structure:-
   2.1 Access method.
   2.2 Representation for same sample data.
   2.3 Indexing techniques.

3- Data models:-
   3.1 The relational approach.
   3.2 The hierarchical approach.
   3.3 The network approach.

4- Data Languages:-
   4.1 Data definition.
   4.2 Network selection.
   4.3 Relational algebra (Traditional set operation, special relational operation).
   4.4 Data definition (CCL).
   4.5 Data manipulation (DML).

5- Normalization:-
   5.1 Functional dependence.
   5.2 First, Second & third normal forms.
   5.3 Fourth normal form.

6- Database design methods:-
   6.1 Logical design phases.
      6.1.1 Based on entity relationship concepts.
      6.1.2 Based on normalization concepts.
   6.4 Physical design phase.

7- Operational requirements:-
   7.1 Security.
   7.2 Integrity.
   7.3 Concurrency.

Reference:
   - An Introduction to Database System. C. J. Date
Forth: Syllabus of the forth year

Pattern recognition

Model of a pattern system; representation techniques for classifier; parametric and nonparametric classification method; clustering; feature extraction for two-dimensional visual pattern recognition.

Advance artificial Intelligence (elective)


Computer network and internet (elective)

Network architecture, OSI reference model- service. Physical layer – review of
data communication - digital transmission - transmission and switching - ISDN architecture - LAN- WAN protocol. Data link layer, error detection and correction. Network layer, transport layer, session layer, presentation layer.

Understanding the internet using several access methods required software and tools. Topics include: email, FTP, Telnet, Gopher, Archie, WWW, HTML, how to create an active web site.

(Reference) المصادر


Computer and data security

1. Introduction
2. Theoretical background
3. Cryptography concepts.
5. Classical cryptanalysis.
8. Randomness concepts.
9. Randomness testing methods.
10. Block cipher (DES) methods.
11. Another type of block cipher.
12. Public-key methods.
13. Authentication
15. Key managements.
17. Information hiding techniques
Operating system

Roles of an OS: simplified machine, resource allocator, and history and development of OSs. The rule of simplified machine; hardware, interrupt, device drivers, and virtual machines. Processes; process attributes, time sharing and process state, process dispatch, and the null process. Synchrony Dow level issues: data integrity (the producer / consumer problem), deadlock (the dining philosophers), critical sections, Peterson’s algorithm, busy wait versus process blocking, and semaphores. Layered structure in an OS: functions of the nucleus interrupt vectors, processes, semaphore, and data structure in the nucleus. Synchrony (higher level methods): monitors, massage passing and rendez-vous. Memory control: mono programming, multi-programming, swapping virtual memory (paging, segmentation, and paging/segmentation).

I/O with devices: issues per device, handler design issues, handler structure, buffers, and spooling (usually output). Files; a file regarded as a virtual device, virtues of disk files, file names, file operations, directories, access rights allocation: policy and mechanism, deadlock (precondition and prevention), high level scheduler, and accounting and rationing. User interface: command line interpreter (input), monitor (output), and graphical user interfaces (output and input if with mouse), protection against hacking: user names, password, physical identification, encryption system loopholes, institutional loopholes. Distributed system.

(Reference)

Computer Security Branch
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قواعد بيانات (اختياري)
شيكوات حاسبة
المجموع
Subject and syllabus of Computer Security branch

First: Syllabus of the first year

Structured programming
Algorithms. Modular programming concepts. Top-down design methodology. Structured programming concepts. Structure of Pascal programs. Expressions. I/O and assignment statements. Procedures and function. Control structures: (Sequence, selections (if-then-else, case-of) and repetitions (while – do, repeat – until, for – do)). Data structures: (arrays, sets, strings, records, and files. Recursion – simple algorithms for sorting (bubble) and searching (sequential)).

References (المصادر)
“Problem solving and structured programming in Pascal” by Elliot B. Koffman.

Mathematics

Discrete structures

References (المصادر)
- Discrete mathematical structures with application to computer science by Trem Blay manohar 1975.
- Introduction to discrete structures by Perpetrate and Yeh, 1973.

Computer organization and logic design

Instruction Formats & addressing Technique (introduction. Register Definition. Instruction Formats. Addressing Technique).
Type Of Computer Systems And Types of Computers Application (Introduction. Types of Computer systems. Types of Computer Application).

(References)

Number theory

Probability theory
Second: Syllabus of the second year

Numerical analysis


References

- Numerical methods using Matlab; prentice hall.

Microprocessor and assembly programming

CPU architecture register transfer, memory, peripheral control chips, data transfer, fetch and execute cycles, address and data and control busses, brief introduction to machine code, instruction sets(from, orthogonality, number of addresses), and decoding. Assembly language programming: addressing modes of the 8086, data registers, flags, the status register, implementing control structures in assembly language, structured assembly language programming using procedures, arithmetic and logic instructions, stack (concepts and applications), string processing, and tools for preparing and debugging and translating programs. MS-DOS operating system structure: MSDOS and BIOS disk and keyboard system architecture. Advanced features of processors: segments and segment registers, interrupts and interrupt service routines, I/O port addressing, instruction pipelining, and cache memory.

References

المصادر
Data structure and algorithm


References

- "An introduction to data structures with application", Jean_Paul Tremblay, Paul G. Sorensen.
- "Data structures through Pascal", Ellis horowitz and Sortaj sahni.
- "Introduction to data structure with Pascal", Thomas L. Naos bhagat sigh.
- "The Art of the computer", donald E.knuth vol. 1 fundamemntal algorithm, vol.3 sorting and searching.

Computational theory

Left linear grammar
Right linear grammar

(Reference)


Object oriented programming OOP

Fundamental concept: classes, objects inheritance, generosity, and polymorphism: single, multiple and virtual inheritance, C++ programming (or any object oriented language): constants, math, operators, logic operators, conditional statements, loop statements functions, arrays, strings, files.

Advance mathematics

Formation of partial differential equations-first order linear and non-linear equations.
Boundary value problems - formation of the wave equation, equation for the one dimensional and two dimensional heats flows.
Laplace transform: Laplace transformation and inverse - properties of laplace transform.
Fourier series: periodic functions - odd and even functions - half range Fourier sine and cosine series.
Fourier transform – definition - sine cosine transforms - finite Fourier sine and cosine transforms – convolution - inverses.
Bessel’s equations: beta and gamma function - series solutions of Bessel equation.

(Reference)
Third: Syllabus of the third year

Information theory

Computer Graphics


(References)


Computer Architecture

CPU Organization: A Model CPU Architecture, Instruction Set Design Issues, And Language-Oriented Architectures. Microprogramming: Design Of CPU Control Unit, Microprogrammed vs Hardwired Control, Complexity Of Microprograms, And Firmware. I/O: Peripheral Control Strategies. Direct Memory Access, And I/O Channels. Memory...
Management: Register Windowing, Memory, Interleaving, Cache Memory, and Tagged Storage. Pipeline and Vector Processing: Instruction Pipelining, Arithmetic Pipelining (Integer and Floating Point Multiplication), Systolic Arrays, and Vector Processing. Multiprocessors: Interprocessor Communication Networks and Methods and Cache Coherence. Associative Memory; Content-Addressable Memories, Arithmetic in Memory, Applications (Database Machines). Non-Von-Neumann Architectures: Dataflow and Graph Reduction.


Compiler


Artificial Intelligence


(Reference)


Cipher system

Database

1- DB Introduction:-
   1.1 Database definition (Entity and relationship, DBA, DBMS).
   1.2 Why database.
   1.3 Data independence.
   1.4 databases Architecture.
2- Storage structure:-
   2.1 Access method.
2.2 Representation for same sample data.
2.3 Indexing techniques.

3- Data models:-
3.1 The relational approach.
3.2 The hierarchical approach.
3.3 The network approach.

4- Data Languages:-
4.1 Data definition.
4.2 Network selection.
4.3 Relational algebra (Traditional set operation, special relational operation).
4.4 Data definition (CCL).
4.5 Data manipulation (DML).

5- Normalization:-
5.1 Functional dependence.
5.2 First, Second & third normal forms.
5.3 Fourth normal form.

6- Database design methods:-
6.1 Logical design phases.
   6.1.1 Based on entity relationship concepts.
   6.1.2 Based on normalization concepts.
6.2 Physical design phase.

7- Operational requirements:-
7.1 Security.
7.2 Integrity.
7.3 Concurrency.

(References)

ο An Introduction to Database System. C. J. Date.

Computer networks

ο LAN and WAN: network access point, LAN and WAN communication device, network cable types, network standard
(Ethernet, token ring, transmission type, WAM method, bus interface, and access method.

- The basic of OSI layers, how the OSI model compare with the TCP/IP model.
- Internet addressing: internet address class, IP addressing rules, reserved IP addressing, sub-networks.
- Introduction to internet servers.
Forth: Syllabus of the fourth year

Intelligent system

1-Introduction
2-Intelligent Planning /4
3- Machine Learning Techniques /4
4- Machine Learning – Neural Networks /4
5- Machine Learning – Genetic Algorithms /3
6- Visual Perception /4
7-Linguistic Perception /3
8- Knowledge Acquisition /3
9- Distributed Intelligent Systems/3
10-Parallel Intelligent Systems/3

Networks security

Part 1: foundations of information security:
- Threats & countermeasures
- Terminology: Security Objectives and Services, cryptographic algorithms and protocols.
- Cryptography and Cryptanalysis
- Primitives : symmetric Encryption, Asymmetric Encryption / signing, modification check values, Random number generation
- Cryptographic protocols
- Access control

Part 2: network security integration and layer security protocols:
- Basic design space of security integration
- Pragmatic internet computing model and Different security Requirement levels
- Discussion of integration into lower vs Higher protocol Layers and into end systems vs intermediate systems.
- Kink layer security protocols : point to point protocol, point to point tunneling protocol, layer 2 tunneling protocol.
- Virtual private networks: definition and design alternative

Part 3: internet security Architecture (IPSec):
- Basic security deficits of the internet protocol
- Security objectives of IPSec
- Overview on concepts security Associations, Security Association Database, security policy database, security protocols
- Transport mode and tunnel mode
- Authentication header (AH)
- Encapsulating security payload (ESP)
- Authentication and key management

Part 4: Transport layer security protocols and firewalls:
- Secure socket layer / transport layer security (SSL/TLS)
- Secure shell (SSH)
- Basic firewall concepts
- Firewall Architectures
- Packet filtering
- Proxy services and Bastion Hosts

Part 5: security in Wireless and mobile networks:
- Specific threats in mobile communications
- Security of wireless local Area networks according to IEEE 802.11
- GSM/GPRS/UMTS security concepts and protocols
- Outlook on security for mobile internet communications

Main reference


Additional Reference

Operating system


I/O with devices: issues per device, handler design issues, handler structure, buffers, and spooling (usually output). Files: a file regarded as a virtual device, virtues of disk files, file names, file operations, directories, access rights allocation: policy and mechanism, deadlock (precondition and prevention), high level scheduler, and accounting and rationing. User interface: command line interpreter (input), monitor (output), and graphical user interfaces (output and input if with mouse), protection against hacking: user names, password, physical identification, encryption system loopholes, institutional loopholes. Distributed system.

(Reference)


Advance cipher system

Image and signal processing
Internet architecture