



No.:

Date: / /

الى / امانة مجلس الجامعة

م / المناهج

تحية طيبة...

اشارة الى الكتاب المرقم 10058 في 2005/7/6 والمتضمن اعداد دراسة عن المناهج الدراسية ،  
نود اعلامكم بانته تم تحديث المناهج الدراسية للقسم ولكافة الفروع العلمية في العام الدراسي  
2004-2005 وخطة القسم مستمرة في مجال تحديث المناهج.

مع التقدير

المرفقات/

المفردات الدراسية لفروع القسم الاربعة

د. عبد المنعم صالح رحمة

رئيس القسم وكالة

الخطة الدراسية لمرحلة البكالوريوس في قسم علوم الحاسبات

## فرع البرمجيات

### السنة الأولى:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
4	1	2	3	البرمجة المهيكلية
3	1	-	3	رياضيات
3	1	-	3	هياكل متقطعة
3	1	2	2	تركيب حاسبة
2	1	-	2	تكنولوجيا المعلومات
3	1	2	2	تصميم منطقي
مستوفي	-	-	2	اللغة الانكليزية
مستوفي	-	2	-	تطبيقات جاهزة (عملي)
18	6	8	17	المجموع

### السنة الثانية:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
2	1	-	2	تحليل عددي
3	1	2	2	معالجات مايكروية ولغة التجميع
3	1	2	2	هياكل بيانات وخوارزميات
2	1	-	2	نظرية احتسابية
3	1	2	2	البرمجة الكيائية O.O.P
2	1	-	2	رياضيات متقدمة
3	1	2	2	تحليل نظم وتصميم قواعد البيانات
18	7	8	14	المجموع

### السنة الثالثة:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
2	1	-	2	بحوث العمليات والاحتمالات
3	1	2	2	رسوم الحاسبة
2	1	-	2	معمارية الحاسبة
3	-	2	2	مترجمات
3	1	2	2	ذكاء اصطناعي
3	1	2	2	هندسة البرمجيات (اختياري)
3	1	2	2	قواعد بيانات متقدمة
3	1	2	2	تطبيقات رياضية في الحاسبات (اختياري)
22	7 6	12	16	المجموع

السنة الرابعة:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
3	1	2	2	تطبيقات ذكية
3	1	2	2	الاتصالات وشبكات الحاسبات
3	1	2	2	برمجة النوافذ المتقدمة
3	1	2	2	نظم تشغيل
2	1	-	2	امنية الحاسبات والبيانات
3	1	2	2	معالجة الصور (اختياري)
2	1	-	2	معمارية الانترنت (اختياري)
3	-	4	1	مشروع
22	7	14	15	المجموع

المواد المختارة:

السنة الثالثة:

مناقشة	الساعات		الموضوع
	عملي	نظري	
1	2	2	الانترنت والانترنت
-	-	3	تكنولوجيا المعلومات المتقدم
1	2	2	هندسة البرمجيات
-	2	2	تطبيقات رياضية في الحاسبات

السنة الرابعة:

مناقشة	الساعات		الموضوع
	عملي	نظري	
1	-	2	ضغط البيانات
1	2	2	رسوم ثلاثية الابعاد
1	-	2	نمذجة ومحاكاة
1	2	2	معالجة الصور
1	-	2	معمارية الانترنت

## فرع نظم المعلومات

السنة الاولى:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
4	1	2	3	البرمجة المهيكلية
3	1	-	3	رياضيات
3	1	-	3	هياكل متقطعة
4	1	2	3	تصميم منطقي وتركيب حاسبة
2	1	-	2	مبادئ تكنولوجيا المعلومات
3	1	2	2	تحليل وتصميم نظم المعلومات
مستوفي	-	-	2	اللغة الانكليزية
مستوفي	-	2	-	تطبيقات جاهزة (عملي)
19	6	8	18	المجموع

السنة الثانية:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
2	1	-	2	تحليل عددي
3	1	2	2	معالجات مايكروية ولغة التجميع
3	1	2	2	هياكل بيانات وخوارزميات
2	1	-	2	نظرية احتسابية
3	1	2	2	البرمجة الكيانية O.O.P
2	1	-	2	رياضيات متقدمة
3	1	2	2	قواعد بيانات
18	7	8	14	المجموع

السنة الثالثة:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
2	1	-	2	بحوث العمليات والاحتمالات
3	1	2	2	رسوم الحاسبة
2	1	-	2	معمارية الحاسبة
3	-	2	2	مترجمات
3	1	2	2	ذكاء اصطناعي
3	1	2	2	هندسة البرمجيات (اختياري)
3	1	2	2	قواعد بيانات موزعة (اختياري)
3	1	-	3	تكنولوجيا معلومات متقدمة
22	7	10	17	المجموع

السنة الرابعة:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
3	1	2	2	انظمة ذكية
3	1	2	2	الاتصالات وشبكات الحاسبات
2	1	-	2	نظم ادارة المعلومات
3	1	2	2	نظم تشغيل
2	1	-	2	امنية الحاسبات والبيانات
3	1	2	2	معالجة الصور (اختياري)
2	1	-	2	معمارية الانترنت (اختياري)
3	-	4	1	مشروع
21	7	12	15	المجموع

المواد المختارة:

السنة الثالثة:

الساعات	الموضوع		
	مناقشة	عملي	نظري
1	-	2	نظم اتخاذ القرار
1	-	2	نمذجة ومحاكاة
1	2	2	هندسة البرمجيات
1	2	2	قواعد بيانات موزعة

السنة الرابعة:

الساعات	الموضوع		
	مناقشة	عملي	نظري
1	2	2	شبكات عصبية
1	-	2	نظم المعلومات الادارية
1	-	2	الانظمة الموزعة
1	2	2	معالجة الصور
1	-	2	معمارية الانترنت

## فرع الذكاء الاصطناعي

السنة الاولى:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
4	1	2	3	البرمجة المهيكلية
3	1	-	3	رياضيات
3	1	-	3	هياكل متقطعة
4	1	2	3	تصميم منطقي وتركيب حاسبة
3	1	2	2	مبادئ الذكاء الاصطناعي
2	1	-	2	مبادئ نظم المعلومات
مستوفي	-	-	2	اللغة الانكليزية
مستوفي	-	2	-	تطبيقات جاهزة (عملي)
19	6	8	18	المجموع

السنة الثانية:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
2	1	-	2	تحليل عددي
3	1	2	2	معالجات مايكروية ولغة التجميع
3	1	2	2	هياكل بيانات وخوارزميات
2	1	-	2	نظرية احتسابية
3	1	2	2	البرمجة الكيانية O.O.P
2	1	-	2	رياضيات متقدمة
3	1	2	2	لغات الذكاء الاصطناعي
18	7	8	14	المجموع

السنة الثالثة:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
2	1	-	2	بحوث العمليات والاحتمالات
3	1	2	2	رسوم الحاسبة
2	1	-	2	معمارية الحاسبة
3	-	2	2	مترجمات
3	1	2	2	معالجة لغات طبيعية
3	1	2	2	شبيكات عصبية وخوارزميات جينية (اختياري)
3	1	2	2	قواعد بيانات
3	1	2	2	نظم خبيرة (اختياري)
22	7	12	16	المجموع

السنة الرابعة:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
3	1	2	2	ذكاء اصطناعي متقدم
3	1	2	2	شبكات الحاسبات
3	1	-	2	المنطق المضطرب
3	1	2	2	نظم تشغيل
2	1	-	2	امنية الحاسبات والبيانات (اختياري)
3	1	2	2	معالجة الصور وتميز الانماط
2	1	-	2	معمارية الانترنت (اختياري)
3	-	4	1	مشروع
21	7	12	15	المجموع

المواد المختارة

السنة الثالثة:

مناقشة	الساعات		الموضوع
	عملي	نظري	
1	-	2	التنبؤ واتخاذ القرار
1	2	2	نمذجة ومحاكاة
1	2	2	شبكات عصبية وخوارزميات جينية
1	2	2	نظم خبيرة

السنة الرابعة:

مناقشة	الساعات		الموضوع
	عملي	نظري	
1	2	2	روبوت
1	2	2	قواعد بيانات ذكية
1	2	2	انظمة ذكية متقدمة
1	-	2	امنية الحاسبات والبيانات
1	-	2	معمارية الانترنت

## فرع أمنية الحاسبات

السنة الأولى:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
4	1	2	3	البرمجة المهيكلية
3	1	-	3	رياضيات
3	1	-	3	هياكل متقطعة
4	1	2	3	تصميم منطقي وتركيب حاسبة
3	1	-	3	نظرية الأرقام
2	1	-	2	نظرية الاحتمالات
مستوفي	-	-	2	اللغة الانكليزية
مستوفي	-	2	-	تطبيقات جاهزة (عملي)
19	6	6	19	المجموع

السنة الثانية:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
2	1	-	2	تحليل عددي
3	1	2	2	معالجات مايكروية ولغة التجميع
3	1	2	2	هياكل بيانات وخوارزميات
2	1	-	2	نظرية احتسابية
3	1	2	2	البرمجة الكيانية O.O.P
2	1	-	2	رياضيات متقدمة
3	1	-	3	نظرية المعلومات
18	7	6	18	المجموع

3- المرحلة الثالثة

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
2	1	-	2	اخفاء المعلومات
3	1	2	2	رسوم الحاسبة
2	1	-	2	معمارية الحاسبة
3	-	2	2	مترجمات (اختياري)
3	1	2	2	ذكاء اصطناعي
3	1	2	2	تشفير
3	1	2	2	قواعد بيانات (اختياري)
3	1	2	2	شبكات حاسبة
22	7	12	16	المجموع



4- المرحلة الرابعة

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
3	1	2	2	انظمة ذكية
3	1	-	3	امنية الشبكات
2	1	-	2	تحليل الشفرة
3	1	2	2	نظم تشغيل
2	1	-	2	تشفير متقدم
3	1	2	2	معالجة الصور والاشارة (اختياري)
2	1	-	2	معمارية الانترنت (اختياري)
3	-	4	1	مشروع
21	7	10	16	المجموع

المواد المختارة

السنة الثالثة:

مناقشة	الساعات		الموضوع
	عملي	نظري	
1	2	2	الانترنت والانترانت
1	2	2	الخوارزميات الجينية والشبكات العصبية
1	-	2	تعقب المتطفلين
-	2	2	مترجمات
1	2	2	قواعد بيانات

السنة الرابعة:

مناقشة	الساعات		الموضوع
	عملي	نظري	
1	2	2	ضغط البيانات
1	2	2	المنطق المضرب
1	-	2	نمذجة ومحاكاة
1	2	2	معالجة الصور والاشارة
1	-	2	معمارية الانترنت
1	-	2	الانظمة الموزعة

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

## السنة الأولى:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
4	1	2	3	البرمجة المهيكلية
3	1	-	3	رياضيات
3	1	-	3	هياكل متقطعة
3	1	2	2	تركيب حاسبة
٢	1	-	٢	تكنولوجيا المعلومات
٣	1	2	٢	تصميم منطقي
مستوفي	-	-	2	اللغة الانكليزية
مستوفي	-	٢	-	تطبيقات جاهزة (عملي)
١٨	٦	٨	١٧	المجموع

## السنة الثانية:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
٢	١	-	٢	تحليل عددي
٣	١	٢	٢	معالجات مايكروية ولغة التجميع
٣	١	٢	٢	هياكل بيانات وخوارزميات
٢	١	-	٢	نظرية احتسابية
٣	١	٢	٢	البرمجة الكيانية O.O.P
٢	١	-	٢	رياضيات متقدمة
٣	١	٢	٢	تحليل نظم وتصميم قواعد البيانات
١٨	٧	٨	١٤	المجموع

## السنة الثالثة:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
٢	١	-	٢	بحوث العمليات والاحتمالات
٣	١	٢	٢	رسوم الحاسبة
٢	١	-	٢	معمارية الحاسبة
٣	-	٢	٢	مترجمات
٣	١	٢	٢	ذكاء اصطناعي
٣	١	٢	٢	هندسة البرمجيات (اختياري)
٣	١	٢	٢	قواعد بيانات متقدمة
٣	-	٢	٢	تطبيقات رياضية في الحاسبات (اختياري)
٢٢		١٢٦	١٦	المجموع

## السنة الرابعة:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
٣	١	٢	٢	تطبيقات ذكية
٣	١	٢	٢	الاتصالات وشبكات الحاسبات

٣	١	٢	٢	برمجة النوافذ المتقدمة
٣	١	٢	٢	نظم تشغيل
٢	١	-	٢	امنية الحاسبات والبيانات
٣	١	٢	٢	معالجة الصور (اختياري)
٢	١	-	٢	معمارية الانترنت (اختياري)
٣	-	٤	١	مشروع
٢٢	٧	١٤	١٥	المجموع

### المواد المختارة:

#### السنة الثالثة:

الساعات			الموضوع
مناقشة	عملي	نظري	
١	٢	٢	الانترنت والانترانت
-	-	٣	تكنولوجيا المعلومات المتقدم
١	٢	٢	هندسة البرمجيات
-	٢	٢	تطبيقات رياضية في الحاسبات (اختياري)

#### السنة الرابعة:

الساعات			الموضوع
مناقشة	عملي	نظري	
١	-	٢	ضغط البيانات
١	٢	٢	رسوم ثلاثية الابعاد
١	-	٢	نمذجة ومحاكاة
١	٢	٢	معالجة الصور
١	-	٢	معمارية الانترنت

## **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)).**

**المصادر (References)**

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

### **Mathematics**

**Functions. Transcendental functions. Sequence and series. Differentiation and applications. Integration and applications. Multiple integrals. Polar plane. Complex number. Matrices. Vector analysis.**

### **Discrete structures**

**Set theory. Mathematical induction. Relations and function. Mathematical logic. Elementary number theory. Recursion. Graph theory. Groups.**

**المصادر (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**

**Data representation: (number, characters) data storage: (Disks, tapes, and CD-ROMs). Computer Arithmetic: (integer, fixed point, and floating – point Arithmetic). Computer Architecture: (Von-Neumann model, processor architecture, busses, registers, ALU, control unit, RAM and ROM). Interface: (computer I/O processing, I/O devices (input: keyboard, touch screen, mouse and output: display, printer)), data transmission. Machine language: (machine level programming). Programming languages. Principles of editors translation (assemblers, interpreters, compilers), linkers, and loaders. Operating systems and windows. Common application packages (word processor)**

## **Logic design**

**Number systems and codes. Logic gates. Boolean algebra. Minimization methods (k-map and Q-M). Combination logic circuits. Adders. Subtractors. Comparators. Code converters. Multiplexers. Sequential logic circuits. Flip-flops. S-R F-F. D F. J-K F-F. T F-F. Registers. Counters. State diagram and Fsa. Rom. Ram.**

## **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 and 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) المصادر

- 1- Abel, P. "IBM PC assembly language and programming", 4<sup>th</sup> ed., prentice hall, 1998.
- 2- Thorne, M. "computer organization and assembly language programming", 2<sup>nd</sup> Ed., Benjamin/Cummings, 1990.



## System analysis and database design

System analysis and design (information systems. The system life cycle (preliminary investigation. Analysis. Design. Development. Implementation documentation. Case study.

المصادر (references)

- 1- C. Avgerou and T. Cornford, "developing information systems: concepts, issues, and practice", 2<sup>nd</sup> Ed., Macmillan press, 1998.
- 2- D.E. Avison and Fitzgerald, "information systems development: methodologies and tools", 2<sup>nd</sup> ed., McGraw-Hill, 1995.

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).

المصادر (reference)

- 1- T.M. Connolly, C.E. Begg and A.D. Strachan, "data base systems: a practical approach to design, implementation and management", 2<sup>nd</sup> ed., Addison Wesley, 1998.
- 2- C.J. Data, "introduction to data base systems", 7<sup>th</sup> Ed., Addison-Wesley, 2000.
- 3- C.J Data and H. Darwen, "A guide to the SQL standard", 4<sup>th</sup> ed., Addison-Wesley, 1997.

## 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) المصادر

- 1- "An introduction to data structures with application", Gean\_Paul Tremblay, Paul G. Sorenson.
- 2- "Data structures through Pascal", Ellis horowitz and Sortaj sahani.
- 3- "Introduction to data structure with Pascal", Thomas L. Naos bhagat sigh.
- 4- "The Art of the computer", donald E.knuth vol. 1 fundamemntal algorithm, vol.3 sorting and rearcinging .

## Computational theory

Set notation. Finite automata (dfa. Nf. Finite automata. Equivalence of nfa with and without empty-moves. Regular experssions). Introduction to grammars (phrase structure grammar. Context\_sensitive grammar. Context\_free grammar.

Chomssky normal form.

Greibach normal form.

The empty string in context\_free grammar ambiguity.

Regular grammar

Left\_linear grammar

Right\_linear grammar

Kleen theorm - two- way finite automata. Turing achine push down automata. Decidability rules. Undecidable. Complexity theorm.

(Reference) المصادر

- 1- H.R. Lewis and C.H. Papadimition, "Elements of the theory of computation", prentice-hall, 1981.
- 2- R.W. Floyd and R. Beigel, "The language of machine: an introduction to computability and formal languages "Computer science press, network, 1994.
- 3- M. Sipser. "Introduction to the theory of computation", Boston Pws pub, 1996.

## 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.**

**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.**

المصادر (reference)

1-Thomas, G. "Calculus and analytic Geometry", 5'th edition, Addison-Wesley.

## **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 (gant 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) المصادر

- 1- Sommerville. "Software engineering", 5<sup>th</sup> ed., Addison-Wesley, 1996.
- 2- R. Pressman and D. Ince, "software engineering a practitioner's approach", 4<sup>th</sup> European ed., McGraw hill, 1997.

## 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(1) 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.

(Reference) المصادر

- 1- R. Wilhelm, "Compiler Design", Addison-Wesley, 1995.
- 2- V. Aho, R.Sethi, J.D Ullman, " Compiler Principles, Techniques and Tools", Addison-Wesley, 1986.
- 3- J.P. Tremblay, P.G. Sorensen, "The Theory and Practice Of Computer Writing", McGraw Hill, 1985.

## 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 اللغات التطبيقية

- Functional Language اللغات الدالية
- Declaration Language اللغات التعريفية

### 4- Declaration Language Tools أدوات اللغات التعريفية

- Prolog Language Elements عناصر اللغة برولوج
- Problem Description تعريف المسألة
- Primitives الأولويات
- Prolog and Pascal لغة برولوج وباسكال
- List Notation تعريف القائمة
- Files Access الملفات
- Dynamic Data Bases قاعد البيانات الغير ثابتة
- Dynamic Internal Data Bases قواعد البيانات الداخلية
- Declarations التعريف العام
- Applications تطبيقاتها
- Expert Systems الأنظمة الخبيرة

### 5- An Overview of the Aspects of ADA فكرة عامة عن ADA

- ADA and Pascal علاقة لغة ADA مع Pascal

### 6- Functional Language Tools أدوات اللغات الدالية

- LISP Language لغة LISP
- Basic LISP Primitives أساسيات لغة LISP
- Procedure Definition تعريف الإجراءات
- Predicates and Conditionals الشروط
- Data Abstraction تجريد المعلومات
- Files الملفات
- Printing and Reading القراءة والطباعة
- Arrays المصفوفات
- Structure التراكيب

## PROLOG

Programming for Artificial Intelligence by Ivan Bratko

LISP 3<sup>rd</sup> Edition

Patrick Henry Winston

## Computer Graphics

**Introduction: Display Devices (E, G., Raster, Vector). Elementary Graphics Figures Line and Drawing Algorithm. Storing Pictures And 2D Transformation: Writing And Reading Graphics Data Files, Pictures Translation, Pictures Rotation, And Pictures Scaling, The IBM Computers: IBM Pc XT And AT System Graphics, IBM Graphics Modes, And Turbo Pascal Graphics Subprograms. Clipping and Windowing Point and Line Clipping, Clipping Algorithms, and Polygon Clipping. Curves: Polynomial Curves and Spline Curves. Elementary 3D Graphics: Introduction, Coordinates System, Transformations, Orthogonal Projection, Multiple Views, Hidden Lines and Surfaces, Shading and Coloring, Animation Techniques. Tools for Developing Graphic Software.**

(References) المصادر

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

## 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.**

(Reference) المصادر

- 1- David A. Patterson and John L. Hennessy, "Computer Organization And Design: The Hardware/ Software Interface". Morgan Kaufmann, 1998.

## Artificial Intelligence

Knowledge Representation: Proposition and Predicate Logic and Theorem Proving (Resolution), Semantic Networks, Production Rules, Frames and Scripts. Prolog Programming: Facts, Rules, Queries, Recursive Programming Lists, Arithmetic Expressions, Backtracking and Cuts, Negation as Failure Simple Examples for Applications. State Space Search And Problem Reduction: State Space Search (Depth-First Search, Breadth-First Search, Directed Searches And The A Star) And Problem Reduction. Expert Systems: Function And Structure Of Knowledge- Based Systems, Forward And Backward Chaining, Handling Uncertainty, User Interfaces (Why, How, What If), Expert System Shells, An Example Of A Commercial System Shell.

(Reference) المصادر

- 1- D. Gabbay, "Elementary Logics: A Procedural Perspective", Prentice Hall, 1998.
- 2- W. F. Clockssin And C. S. Melish, "Programming In Prolog", 4<sup>th</sup> Ed., Springer- Velag, 1994.
- 3- Bratko, "Prolog Programming For Artificial Intelligence" 2<sup>nd</sup> Ed., Addison- Wesley Publishing Company, 1990.
- 4- Elaine Rich, "Artificial Intelligence", Pub, McGraw Hill, 1st Ed., 1988.

## 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 theory and games. Inventory model. Queuing theory. Simulation.



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

## **Advance information technology (elective)**

### **1- Advanced information technology.**

- **Information technology: principles, practices, and opportunities.**
- **A tour of computer system.**
- **A tour of the internet and the World Wide Web.**

### **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- 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

### **Windows programming**

**Introduction.** The main difference between Dos and Windows version. Windows concept and technology. The windows window. Visual interface component. Windows class. Message. Windows resources. Windows function. The coordinate system. The element of windows application program. The WM-PAINT and WM-DESTROY message. Creating menus. Message box. Dialog box. Scroll bars. Adding icons, cursors, and bitmap.

## 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, plaction oriented layers; transport layer, session layer, presentation layer, and application layer.

(Reference) المصادر

- 1-A. Tannenbaum, "computer networks", 3<sup>rd</sup> ed., prentice-hall, 1996.
- 2-F. Halsall, "data communications, computer networks and Osi", 4<sup>th</sup> ed., Addison – Wesley, 1995.
- 3-J. R. Freer. "Computer communication and networks", Us1 press, 1996.

## 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

1-A. M. Lister and R. D. eager ."Fundamentals of operating systems", 5<sup>th</sup> ed., Macmillan 1975/1993.

2- A. S. Tanenbaum. "Modern operating systems ", prentice hall, 1992.

## Advance intelligence application

Introduction – problem space and search - production system- characteristics. Heuristic search techniques- generate and test – hill climbing – best fit. Graph search- A\* algorithm. Problem reduction- constraint satisfaction- means and end analysis.

Natural language processing- level of language. Expressing rules of syntax. Context free grammar. Dictionaries. Transformational grammar. Syntactic parsing. Top-down and bottom-up parsing. Transition network. Augmented transition network ATN. Syntax and semantic. Case grammar- syntactic use of semantic knowledge.

Representation knowledge. Procedural versus declarative. Reasoning under uncertainty- nonmontonic reasoning – statistical reasoning. Bayesian network. Expert system – representation using domain knowledge –expert system shell.

## 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 نظم المعلومات

### السنة الاولى:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
٤	١	٢	٣	البرمجة الهيكلية
٣	١	-	٣	رياضيات
٣	١	-	٣	هياكل متقطعة
٤	١	٢	٣	تصميم منطقي وتركيب حاسبة
٢	١	-	٢	مبادئ تكنولوجيا المعلومات
٣	١	٢	٢	تحليل وتصميم نظم المعلومات
مستوفي	-	-	٢	اللغة الانكليزية
مستوفي	-	٢	-	تطبيقات جاهزة (عملي)
١٩	٦	٨	١٨	المجموع

### السنة الثانية:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
٢	١	-	٢	تحليل عددي
٣	١	٢	٢	معالجات مايكروية ولغة التجميع
٣	١	٢	٢	هياكل بيانات وخوارزميات
٢	١	-	٢	نظرية احتسابية
٣	١	٢	٢	البرمجة الكيانية O.O.P
٢	١	-	٢	رياضيات متقدمة
٣	١	٢	٢	قواعد بيانات
١٨	٧	٨	١٤	المجموع

### السنة الثالثة:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
٢	١	-	٢	بحوث العمليات والاحتمالات
٣	١	٢	٢	رسوم الحاسبة
٢	١	-	٢	معمارية الحاسبة
٣	-	٢	٢	مترجمات
٣	١	٢	٢	ذكاء اصطناعي
٣	١	٢	٢	هندسة البرمجيات (اختياري)
٣	١	٢	٢	قواعد بيانات موزعة (اختياري)
٣	١	٢	٣	تكنولوجيا معلومات متقدمة
٢٢	٧	١٠	١٧	المجموع

السنة الرابعة:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
٣	١	٢	٢	انظمة ذكية
٣	١	٢	٢	الاتصالات وشبكات الحاسبات
٢	١	-	٢	نظم ادارة المعلومات
٣	١	٢	٢	نظم تشغيل
٢	١	-	٢	امنية الحاسبات والبيانات
٣	١	٢	٢	معالجة الصور (اختياري)
٢	١	-	٢	معمارية الانترنت (اختياري)
٣	-	٤	١	مشروع
٢١	٧	١٢	١٥	المجموع

المواد المختارة:

السنة الثالثة:

مناقشة	الساعات		الموضوع
	عملي	نظري	
١	-	٢	نظم اتخاذ القرار
١	-	٢	نمذجة ومحاكاة
١	٢	٢	هندسة البرمجيات
١	٢	٢	قواعد بيانات موزعة

السنة الرابعة:

مناقشة	الساعات		الموضوع
	عملي	نظري	
١	٢	٢	شبكات عصبية
١	-	٢	نظم المعلومات الادارية
١	-	٢	الانظمة الموزعة
١	٢	٢	معالجة الصور
١	-	٢	معمارية الانترنت

# 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

Functions. Transcendental functions. Sequence and series. Differentiation and applications. Integration and applications. Multiple integrals. Polar plane. Complex number. Matrices. Vector analysis.

### Discrete structures

Set theory. Mathematical induction. Relations and function. Mathematical logic. Elementary number theory. Recursion. Graph theory. Groups.

### Computer organization and logic design

Introduction to Computers: (analogue Versus Digital. Back Ground. Computer Organization. Computer Functional Units. Basic Operational Concepts of A Computer ).  
Instruction Formats & addressing Technique (introduction. Register Definition. Instruction Formats. Addressing Technique).  
Programming Systems (Introduction. Microprocessor Programming. High Level Language).  
Buss & Interfaces (Introduction . Buses Input / Output Interfaces. Bus Standards & Techniques. Memory Accessing Methods. Introduction



**General Out lines On Memories . Semiconductor Memories . Mass Storage Devices. Input & out put Devices .Input & Out put Devices .**

**Introduction. I/O Sources. Output). Data Communication & Computer Networking (Introduction. Data Communication. Computer Networking) 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:**

**1- Computer Organization and architecture By William Stallings 1987.**

## **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:-

- 1- Principles of information systems, Ralph M. Stair, George W., Reynolds, 4<sup>th</sup> d., 1999.

## **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 and 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) المصادر

1- Abel, P. "IBM PC assembly language and programming", 4<sup>th</sup> ed., prentice hall, 1998.

- 2- Thorne, M. "computer organization and assembly language programming ", 2<sup>nd</sup> Ed., Benjamin/Cummings, 1990.

### **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.Hawryszkiewicz, 1988 ---- Prentice Hall of Australia Pty Ltd.
- 2- Structured Analysis & Design of introduction systems.  
By: A Ziya Aktas. 1987 ---- Prentice-Hall International, Inc.

### **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) المصادر

- 1- "An introduction to data structures with application", Gean\_Paul Tremblay, Paul G. Sorenson.
- 2- "Data structures through Pascal", Ellis horowitz and Sortaj sahani.
- 3- "Introduction to data structure with Pascal", Thomas L. Naos bhagat sikh.
- 4- "The Art of the computer", donald E.knuth vol. 1 fundamemntal algorithm, vol.3 sorting and reareging .

## Computational theory

Set notation. Finite automata (dfa. Nf. Finite automata. Equivalence of nfa with and without empty-moves. Regular experssions). Introduction to grammars (phrase structure grammar. Context\_sensitive grammar. Context\_free grammar.

Chomssky 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. Turing achine push down automata. Decidability rules. Undecidable. Complexity theorem.

(Reference) المصادر

- Introduction to Automata Theory Language And Computation, Jone, Hopcraft 1979. Lewis, 1981.
- Introduction to Computer Theory Daniel L.A. Cohen.

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.**

**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.**

المصادر (reference)

1-Thomas, G. "Calculus and analytic Geometry", 5'th edition, Addison-Wesley.

## **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) المصادر

- 1- Sommerville. "Software engineering", 5<sup>th</sup> ed., Addison-Wesley, 1996.
- 2- R. Pressman and D. Ince, "software engineering a practitioner's approach", 4<sup>th</sup> European ed., McGraw hill, 1997.

**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.

(Reference) المصادر

- 1- R. Wilhelm, "Compiler Design", Addison-Wesley, 1995.
- 2- V. Aho, R.Sethi, J.D Ullman, " Compiler Principles, Techniques and Tools", Addison-Wesley, 1986.
- 3- J.P. Tremblay, P.G. Sorensen, "The Theory and Practice Of Computer Writing", McGraw Hill, 1985.

## 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 اللغات التطبيقية

- Functional Language اللغات االدالية
- Declaration Language اللغات التعريفية

### 4- Declaration Language Tools أدوات اللغات التعريفية



-Prolog Language Elements عناصر اللغة برولوج

-Problem Description تعريف المسألة

-Primitives الأولويات

-Prolog and Pascal لغة برولوج وباسكال

- List Notation تعريف القائمة

- Files Access الملفات

- Dynamic Data Bases قاعد البيانات الغير ثابتة

- Dynamic Internal Data Bases قواعد البيانات الداخلية

- Declarations التعريف العام

- Applications تطبيقاتها

- Expert Systems الأنظمة الخبيرة

5- An Overview of the Aspects of ADA فكرة عامة عن ADA

- ADA and Pascal

علاقة لغة ADA مع Pascal

6- Functional Language Tools أدوات اللغات الدالية

-LISP Language لغة LISP

- Basic LISP Primitives أساسيات لغة LISP

- Procedure Definition تعريف الإجراءات

- Predicates and Conditionals الشروط

- Data Abstraction تجريد المعلومات

- Files الملفات

- Printing and Reading القراءة والطباعة

- Arrays المصفوفات

- Structure التراكيب

**PROLOG**

Programming for Artificial Intelligence by Ivan Bratko

LISP 3<sup>rd</sup> Edition

Patrick Henry Winston

Beertbolb Klause Poul Hom

**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 relation ship 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. Data

## **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.**

(Reference) المصادر

- 1- David A. Patterson and John L. Hennessy, "Computer Organization And Design: The Hardware/ Software Interface". Morgan Kaufmann, 1998.
- 2- M. M Maro. "Computer Systems Architecture ", 3<sup>rd</sup> Ed., Prentice- Hall, 1993.

### **Advance information technology (elective)**

- 1- Advanced information technology.
  - Information technology: principles, practices, and opportunities.
  - A tour of computer system.
  - A tour of the internet and the World Wide Web.
- 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.

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 theory and games. Inventory model. Queuing theory. Simulation.

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

## **Computer Graphics**

Introduction: Display Devices (E, G., Raster, Vector). Elementary Graphics Figures Line and Drawing Algorithm. Storing Pictures And 2D Transformation: Writing And Reading Graphics Data Files, Pictures Translation, Pictures Rotation, And Pictures Scaling, The IBM Computers: IBM Pc XT And AT System Graphics, IBM Graphics Modes, And Turbo Pascal Graphics Subprograms. Clipping and Windowing Point and Line Clipping, Clipping Algorithms, and Polygon Clipping. Curves: Polynomial Curves and Spline Curves. Elementary 3D Graphics: Introduction, Coordinates System, Transformations, Orthogonal Projection, Multiple Views, Hidden Lines and Surfaces, Shading and Coloring, Animation Techniques. Tools for Developing Graphic Software.

(References) المصادر

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

**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 (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, plaction oriented layers; transport layer, session layer, presentation layer, and application layer.

(Reference) المصادر

- 1- A. Tannenbaum, "computer networks", 3<sup>rd</sup> ed., prentice-hall, 1996.
- 2- F. Halsall, "data communications, computer networks and Osi", 4<sup>th</sup> ed., Addison – Wesley, 1995.
- 3- J. R. Freer. "Computer communication and networks", Us1 press, 1996.

## Artificial Intelligence

Knowledge Representation: Proposition and Predicate Logic and Theorem Proving (Resolution), Semantic Networks, Production Rules, Frames and Scripts. Prolog Programming: Facts, Rules, Queries, Recursive Programming Lists, Arithmetic Expressions, Backtracking and Cuts, Negation as Failure Simple Examples for Applications. State Space Search And Problem Reduction: State Space Search (Depth-First Search, Breadth-First Search, Directed Searches And The A Star) And Problem Reduction. Expert Systems: Function And Structure Of Knowledge- Based Systems, Forward And Backward Chaining,

## Handling Uncertainty, User Interfaces (Why, How, What If), Expert System Shells, An Example Of A Commercial System Shell.

(Reference) المصادر

- 1- D. Gabbay, "Elementary Logics: A Procedural Perspective", Prentice Hall, 1998.
- 2- W. F. Clockssin And C. S. Melish, "Programming In Prolog", 4<sup>th</sup> Ed., Springer- Velag, 1994.
- 3- Bratko, "Prolog Programming For Artificial Intelligence" 2<sup>nd</sup> Ed., Addison- Wesley Publishing Company, 1990.
- 4- Elaine Rich, "Artificial Intelligence", Pub, McGraw Hill, 1st Ed., 1988.

### 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 (low 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, message 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

1-A. M. Lister and R. D. eager ."Fundamentals of operating systems", 5<sup>th</sup> ed., Macmillan 1975/1993.

2- A. S. Tanenbaum. "Modern operating systems ", prentice hall, 1992.

## 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- Noblocking 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:**

**Distributed Databases- principles and System By: Stefano ceri and Giuseppe pelagatti 1985 McGraw- Hill Book comp.**

## **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)**

**Fundamentals of Artificial Neural networks - Biological prototype - Artificial neuron - activation functions - Single layer and multilayer networks. Training Artificial neural networks - Perceptrons - Exclusive OR Problem - Linear separability - storage efficiency - preceptor learning - perception training algorithms.**

**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

### السنة الاولى:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
٤	١	٢	٣	البرمجة المهيكلية
٣	١	-	٣	رياضيات
٣	١	-	٣	هياكل متقطعة
٤	١	٢	٣	تصميم منطقي وتركيب حاسبة
٣	١	٢	٢	مبادئ الذكاء الاصطناعي
٢	١	-	٢	مبادئ نظم المعلومات
مستوفي	-	-	٢	اللغة الانكليزية
مستوفي	-	٢	-	تطبيقات جاهزة (عملي)
١٩	٦	٨	١٨	المجموع

### السنة الثانية:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
٢	١	-	٢	تحليل عددي
٣	١	٢	٢	معالجات مايكروية ولغة التجميع
٣	١	٢	٢	هياكل بيانات وخوارزميات
٢	١	-	٢	نظرية احتسابية
٣	١	٢	٢	البرمجة الكيانية O.O.P
٢	١	-	٢	رياضيات متقدمة
٣	١	٢	٢	لغات الذكاء الاصطناعي
١٨	٧	٨	١٤	المجموع

### السنة الثالثة:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
٢	١	-	٢	بحوث العمليات والاحتمالات
٣	١	٢	٢	رسوم الحاسبة
٢	١	-	٢	معمارية الحاسبة
٣	-	٢	٢	مترجمات
٣	١	٢	٢	معالجة لغات طبيعية
٣	١	٢	٢	شبكات عصبية وخوارزميات جينية (اختياري)
٣	١	٢	٢	قواعد بيانات
٣	١	٢	٢	نظم خبيرة (اختياري)

٢٢	٧	١٢	١٦	المجموع
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### السنة الرابعة:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
٣	١	٢	٢	ذكاء اصطناعي متقدم
٣	١	٢	٢	شبكات الحاسبات
٣	١	-	٢	المنطق المضرب
٣	١	٢	٢	نظم تشغيل
٢	١	-	٢	امنية الحاسبات والبيانات (اختياري)
٣	١	٢	٢	معالجة الصور وتميز الانماط
٢	١	-	٢	معمارية الانترنت (اختياري)
٣	-	٤	١	مشروع
٢١	٧	١٢	١٥	المجموع

### المواد المختارة

### السنة الثالثة:

مناقشة	الساعات		الموضوع
	عملي	نظري	
١	-	٢	التنبؤ واتخاذ القرار
١	٢	٢	نمذجة ومحاكاة
١	٢	٢	شبكات عصبية وخوارزميات جينية (اختياري)
١	٢	٢	نظم خبيرة (اختياري)

### السنة الرابعة:

مناقشة	الساعات		الموضوع
	عملي	نظري	
١	٢	٢	روبوت
١	٢	٢	قواعد بيانات ذكية
١	٢	٢	انظمة ذكية متقدمة
١	-	٢	امنية الحاسبات والبيانات
١	-	٢	معمارية الانترنت

## 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 ) المصادر

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

#### Mathematics

Functions. Transcendental functions. Sequence and series. Differentiation and applications. Integration and applications. Multiple integrals. Polar plane. Complex number. Matrices. Vector analysis.

#### Discrete structures

Set theory. Mathematical induction. Relations and function. Mathematical logic. Elementary number theory. Recursion. Graph theory. Groups.

- 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

Introduction to Computers: (analogue Versus Digital. Back Ground. Computer Organization. Computer Functional Units. Basic Operational Concepts of A Computer ).

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

Programming Systems (Introduction. Microprocessor Programming. High Level Language).

Buss & Interfaces (Introduction . Buses Input / Output Interfaces. Bus Standards & Techniques. Memory Accessing Methods. Introduction General Out lines On Memories . Semiconductor Memories . Mass Storage Devices. Input & out put Devices .Input & Out put Devices .

Introduction. I/O Sources. Output). Data Communication & Computer Networking (Introduction. Data Communication. Computer Networking) 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:

- 1- Computer Organization and architecture By William Stallings 1987.

Basic concept; topics 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 (Absolute and 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) المصادر

- 1- Abel, P. "IBM PC assembly language and programming", 4<sup>th</sup> ed., prentice hall, 1998.
- 2- Thorne, M. "computer organization and assembly language programming", 2<sup>nd</sup> Ed., Benjamin/Cummings, 1990.

## Programming Artificial intelligence

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

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) المصادر

- 1- "An introduction to data structures with application", Gean\_Paul Tremblay, Paul G. Sorenson.
- 2- "Data structures through Pascal", Ellis horowitz and Sortaj sahani.
- 3- "Introduction to data structure with Pascal", Thomas L. Naos bhagat sigh.
- 4- "The Art of the computer", donald E.knuth vol. 1 fundamemntal algorithm, vol.3 sorting and reareging .

## Computational theory

Set notation. Finite automata (dfa. Nf. Finite automata. Equivalence of nfa with and without empty-moves. Regular experssions). Introduction to grammars (phrase structure grammar. Context\_sensitive grammar. Context \_ free grammar.

Chomssky normal form.

Greibach normal form.

The empty string in context free grammar ambiguity.

Regular grammar

Left linear grammar

Right linear grammar

Kleene theorem – two-way finite automata. Turing machine push down automata.

Decidability rules. Undecidable. Complexity theorem.

(Reference) المصادر

1. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of computation", Prentice-hall, 1981.
2. R.W. Floyd and R. Beigel, "The language of machine: an introduction to computability and formal languages" Computer science press, network, 1994.
3. M. Sipser. "Introduction to the theory of computation", Boston PWS pub, 1996.

## 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.

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.

### **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 theory and games. Inventory model. Queuing theory. Simulation.

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(1) 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.

(Reference) المصادر

1. R. Wilhelm, "Compiler Design", Addison-Wesley, 1995.
2. V. Aho, R. Sethi, J.D Ullman, "Compiler Principles, Techniques and Tools", Addison-Wesley, 1986.
3. J.P. Tremblay, P.G. Sorensen, "The Theory and Practice Of Computer Writing", McGraw Hill, 1985.

## 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.

(Reference) المصادر

- 1- David A. Patterson and John L. Hennessy, "Computer Organization And Design: The Hardware/ Software Interface". Morgan Kaufmann, 1998.
- 2- M. M Maro. "Computer Systems Architecture ", 3<sup>rd</sup> Ed., Prentice- Hall, 1993.

## 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 relation ship 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. Data**

## **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)**

Introduction – problem space and search- production system- characteristics. Heuristic search techniques- generate and test – hill climbing – best fit. Graph search- A\* algorithm. Problem reduction- constraint satisfaction- means and end analysis.

Natural language processing- level of language. Expressing rules of syntax. Context free grammar. Dictionaries. Transformational grammar. Syntactic parsing. Top-down and bottom-up parsing. Transition network. Augmented transition network ATN. Syntax and semantic. Case grammar- syntactic use of semantic knowledge.

Representation knowledge. Procedural versus declarative. Reasoning under uncertainty- nonmonotonic reasoning – statistical reasoning. Bayesian network. Expert system – representation using domain knowledge –expert system shell.

### **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

- 1- A. Tannenbaum, "computer networks", 3<sup>rd</sup> ed., prentice-hall, 1996.
- 2- F. Halsall, "data communications, computer networks and Osi", 4<sup>th</sup> ed., Addison – Wesley, 1995.
- 3- J. R. Freer. "Computer communication and networks", Us1 press, 1996.

## 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 (low 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, message 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

1-A. M. Lister and R. D. eager ."Fundamentals of operating systems", 5<sup>th</sup> ed., Macmillan 1975/1993.

2- A. S. Tanenbaum. "Modern operating systems ", prentice hall, 1992.

# **Computer Security Branch**

## فرع أمنية الحاسبات

### السنة الأولى:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
4	1	2	3	البرمجة المهيكلية
3	1	-	3	رياضيات
3	1	-	3	هياكل متقطعة
4	1	2	3	تصميم منطقي وتركيب حاسبة
3	1	-	3	نظرية الأرقام
2	1	-	2	نظرية الاحتمالات
مستوفي	-	-	2	اللغة الانكليزية
مستوفي	-	2	-	تطبيقات جاهزة ( عملي)
19	6	6	19	المجموع

### السنة الثانية:

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
2	1	-	2	تحليل عددي
3	1	2	2	معالجات مايكروية ولغة التجميع
3	1	2	2	هياكل بيانات وخوارزميات
2	1	-	2	نظرية احتسابية
3	1	2	2	البرمجة الكيانية O.O.P
2	1	-	2	رياضيات متقدمة
3	1	-	3	نظرية المعلومات
18	7	6	15	المجموع

### 3- المرحلة الثالثة

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
2	1	-	2	اخفاء المعلومات
3	1	2	2	رسوم الحاسبة
2	1	-	2	معمارية الحاسبة
3	-	2	2	مترجمات (اختياري)
3	1	2	2	ذكاء اصطناعي
3	1	2	2	تشفير

٣	١	٢	٢	قواعد بيانات (اختياري)
٣	١	٢	٢	شبكات حاسبة
٢٢	٧	١٢	١٦	المجموع

#### ٤ - المرحلة الرابعة

الوحدات	الساعات			الموضوع
	مناقشة	عملي	نظري	
٣	١	٢	٢	انظمة ذكية
٣	١	-	٣	امنية الشبكات
٢	١	-	٢	تحليل الشفرة
٣	١	٢	٢	نظم تشغيل
٢	١	-	٢	تشفير متقدم
٣	١	٢	٢	معالجة الصور والاشارة (اختياري)
٢	١	-	٢	معمارية الانترنت (اختياري)
٣	-	٤	١	مشروع
٢١	٧	١٠	١٦	المجموع

#### المواد المختارة

#### السنة الثالثة:

مناقشة	الساعات		الموضوع
	عملي	نظري	
١	٢	٢	الانترنت والانترانت
١	٢	٢	الخوارزميات الجينية والشبكات العصبية
١	-	٢	تعقب المتطفلين
-	٢	٢	مترجمات
١	٢	٢	قواعد بيانات

#### السنة الرابعة:

مناقشة	الساعات		الموضوع
	عملي	نظري	
١	٢	٢	ضغط البيانات
١	٢	٢	المنطق المضرب
١	-	٢	نمذجة ومحاكاة
١	٢	٢	معالجة الصور والاشارة
١	-	٢	معمارية الانترنت
١	-	٢	الانظمة الموزعة

# Subject and syllabus of Computer Security branch

## First: Syllabus of the first year

**Structured programming** البرمجة المهيكلة  
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

رياضيات

Functions. Transcendental functions. Sequence and series. Differentiation and applications. Integration and applications. Multiple integrals. Polar plane. Complex number. Matrices. Vector analysis.

## Discrete structures

هياكل متقطعة

Set theory. Mathematical induction. Relations and function. Mathematical logic. Elementary number theory. Recursion. Graph theory. Groups.

(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

تصميم منطقي وتركيب حاسبة

Introduction to Computers: (analogue Versus Digital. Back Ground. Computer Organization. Computer Functional Units. Basic Operational Concepts of A Computer ).

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

Programming Systems (Introduction. Microprocessor Programming. High Level Language).

Buss & Interfaces (Introduction . Buses Input / Output Interfaces. Bus Standards & Techniques. Memory Accessing Methods. Introduction General Out lines On Memories . Semiconductor Memories . Mass Storage Devices. Input & out put Devices .Input & Out put Devices .

Introduction. I/O Sources. Output). Data Communication & Computer Networking (Introduction. Data Communication. Computer Networking) 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. Code Converters. Multiplexers. Sequential Logic Circuits. Flip-Flop, S-Rff, J-Kff, Tff, Dff. Registers. Counters. State Diagram and FSA. ROM. RAM.

المصادر (References)

- Computer Organization and architecture By William Stallings 1987.

## Number theory

نظرية الارقام

## Probability theory

نظرية الاحتمالات

## Second: Syllabus of the second year

### Numerical analysis

تحليل عددي

Binary fraction and shifting. Scientific notation machine number and computer accuracy. Computer floating point numbers. Error analysis (Absolute and 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.

المصادر (References)

- Numerical methods using Matlab; prentice hall.

### Microprocessor and assembly programming معالجات ميكروية ولغة التجميع

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.

المصادر (Reference)

- Abel, P. "IBM PC assembly language and programming", 4<sup>th</sup> ed., prentice hall, 1998.
- Thorne, M. "computer organization and assembly language programming", 2<sup>nd</sup> Ed., Benjamin/Cummings, 1990.

## Data structure and algorithm

هياكل بيانات وخوارزميات

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.

المصادر (References)

- "An introduction to data structures with application", Gean\_Paul Tremblay, Paul G. Sorenson.
- "Data structures through Pascal", Ellis horowitz and Sortaj sahani.
- "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

نظرية احتسابية

Set notation. Finite automata (dfa. Nf. Finite automata. Equivalence of nfa with and without empty-moves. Regular experssions). Introduction to grammars (phrase structure grammar. Context\_sensitive grammar. Context\_free grammar.

Chomssky 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. Turing achine push down automata. Decidability rules. Undecidable. Complexity theorem.

(Reference) المصادر

- H.R. Lewis and C.H. Papadimition, “Elements of the theory of computation”, prentice-hall, 1981.
- R.W. Floyd and R. Beigel, “The language of machine: an introduction to computability and formal languages “Computer science press, network, 1994.
- M. Sipser. “Introduction to the theory of computation”, Boston Pws pub, 1996.

## Object oriented programming OOP

البرمجة الكيانية

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

رياضيات متقدمة

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) المصادر

- Thomas, G. "Calculus and analytic Geometry", 5<sup>th</sup> edition, Addison-Wesley.

## Information theory

نظرية المعلومات

## Third: Syllabus of the third year

## Information hiding

إخفاء المعلومات

## Computer Graphics

رسوم الحاسبة

Introduction: Display Devices (E, G., Raster, Vector). Elementary Graphics Figures Line and Drawing Algorithm. Storing Pictures And 2D Transformation: Writing And Reading Graphics Data Files, Pictures Translation, Pictures Rotation, And Pictures Scaling, The IBM Computers: IBM Pc XT And AT System Graphics, IBM Graphics Modes, And Turbo Pascal Graphics Subprograms. Clipping and Windowing Point and Line Clipping, Clipping Algorithms, and Polygon Clipping. Curves: Polynomial Curves and Spline Curves. Elementary 3D Graphics: Introduction, Coordinates System, Transformations, Orthogonal Projection, Multiple Views, Hidden Lines and Surfaces, Shading and Coloring, Animation Techniques. Tools for Developing Graphic Software.

(References) المصادر

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

## Computer Architecture

معمارية الحاسبة

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.

(Reference) المصادر

- David A. Patterson and John L. Hennessy, "Computer Organization And Design: The Hardware/ Software Interface". Morgan Kaufmann, 1998.
- M. Mano, "Computer Systems Architecture ", 3<sup>rd</sup> Ed., Prentice- Hall, 1993.

## Compiler

مترجمات

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(1) 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.

(Reference) المصادر

- R. Wilhelm, "Compiler Design", Addison-Wesley, 1995.
- V. Aho, R. Sethi, J.D Ullman, " Compiler Principles, Techniques and Tools", Addison-Wesley, 1986.
- J.P. Tremblay, P.G. Sorensen, "The Theory and Practice Of Computer Writing", McGraw Hill, 1985.

## Artificial Intelligence

ذكاء اصطناعي

Knowledge Representation: Proposition and Predicate Logic and Theorem Proving (Resolution), Semantic Networks, Production Rules, Frames and Scripts. Prolog Programming: Facts, Rules, Queries, Recursive Programming Lists, Arithmetic Expressions, Backtracking and Cuts, Negation as Failure Simple Examples for Applications. State Space Search And Problem Reduction: State Space Search (Depth-First Search, Breadth-First Search, Directed Searches And The A Star) And Problem Reduction. Expert Systems: Function And Structure Of Knowledge- Based Systems, Forward And Backward Chaining, Handling Uncertainty, User Interfaces (Why, How, What If), Expert System Shells, An Example Of A Commercial System Shell.

المصادر (Reference)

- D. Gabbay, "Elementary Logics: A Procedural Perspective", Prentice Hall, 1998.
- W. F. Clockssin And C. S. Melish, "Programming In Prolog", 4<sup>th</sup> Ed., Springer- Velag, 1994.
- Bratko, "Prolog Programming For Artificial Intelligence" 2<sup>nd</sup> Ed., Addison- Wesley Publishing Company, 1990.
- Elaine Rich, "Artificial Intelligence", Pub, McGraw Hill, 1st Ed., 1988.

## Cipher system

تشفير

## Database

قواعد بيانات

### 1- DB 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 relation ship 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) المصادر

- An Introduction to Database System. C. J. Data.

## Computer networks

شبكات الحاسبات

- Introduction to networking: network paradigms, client-server model, web-based model, network categories, network topology.
- Networking protocols: OSI/RM, packets, connection-oriented and connectionless, application/ transport/ network protocols, routable and non-routable protocol.
- 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.
- TCP/IP architecture: internet architecture, internet protocol.
- 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

انظمة ذكية

- 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

امنية الشبكات

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

- Gunter schfer. Security in fixed and wireless networks John wiley & Sone, 2003.

#### Additional Reference

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**Operating system**

Roles of an OS: simplified machine, resource allocate, and history and development of OS. 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 (low 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, message passing and rendezvous. 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.

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**Advance cipher system**

تشفير متقدم

**Image and signal processing**

معالجة الصور والاشارة

