

Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department




**Academic program
and course
description guide**

2024

Ministry of Higher Education and Scientific Research
Scientific supervision and evaluation device
Department of Quality Assurance and Academic Accreditation

Academic Description Program 2023-2024

Name university: Mosul
Name collage: Computer science And Mathematic
Name of department :Computer science
File filling date: 1-4-2024


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Dr. Wael Wadullah
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Department Head

Date: 24/4/2024

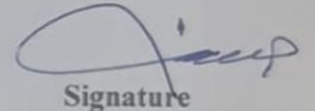

Signature

The file has already been checked by

Director of Quality Assurance and
Assesment Performance of the college of
computer science and mathematic

Asst. Prof. Dr. Mohammed Chachan yonnis

Date: 24/4/2024


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Date: 24/4/2024

جامعة الموصل
كلية علوم الحاسوب والرياضيات
قسم علوم الحاسوب


Approval of the Dean

Prof. Dr. Dhuha Basheer Abdullah

Date: 24/4/2024

Academic program description form

Reviewing the performance of higher education institutions ((academic program review))

Description of the academic program

This academic program description provides a brief summary of the most important features of the program and the learning outcomes the student is expected to achieve; Demonstrating whether he has made the most of the available opportunities. It is accompanied by a description of each course within the program

University of Mosul	Educational institution	1
College of Computer Science and Mathematics/Department of Computer Science	University department/center	2
Computer Science	Name of the academic program	3
Bachelor of Science in Computer Science	Name of the final certificate	4
Bologna System (First Phase) Course system (second, third and fourth stages)	School system	5
Academic accreditation(ABET)	Accredited accreditation program	6
Central examinations	Other external influences	7
2024	Date the description was prepared	8

Objectives of the academic program

1	Providing students with theoretical and academic knowledge and scientific skills according to the latest scientific findings, as professional and academic cadres that provide society and its institutions with distinguished specialists and various academic qualifications, and strive to increase the number of accepted students after developing and increasing the department's capabilities according to need The labor market and monitoring the educational level through results statistics every year
2	Providing solutions to the problems of state institutions in this regard through the research of graduate students and teaching staff.
3	Keeping pace with modern scientific developments through the research projects of the teachers and focusing on being in the modern fields, especially the applied ones, while not neglecting the academic aspect, including its scientific importance to the department, and following up on this through the research plans prepared annually for the department.
4	Focusing on educational goals through the educational guidance committees in the department linked to the guidance committee in the college and continuous meetings with students to refine their personalities and guide them educationally to solve their problems in a manner consistent with the ethics of our society. All of this is through following up on the committees and their reports that are submitted to the committee in the college and the department presidency.
5	Raising the level of scientific research by holding an annual conference and participating in local, Arab and international conferences.
6	Communicating with modern scientific sources by providing modern books and references from scientific book fairs.

Required learning outcomes and teaching, learning and assessment methods

1	<p>Knowledge and understanding</p> <ol style="list-style-type: none"> 1. For the student to learn programming languages 2. The ability to find scientific solutions to societal problems programmatically.
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	<p>3. The ability to use and develop means of communication and wired and wireless networks</p> <p>4. The ability to analyze and evaluate software systems before starting to design the system.</p> <p>5. Developing student skills in building smart systems that are based on analysis Inference, reasoning, and self-learning.</p> <p>6. Providing the student with some basic rules for evaluating and building software systems based on the basics of software analysis. .Increasing the student's knowledge of the basics of implementing software systems through understanding the mechanism of computer operation.</p>
2	<p>Subject-specific skills</p> <p>1 .theoretical</p> <p>2 .practical</p> <p>3 .Summer training</p> <p>4 .Graduation research</p>

Teaching and learning methods

1	Ordinary blackboard
2	Smart board
3	Data display device
4	Theoretical, practical, and applied lectures, daily assignments and discussions

Evaluation methods

1	Electronic exams
2	Central and monthly examinations
3	Daily exams
4	Scientific reports
5	Practical exams
6	Research projects
7	Exams, assignments, daily assignments, discussions, laboratory reports, graduation project

Thinking skills

1	The skill of deduction and analysis
2	Comparison skill
3	Discussion skills
4	Skills in using computers and the Internet
5	Research and investigation skill
6	The skill of conducting research and drawing conclusions
7	Decision making skill

Teaching and learning methods

1	Theoretical lectures
2	Practical laboratories
3	Research and investigation
4	Discussion groups within practical lessons
5	Lectures, practical experiments, applications, homework, scientific discussions

Evaluation methods

1	Electronic exams
2	Oral and written examinations
3	Research projects
4	Class discussions
5	Evaluation of assignments and discussions
6	Evaluating individual and group research
7	Exams, assignments, daily assignments, discussions, laboratory reports, graduation project

General and transferable skills (other skills related to employability and personal development)

1	Developing the ability for effective teamwork
2	Developing the ability for self-learning
3	Developing the ability to present and discuss ideas
4	Developing the ability to address problems in a logical, organized manner
5	Ability to work in a multidisciplinary team
6	Ability to communicate and build

Teaching and learning methods

1	Cooperative learning
2	Group discussions
3	Individual learning
4	Lectures, practical experiments, applications, homework, scientific discussions

Evaluation methods

1	Observing students' interaction in different situations
2	Presenting real-life issues and problems and observing how students deal with them programmatically.
3	Evaluating group and individual work
4	Solutions to summer training problems through graduation projects

Program structure

The first stage (Bologna System)

Semester	N o.	Module Code	Module Name in English	subject name الدراسية	Language	SSWL (hr/w)					Exam hr/se m	SSWL hr/sem	USS WL hr/se m	SWL hr/sem	ECTS	Module Type	Prereq uisite Module (s) Code	
						CL (hr/ w)	Lec t (hr/ w)	Lab (hr/ w)	Pr (hr/ w)	Tut (hr/ w)								Se mn (hr/ w)
One	1	UoMCS 101	Programming Fundamentals	أساسيات البرمجة	English	2	1	2	1		5	89	61	150	6.00	C		
	2	UoMCS 102	Logic Circuits Design	تصميم الدوائر المنطقية	English	2	1	2			5	75	75	150	6.00	C		
	3	UoMCS 103	System Analysis and Design	تحليل وتصميم النظام	English	3	1			1	1	4	74	76	150	6.00	C	
	4	UoMCS 104	Discrete Mathematics	رياضيات متقطعة	English	3	1			1		4	74	51	125	5.00	B	
	5	UoMCS 105	Calculus	تفاضل وتكامل	English	3	1			1		4	74	51	125	5.00	S	
	6	UoMCS 106	English Language 1	اللغة الانكليزية ١	English	2	1					3	45	5	50	2.00	E	
					Total	15	6	4	1	3	1	25	431	319	750	30.00		
Two	1	UoMCS 107	Advanced Programming	البرمجة المتقدمة	English	2	1	2	1			5	89	61	150	6.00	C	UoMCS 101
	2	UoMCS 108	Principles of Computer Organization	مبادئ تركيب الحاسوب	English	2	1	2				5	75	75	150	6.00	C	
	3	UoMCS 109	Web Programming	برمجة الويب	English	2	1	2				5	75	50	125	6.00	C	UoMCS 104
	4	UoMCS 110	Principles of Statistics	مبادئ الإحصاء	English	2	1	2				5	73	52	125	5.00	B	
	5	UoMCS 111	Democracy and Human Rights	الديمقراطية وحقوق الانسان	Arabic	2	1					3	44	6	50	2.00	E	
	6	UoMCS 112	Computer	الحاسوب	English	2	1	2				3	73	20	93	3.00	S	
	7	UoMCS 113	Arabic Language	اللغة العربية	Arabic	2	1					3	45	12	57	2.00	E	
						Total	14	7	10	1	0	0	29	474	276	750	30.00	

The second, third and fourth stages (course system)

Second year - first semester

Number of Units	Number of Hours			Course Code	Name
	Discussion	Practical	Theoretical		
2	—	—	2	CMCS20F21011	Scientific Research Methodology
3	—	2	2	CMCS19 F21021	Entity Programming
3	—	2	2	CMCS19 F21031	Numerical Analysis (1(
3	—	—	3	CMCS19 F21041	Computational (1(
3	—	—	3	CMCS19 F21051	Computer Architecture
3	—	2	2	CMCS19 F21061	Data Structures (1(
3	—	—	3	CMCS19 F21071	System Analysis and Design

Second year - Second semester

Number of Units	Number of Hours			Course Code	Name
	Discussion	Practical	Theoretical		
3	1	—	3	CMCS19 F22011	Probability and Random Variables
3	—	—	3	CMCS19 F22021	Computational (2(
3	—	2	2	CMCS19 F22031	System Software
3	—	2	2	CMCS19 F22041	Data Structures (2(
3	—	2	2	CMCS19 F22051	Visual Programming
3	2	—	3	CMCS19 F22061	Advanced Calculus

Third year - first semester

Number of Units	Number of Hours			Course Code	Name
	Discussion	Practical	Theoretical		
3	—	2	2	CMCS21 F3021	Compiler (1(
3	—	2	2	CMCS19 F31021	Databases (1(
3	—	2	2	CMCS19 F31031	Software Engineering
3	—	2	2	CMCS21 F31041	Coding
2	—	—	2	CMCS19 F31051	Management Principles
3	—	—	3	CMCS19 F31061	Operations Research

Third year - Second semester

Number of Units	Number of Hours			Course Code	Name
	Discussion	Practical	Theoretical		
3	—	2	2	CMCS21 F3021	Compiler (2(
3	—	2	2	CMCS19 F32021	Artificial Intelligence
3	—	2	2	CMCS19F32031	Databases (2(
2	—	—	2	CMCS19 F32041	English Language (2(
3	2	—	2	CMCS18F32051	Digital Signal Processing
3	—	2	2	CMCS19 F32061	Operating Systems (1(
3	1	2	2	CMCS19F32071	Computational Mathematics

Fourth year - First semester

Number of Units	Number of Hours			Course Code	Name
	Discussion	Practical	Theoretical		
3	—	2	2	CMCS19 F41011	Operating Systems (2(
3	—	—	3	CMCS19 F41071	Computer Networks
3	—	2	2	CMCS19 F41081	Computer Security
2	—	—	2	CMCS19 F41091	Modeling and Simulation
3	—	2	2	CMCS20FM2011	Digital Image Processing
2	—	4	—		Graduation Research Project (1(

Fourth year - Second semester

Number of Units	Number of Hours			Course Code	Name
	Discussion	Practical	Theoretical		
2	—	2	1	CMCS19 F42071	Computer Networks Lab
3	—	—	3	CMCS19 F42041	Distributed Systems
3	—	2	2	CMCS19 F42081	Multimedia and Network Security
3	—	—	3	CMCS19 F42091	E-Commerce
2	1	—	2	CMCS21F42101	Information Theory and Data Compression
2	—	4	—		Graduation Research Project (2)



		Programming Fundamentals 1 اساسيات البرمجة	Course Name
			Course Code
		Providing a general introduction to computer programming by focusing on the concepts of problem solving, basic programming constructs, and program design. The course introduces how to design and test simple programs.	Course Objectives
		The course starts with the basics of computers and its main units. Then the course introduces the basics of problem solving then the logical thinking. The logical thinking is explained through solving simple programming problems using flowcharts. Then the course moves to the basic programming using C#. The course introduces the basic I/O and user input. In addition the course introduces arithmetic operations, logical operations and comparative operations. Next, the course introduces some advanced constructs such as looping and decision making in C#.	Course Basic Details
		C# 6.0 and the .NET 4.6 Framework Seventh Edition, by Andrew Troelsen and Philip Japikse, APRESS, 2015	Textbooks
		None	External Resources
	Semester Endeavour Grade Semester Final Grade	Semester Endeavour Grade Semester Final Grade	Graduations and Grade Distribution
	50	35	

Number of hours: 2 theoretical

Number of units: 3

Lecture locations: Computer Science Department

Vocabulary by week

Week	Vocabulary	Subject	Week
	Problem solving strategies	Programming Fundamentals - problem solving	First
	The role of algorithms in the problem-solving process	Programming Fundamentals - problem solving	Second
	Implementation strategies for algorithms	Programming Fundamentals - problem solving	Third
	Basic syntax and semantics of higher-level language	Programming Fundamentals - constructs of C++	Fourth
	Variables, types, expressions, and assignment	Programming Fundamentals - constructs of C++	Fifth
	Simple I/O	Programming Fundamentals - constructs of C++	Sixth
	Conditional and Iterative control structure Methods (functions) and parameter passing	Programming Fundamentals - constructs of C++	Seventh
	Midterm exam	Midterm exam	Eighth
	Representation of numeric data	Programming Fundamentals - data structures	Ninth
	Range, precision. and rounding errors	Programming Fundamentals - data structures	Tenth
	Arrays (1D arrays only)	Programming Fundamentals - data structures	Eleventh
	Representation of character data	Programming Fundamentals - data structures	Twelfth
	Strings and string processing	Programming Fundamentals - data structures	Thirteenth
	Course Review	Course Review	Fourteenth



	Computer Organization مبادئ تركيب الحاسوب	subject name
		subject code
<p>This course is considered one of the basic courses in computer science, through which the student acquires basic knowledge about the internal parts of the computer and how each part works. This course aims to introduce the student to the architecture of the 8086 processor, the main units, how to connect them, and the fixed signals, as well as teaching the student the necessary skills in programming in assembly ..language</p>		subject goal
<p>Computer Organization Syllabus: Processor and its architecture, memory hierarchy, I/O and storage topics, instruction set architecture, addressing mode, architecture of the Intel 80*86 based microprocessors, micro assembler programming techniques involving building, incorporating and maintaining libraries using assembler speedups.</p>		Basic details
John "8086 Intel family"		Textbooks
<p>Bery Brey "8086, 8088, 80186, 809286, 80386, 80486 and Pentium" Sunil Mathur "Microprocessor 8086 Architecture Programming and interfacing",2011</p>		Recourses
Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
50	35	

Week	syllabus	Subject
	Computer architecture (cpu structure)	Introduction
	Von_neuman Model, Computer Architecture	Computer Model
	Main memory & external memory, Hard disk and floppy disk	Memory hierarchy
	System Bus	Buses
	Fetch and execute Performing a write operation	Read and write operation
	Memory address space & data organization 8086	architecture of the Intel 80*86
	Memory segmentation	Memory segmentation
	How 8086/8088 read & write from memory	Read/write from memory of 8086mp
	Logical and physical address, Dedicated , reserved and general –use memory	Type of addresses
	Addressing mode	addressing mode
	Addressing mode	addressing mode
	Data transfer inst.(MOV,LEA,LDS,LES,...)	Instruction set
	Data transfer inst. (XLAT,LAHF,SAHF)	Instruction set
	Revision	revision



		1Discrete Structure هياكل متقطعة ١	subject name
			subject code
<p>This course is considered one of the basic courses in computer science, through which the student acquires basic knowledge about the nature of discrete structures and how to transform and formulate any application and convert it from the theoretical side into a set of symbols and variables through which software can be formulated to achieve the desired goal. The terms and notations of discrete structures are useful for studying and expressing issues related to objects such as data, variables, and functions and employing them in the field of computer programming and algorithms..</p>			subject goal
			Basic details
Discrete Mathematica and it's applications, Kenneth H. Rosen, 2012.			Textbooks
https://www.pdfdrive.com/discrete-mathematics-books.html			Resources
Final Semester Grade		Semester Attendance Grade	Grade division
60		40	

Week	syllabus	Subject
	Introduction to Discrete Structures	Introduction to Discrete Structures
	Propositions Logic	Propositions Logic
	Compound Proposition classification	Compound Proposition classification
	Logical Equivalence	Logical Equivalence
	Predicate definition	Predicate definition
	Quantification and it's types	Quantification and it's types
	Introduction to Sets	Introduction to Sets
	Operations on sets	Operations on sets
	Adjacency list and matrix	Adjacency list and matrix
	Computing problems	Computing problems
	Pascal's triangle	Pascal's triangle
	Sequences	Sequences
	Introduction to graphs	Introduction to graphs
	Summation and Product notation	Summation and Product notation



		Calculus 1 1 تفاضل وتكامل	subject name
			subject code
Teaching computer science students the mathematical fundamentals required for computer science programmers, with a focus on practical matters and away from the theories usually studied by mathematics ..students			subject goal
Introduction to plane geometry, function and graph, slope of curves, derivative of function, applications on functions and its derivative, properties of limit and limit theorems, Inverse of functions and their derivative.			Basic details
Calculus volume I by Foster , 2010			Textbooks
Calculus volume I by Anton , 2002			Resources
Final Semester Grade	Semester Attendance Grade		Grade division
60	40		

Week	syllabus	Subject
	Introduction to plane geometry	Introduction to plane geometry
	Function and graph	Function and graph
	Slope of curves	Slope of curves
	Derivative of function	Derivative of function
	Derivative of function	Derivative of function
	Derivative of function	Derivative of function
	Derivative of function	Derivative of function
	Applications on functions and its derivative	Applications on functions and its derivative
	Applications on functions and its derivative	Applications on functions and its derivative
	Applications on functions and its derivative	Applications on functions and its derivative
	Properties of limit and limit theorems	Properties of limit and limit theorems
	Properties of limit and limit theorems	Properties of limit and limit theorems
	Inverse of functions and their derivative	Inverse of functions and their derivative
	Inverse of functions and their derivative	Inverse of functions and their derivative



		Software Application برامج تطبيقية	subject name
			subject code
<p>The course aims to introduce students to the general concept of the computer, its parts and types, and to teach students about the types of input and output devices and types of memories. And to identify the types of system operating programs and application programs. And to learn what (Microsoft Office) is and its contents. And to study the types of application programs. The course aims to teach the student how to use application programs and how to apply them to the computer, including the writing program (Word). As well as to introduce the student to the presentation program (Powerpoint) and how to use it and apply it to the computer. The course also aims to study the basic concept of the Internet and how to deal ..with Internet technologies</p>			subject goal
<p>Study the basic concepts of computers, their types, and the application of .application programs</p>			Basic details
			Textbooks
<p>Microsoft office (Woody, Leonhard). ١ . Microsoft office 2007(Tomas J.). ٢ . Microsoft office (Jon Welkenbach) ٣ .</p>			Recourses
Final Semester Grade		Semester Attendance Grade	Graduations and Grade Distribution
60		40	

Week	syllabus	subject
	Computer Basics, Computer Components Types of Components, HARDWARE Input Devices	Computer Basics
	Output Devices, Memory and Storage and Performance Storage Devices, Computer Performance, SOFTWARE Application software. Types of operating system, Types of Application.	Type of memory storage
	Windows 7, Desktop Icons, Desktop Components, Special Icons on the desktop.	Windows 7
	Icon Operations, Arrange Icons On the Desktop, Change Icon size, Start Menu Parts Working with Windows, Moving a window Using the taskbar, Understanding the parts of a window, Back and Forward buttons Working with file and folder, Selecting Single object, Multiple object, Rename.	Parts of Desktop and Desktop Icons
	Copying, Moving (cut), Create a Folder Deleting, Restore item from recycle Bin Opening an existing file or folder Working with Control Panel	Type of operations that applied on file and folder
	Microsoft Word Basics, Opening Microsoft Word, Creating and Managing Files Open Word, Create a New File, Save a New File, Open a Saved File, The Microsoft Office Ribbon, Moving Around Within a Microsoft Word Document Select All of the Text in a Document, Editing and Rewriting.	Microsoft Word Basics
	Replace Text, Insert Text, To Copy & Paste Text, Formatting Text, Formatting existing tex, Formatting as you Type	Formating Text
	Adding Character Emphasis, To Add Character Emphasis as you Type, Remove the Emphasis from Text. Changing Typeface and Font Size Change the Typeface as you Type Change the Font Size as you Type Changing Paragraph Alignment,	Formating Text
	Undoing/Redoing Changes, Undo/Redo Actions, Checking Spelling and Grammar Check the Spelling of a Finished Document Saving Your Work	Checking Spelling and Grammar

	Save Your Work for the First Time /or under a New Name, Saving your Work after the First Time, Opening a Saved Document, Printing.	Document and saving file
	Microsoft PowerPoint 2007, Create a New Presentation, Open an Existing Presentation Save a Presentation, Add Items to Quick Access Toolbar	Microsoft PowerPoint 2007
	Add Design Template to Blank Presentation Change Color Scheme of Design Template Add Slides to Presentation, delete Slides from Presentation, Using Bulleted Lists Viewing a Slide Presentation Print	Create PowerPoint
	Internet, General Concept, Starting Internet Explorer, The Components of internet Explorer, Icons on the standard toolbar Web Addresses	Introduction to Internet
	Search for information in internet, Electronic Mail E-Mail Characteristics E-mail address E-mail address characteristics	Dealing with the Internet

		Human Rights حقوق انسان	subject name
			subject code
Subject aims to introduce human rights in order to defend human dignity and contribute to changing human life for the better regarding: changing values and feelings - and changing behavior, as well as promoting the idea of social justice and strengthening the link between the individual, the group, the state and its institutions, developing skills to monitor violations and deal with violators and supporting skills to understand human rights issues in addition to enhancing ways of participation in public affairs - citizenship			subject goal
			Basic details
			Textbooks
Dr. Amir Abdel Aziz, Human Rights in Islam Nasreen Muhammad Abdo Hassouna, 2015, Human Rights... Concept, Characteristics, Classifications and Sources			Resources
Final Semester Grade	Semester Attendance Grade		Grade division
60	40		

Week	syllabus	Subject
	The roots of human rights and their development in human history	Roots of human rights and their development in human history
	Section one: Human rights in ancient and medieval times	
	Section two: Human rights in modern and contemporary history	- Human rights: definition, definition and guarantees
	- Human rights: definition, definition and guarantees	
	Section one: The relationship between human rights and public freedoms	- Content: Public freedoms
	Section two: Forms and types of human rights and the interrelationship between them	
	Section three: Guarantees of respect and protection of human rights	General theory of public freedoms
	- Content: Public freedoms	
	General introduction	- Legal system of public freedoms
	General theory of public freedoms	
	Section one: The origin of rights and freedoms	- Guarantees of public freedom
	Section two: The functional nature of the concept of public freedoms	
	- The legal system of public freedoms	- Guarantees of public freedom
	Section one: The legal basis of the legal state Section two: Regulation of public freedoms by public authorities	



		Advanced Programming البرمجة المتقدمة	subject name
			subject code
		Providing some advanced techniques of computer programming focusing on the sophisticated constructs used in problem solving and program design. It introduces how to design and test simple programs.	subject goal
		The course starts with the arrays in C#. The course teaches the students how to declare, read, and print one dimensional and two dimensional arrays. Then the course introduces the methods in C#. Next, the course moves to the recursion technique in C#. Then the course introduces strings C# and some useful built-in methods. The course introduces files in C# and how to read and write information to files. In addition the course introduces collection classes in C#. Lastly, the course introduces exception handling in C#.	Basic details
		C# 6.0 and the .NET 4.6 Framework Seventh Edition, by Andrew Troelsen and Philip Japikse, APress, 2015	Textbooks
		None	Recourses
	Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
	50	35	

Week	syllabus	Subject
	One dimensional Arrays	Arrays
	Two dimensional Arrays	Arrays
	More about arrays	Arrays
	Methods, call-by-value, call-by-reference	Methods
	More about methods	Methods
	Review	Review
	Strings in C# and some built-in methods	Strings
	More about strings	Strings
	Midterm exam	Midterm exam
	Recursion in C# with returning and non-returning values	Recursion
	Declaring, Creating, Reading, Writing to text files	Files
	More about some built-in methods on files	Files
	ArrayList, Stack, Queue, and Dictionary	Collection classes
	Review	Review

		Digital Logic Design التصميم المنطقي	subject name
			subject code
Providing the student with initial information about the logical design of electronic circuits, which are the cornerstone of electronic industries, including computers, starting with the student learning the number systems used in electronic computing and ending with the design of .logical circuits			subject goal
Digital Logic Design Syllabus: Numbering Systems, Arithmetic Operations, Logic Gates Simplification and Boolean Functions, Karnaugh Map Combinational And Sequential Circuits Analysis And Design, Digital Circuit Design, Binary Adder And Subtractor, Multiplexer, De-Multiplexer, Encoder Decoder, Flip-Flops, Registers, Counters.			Basic details
Digital Principles and Applications, by Malvino And Leach			Textbooks
<ul style="list-style-type: none"> Digital Fundamentals, by Floyd Switching Theory and Logic Design, by M. V. Sabramanyam. 			Resources
Final Semester Grade	Semester Attendance Grade		Grade division
50	35		

Week	syllabus	Subject
	Numbering Systems	Numbering Systems
	Arithmetic Operations	Arithmetic Operations
	BCD and Excess 3 Code	BCD and Excess 3 Code
	Logic Gates	Logic Gates
	Simplification and Boolean Functions	Simplification and Boolean Functions
	Karnaugh Map	Karnaugh Map

	Digital Circuit Design	Digital Circuit Design
	Combinational Circuits	Combinational Circuits
	Binary Full and Half Adder	Binary Full and Half Adder
	Binary Subtractor	Binary Subtractor
	Multiplexer and Demultiplexer	Multiplexer and Demultiplexer
	Decoder and Encoder	Decoder and Encoder
	Sequential Circuits	Sequential Circuits
	Flip-Flops	Flip-Flops

		Principles of statistics مبادئ الإحصاء	subject name
			subject code
		The course aims to introduce the student to the principles of statistics and its application areas. It also introduces the student to some of the operations specific to statistics.	subject goal
		This subject is given in the first stage for one semester. In this semester, the student will be given material related to the basics of statistics, basic statistical concepts, basic methods used in statistics, and how to use statistical methods in the field of computer science.	Basic details
		<ul style="list-style-type: none"> • Madsen, B. (2011). Statistics for non-statisticians. Heidelberg: Springer. 	Textbooks
		<ul style="list-style-type: none"> • Gibilisco, S. (2004). Statistics demystified. McGraw-Hill. • Stephens, L. J. (2007). Engineering statistics demystified. McGraw-Hill. • Internet resources. 	Resources
Final Semester Grade	Semester Attendance Grade		Grade division
60	40		

Week	syllabus	Subject
	Introduction	Introduction
	Statistical description of Data	Statistical description of Data
	Cumulative frequency, relative cumulative, percentage cumulative distribution tables	Cumulative frequency, relative cumulative, percentage cumulative distribution tables
	Graphical representation:(frequency histogram, polygon, and curve)	Graphical representation:(frequency histogram, polygon, and curve)
	Statistical measure of data measure of central tendency	Statistical measure of data measure of central tendency
	Calculation of sample mean, geometric mean, harmonic mean, quadratic mean	Calculation of sample mean, geometric mean, harmonic mean, quadratic mean
	Calculation of median, and mode for ungrouped and grouped data	Calculation of median, and mode for ungrouped and grouped data
	Measure of dispersion or variation, calculation of range	Measure of dispersion or variation, calculation of range
	Mean deviation	Mean deviation
	Variance, standard deviation for ungrouped and grouped data	Variance, standard deviation for ungrouped and grouped data
	Calculation of coefficient of variation	Calculation of coefficient of variation
	Calculation of coefficient of variation	Calculation of coefficient of variation
	Calculation of coefficient of Skewness	Calculation of coefficient of Skewness
	Calculation of coefficient of Kurlosis	Calculation of coefficient of Kurlosis

		Discrete Structure 2 2 هياكل منقطعة	subject name
			subject code
<p>This course is considered one of the basic courses in computer science, as it studies specific applications in various fields through analyzing and structuring data, determining objectives, and then creating a set of discrete mathematical codes that are useful in expressing object issues ..in computer programming and algorithms</p>			subject goal
			Basic details
Discrete structure, logic and computability, James L. Hein, 2017.			Textbooks
<ul style="list-style-type: none"> • BeryBrey "8086, 8088, 80186, 809286, 80386, 80486 and Pentium" • Sunil Mathur "Microprocessor 8086 Architecture Programming and interfacing",2011 			Recourses
Final Semester Grade	Semester Attendance Grade		Grade division
60	40		

سبب الاسابيع syllabus

Week	syllabus	subject
	Definition of proofs	Definition of proofs
	Ordered structures	Ordered structures
	Introduction to trees	Introduction to trees
	Tree traversal	Tree traversal
	Relations	Relations
	Functions	Functions
	Map function	Map function
	Definition of strings	Definition of strings
	Definition of lists	Definition of lists
	Simple Ciphers	Simple Ciphers
	Hash function	Hash function
	Introduction to Bijection	Introduction to Bijection
	Geometric and Logical model	Geometric and Logical model
	Semigroup	Semigroup

		Arabic اللغة العربية	subject name
			subject code
		المحافظة على سلامة اللغة العربية بوصفها لغة القرآن الكريم، وعنوان شخصية الأمة، ورمز هويتها. إثراء المعرفة باللغة العربية لغة وأدباً وثقافة وحضارة.	subject goal
		اهمية اللغة العربية والنحو	Basic details
		كتاب النحو الوافي للمؤلف عباس حسن	Textbooks
		كتاب النحو الشافي للمؤلف محمود حسني والفيء ابن مالك	Resources
Final Semester Grade	Semester Attendance Grade		Grade division
60	40		

Week	syllabus	Subject
	اهمية اللغة العربية	اهمية اللغة العربية
	اقسام الكلام	اقسام الكلام
	علامات الاعراب الاصلية	علامات الاعراب الاصلية
	مبتدا وخبر	مبتدا وخبر
	النواسخ	النواسخ
	كان واخواتها	كان واخواتها
	قواعد كتابة العدد	قواعد كتابة العدد
	قواعد رسم الهمزة	قواعد رسم الهمزة
	التاء المربوطة	التاء المربوطة
	التاء المبسوطة	التاء المبسوطة
	موضوعات ادبية	موضوعات ادبية
	ان واخواتها	ان واخواتها
	علامات الاعراب الفرعية	علامات الاعراب الفرعية
	علامات الاعراب	علامات الاعراب



	Research Methodology منهج البحث العلمي	subject name
		subject code
General objective: Acquiring scientific research writing skills		subject goal
<p>The course deals with the different methods of investigating the latest studies and research conducted in the field of curricula and teaching methods, and training on how to choose and write the title of the study; so that it reflects the variables of the study, and determine the problem of the study and its importance according to clear scientific standards, and formulate the objectives of the study in clear and specific language, and train on formulating the study questions and hypotheses, and choosing the literature of the study, and the type of its sources, and how to put it in the text of the thesis and in writing references and sources, and how to choose previous studies by investigating global, regional and local periodicals and research, and how to choose the sample in its types and describe it, and the types of tools and how to use them, and design a plan to research the problem or topic in the field of curricula and teaching methods that serves the educational process and contributes to solving the problems of the local community through applying the scientific method and adhering to its controls.</p>		Basic details
لا يوجد		Textbooks
<p>١. تعليمات كتابة مشاريع التخرج (أ.م.د. محسن نوري حمزة أ.م. مقدم طارق جيجان) ٢٠١٥ ٢. الدليل المختصر في كتابة البحث العلمي (أ.د. عبدالرحمن عبيد) المركز العربية الطبعة first ٢٠١٢ ٣. أساسيات البحث العلمي لطلاب الحاسوب وتقنية المعلومات (د.كمال الدين يوسف) ٢٠١٧</p>		Recourses
Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
60	40	

Week	syllabus	Subject
	المقدمة ومفهوم البحث العلمي	المقدمة
	مفهوم منهج البحث والغاية من البحث وأنواع البحث العلمي	منهج البحث العلمي
	صفات وسلوك الباحث العلمي صفات البحث العلمي الجيد	صفات الباحث
	مفهوم الاقتباس وأنواعه	الاقتباس
	خطوات إعداد البحث العلمي (البدء بالبحث) (اختيار مشكلة وكيفية مراجعة الأدب النظري والدراسات السابقة ذات الصلة بموضوع الدراسة وتحديد اسئلة البحث و أهداف البحث وأهميته وتحديد مجتمع (نطاق) البحث وعينته وتحديد حدود البحث)	خطوات إعداد البحث العلمي
	تكملة خطوات اعداد البحث العلمي (البدء بالبحث) (تحديد فرضيات البحث و اختبار فرضيات البحث باستخدام مناهج البحث العلمي (العملي) والتدوين وتجميع الافكار و صياغة وكتابة البحث وفهرسة المصادر)	خطوات إعداد البحث العلمي
	فروض البحث وانواعها واختيارها باستخدام مناهج البحث العلمي.	فروض البحث
	صياغة وكتابة البحث (عنوان الدراسة، الخلاصة الجداول او القوائم ، المقدمة، المصطلحات، محددات او حدود الدراسة)	صياغة وكتابة البحث
	تكملة موضوع صياغة وكتابة البحث (الدراسات السابقة، الجانب النظري، هدف او اهداف الدراسة، اهمية البحث، منهج البحث المستخدم في الدراسة (الجانب العملي او الجانب المقترح في البحث) ، نتائج الدراسة، مناقشة الدراسة)	صياغة وكتابة البحث
	مصادر البحث (طريقة الاشارة اليها وصيغة كتابتها) وكيفية استعمال علامات الترقيم وكيفية ترقيم صفحات البحث بانواعه.	مصادر البحث
	طريقة ترتيب فصول تقرير البحث . مع عرض نماذج القوائم التي توجد ببحث التخرج.	ترتيب البحث
	والاطلاع على نموذج البحوث المنشورة في المجلات ورسائل الدراسات العليا ومشاريع المرحلة الرابعة .	
	أخطاء تقع عند تحديد مشكلة البحث أخطاء يقع فيها الباحثون، وطريقة صياغة البحث من الناحية اللغوية.	الأخطاء الشائعة
	تعليم الطلبة على طريقة البحث بالنت وخصوصا استعمال محرك بحث الباحث العلمي (google scholar) والاطلاع على برامج ادارة المراجع وكيفية ربطها بمحرك البحث.	البحث بالنت



		Numerical Analysis تحليل العددي	subject name
			subject code
		Numerical analysis is a basic and complementary subject to mathematics. This course aims to introduce the student to the concept of numerical analysis and how to use numerical methods to solve difficult mathematical problems (that cannot be solved manually) computer-based using a programming language. Such as linear equations, solving nonlinear equations, solving systems of linear equations, in addition to numerical integration methods	subject goal
			Basic details
		Curtis F. Gerald, Patrick O. Wheatley و Applied Numerical analysis	Textbooks
		" Applied Numerical Analysis using Matlab". Won young yang, WenwuCao.	Recourses
	Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
	50	35	

Week	syllabus	Subject
	Numerical Analysis	Introduction to Numerical Analysis
	Types Errors	Errors: round off error, truncation error. Absolute and Relative errors.
	non-linear equations	solution of non-linear equations with one variables. Bisection method
	The methods to solution of non-linear equations	False position method Fixed point
	The methods of solution non-linear equations	Secant method Newton- Raphson method
	Special cases	Special cases of Newton-Raphson
	The linear systems	Introduction to linear systems
	direct method	Gauss elimination
	Decomposition	LU decomposition
	Interpolation	linear and cubic interpolation
	Lagrange	Lagrange Interpolation
	Numerical Integration	Trapezoidal rule
	The method of Numerical Integration	Simpson rule
	The method of Numerical Integration	Simpson rule



		Computational Theory 1 النظرية الاحتمالية ١	subject name
			subject code
		Defining the basics of computational theory and the basics of language theory, and the general concepts in building programming languages. It also enables the student to know the various operations that occur in languages. It also enables the student to know the basics of FA as well as the rules used in building programming languages and how to derive .them	subject goal
			Basic details
		Elementary Computability, Formal Languages and Automata	Textbooks
		1- Introduction to the Theory of Computation, by Michael Sipser, 2006. 2- Introduction to Computer Theory. By Daniel I. A.Cohen. Prentice-Hall, Second Edition, 1997	Recourses
	Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
	60	40	

Week	syllabus	Subject
	Set, Strings, alphabets and languages	Introduction to formal languages
	The Chomsky hierarchy of languages.	Types of Languages
	The regular grammars and regular languages. Pumping lemma on regular languages,	Regular Expression
	Closure properties of regular sets(union, catenation and Kleene closure)	Regular Expression
	regular expression, closure properties of regular languages(intersection, complementation and substitution)	Regular Expression
	Decision procedures for regular sets(emptiness, finiteness, containment and equivalence)	
	Finite state automata, Definition	Finite State Automata
	deterministic and nondeterministic finite state automata	Finite State Automata
	equivalence between deterministic and nondeterministic finite state automata	Finite State Automata
	Finite state automata with empty move	Finite State Automata
	Finite state automata with output(The Moore and Mealy Machine)	Finite state automata with output.
	The equivalence between Moore and Mealy machine.	Finite state automata with output.
	Context-free grammars and languages, context free grammar without empty string production (λ -free grammar), derivation trees	Context-free grammars
	Simplification of context-free grammars, the Chomsky and Greibach normal forms. The ambiguous context free grammars.	Context-free grammars



		Computer Architecture معمارية الحاسوب	subject name
			subject code
Definition of computer structure and how units work and explaining computer components, covering all types of memory used and how and explaining the central processing unit and its parts and how to execute instructions inside it and how input and output devices work and explaining parallel processing, which allows the student to have a deep understanding of how computer devices interact with each other and with the operating system in order to perform various functions			subject goal
Types of memory + central processing unit			Basic details
Computer architecture, Kai Hwang , McGraw-Hill,1988			Textbooks
Advanced computer architecture, second edition, Kai Hwang , McGraw-Hill,2011 COMPUTER ORGANIZATIONANDARCHITECTUREDESIGNING FOR PERFORMANCE , 2010,William Stallings			Resources
Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution	
60	40		

Week	syllabus	Subject
	Number Systems	Common Number Systems and Conversions
	Introduction to computer architecture (ISA+HAS) + NON VON NEUMANN MACHINE	Introduction to Computer Architecture
	MEMORY SYSTEM ARCHITECTURE	Memory System Architecture
	RAM +ROM ITS TYPES	Memory Storage Types
	MEMORY ORGANIZATION	Memory Organization
	RAM DESIGN+ CACHE MEMORY	RAM Design
	MAPPING FUCTION IN ACHE	Cache Memory
	INTERLEAVE MEMORY+VIRTUAL MEMORY	Interleaving Memory
	CPU ARCHITECTURE + CONTROL UNIT	CPU Architecture
	INSTRUCTION MICROPROGRAM	Micro-programmed Control
	INPUT OUTPUT DEVICE	Input-Output Design
	Define pipeline and its types	Pipelining
	Define PARALLEL ROCESSING	Parallel Processing
	Type of PARALLEL ROCESSING	Multi-Computer sand Multiprocessors



		Data Structures 1 هياكل بيانات ١	subject name
			subject code
Introduction to the main topics of data structures that focus on the knowledge and importance of data structures and their practical application. Of course, it includes the study of arrays, queues, linked lists, applications, etc. This course uses a high-level language in the application of the course. This course also aims to produce a student with different programming skills that qualify him to work in the labor ...market as a beginner programmer			subject goal
Elementary data structures and their implementation: arrays, strings, structures and files. Specification, implementation and application of stacks, queues, lists, trees and graph. Searching and sorting algorithms.			Basic details
1- A Practical Introduction to Data Structures and Algorithm Analysis Third Edition (Java) Clifford A. Shaffer Department of Computer Science Virginia Tech Blacksburg, VA 24061 April 16, 2009.			Textbooks
Data Structures and Algorithms: Annotated Reference with Examples First Edition Copyright °c Granville Barnett, and Luca Del Tongo 2008.			Recourses
Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution	
50	35		

Week	syllabus	Subject
	Data types, operations on Data Structure, Types of Data Structure	Introduction to Data Structures
	Arrays representation, Basic operations in Array, 2D Array	Arrays Data Structure
	Linked-List types, Basic operations in linked-List, Creating a linked-list	Linked-List Data Structure
	Creating a Circular linked-list Creating a Double linked-list	Circular and Double linked-list
	Stack Representation, Basic operation on stack, Stack applications	Stack Data Structure
	Expression notations, prefix expression notation using stack, postfix expression notation using stack	Expression Parsing &Evaluation using Stack
	Queue Representation, Queue basic operations, Circular Queue	Queue Data Structure
	Linear Search, Binary Search	Searching Techniques
	Linear Probing, Hash function, Operations on Hash Table	Hash Table Data Structure
	Sorting techniques, Bubble Sort algorithm	Sorting techniques
	Quick Sort Pivot Algorithm, Evaluation of Quick Sort algorithm	Quick Sorting Algorithm
	Merge Sorting Algorithm, Evaluation of merge sort algorithm.	Merge Sorting Algorithm
	Types of Tree Structure, Binary tree, Binary Search Tree, AVL Tree	Tree Data Structure
	Introduction to graph structure, Terms in Graph, Graph representations.	Graph Data Structure



		System Analysis and Design تحليل وتصميم النظام	subject name
			subject code
		It aims to enable students to analysis existing systems and develop other new systwms of system analysis and design by using different approaches and techniques.	subject goal
			Basic details
		Systemes Analysis and Design – Forth Edition By: Alan Dennis, Barbara Haley Wixom, and Roberta M. Roth, John Wiley & Sons, Inc., 2009.	Textbooks
			Recourses
	Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
	60	40	

Week	syllabus	Subject
	Data vs. Information, Defining A System, Sytem Types	System Analysis (Introduction)
	Planning Phase, Analysis Phase, Design Phase, Phase Implementation	System Development Life Cycle
	Methodology Types, Categories of the System Development Methodology	Systems Development Methodologies
	Project Initiation, System Request, Feasibility Analysis	System Planning Phase
	Project Management, Creating The Work Plan, Staffing The Project	Project Management
	Interviews, Joint Application design (JAD), Questionnaire, Document Analysis, Observation	Information Gathering
	Data flow diagramming(DFD), Using a DFD to Define Business Processes, DFD Levels, Use Case.	Process Modeling and Data Flow Diagramming
	Logical data models (LDMs), Physical data models (PDMs), Normalization.	Data Modeling
	Design phase steps, Design Strategies, Selecting a Design Strategy, Moving from Lgical to Physical Model.	Design Phase
	The Purpose of Architecture Design, Functions (Software) of Architectural Components, Operational Requirements, Performance Requirements Security Requirements, Network Model.	Arthitecture Design
	User Interface Design fFundamental Parts, Principles For User Interface Design, User Interface Design Process, Basic Principles of Navigation Design.	User Interface Design and Navigation Design
	Data Storage Formats, Database Types, Optimizing Data Storage.	Data Storage Design
	Top-Down Modular Approach, Structure Chart, Structure Chart Elements, Building the Structure Chart, Program Specification.	Program Design
	Construction, Installation, Post – Implementation Evaluation, System Maintenance.	Implementation Phase



		Computational Theory 2 النظرية الاحتمالية ٢	subject name
			subject code
		Defining the basics of computational theory and the basics of language theory, and the general concepts in building programming languages. It also enables the student to know the various operations that occur in languages. It also enables the student to know the basics of PDA and Turing machines.	subject goal
			Basic details
		Elementary Computability, Formal Languages and Automata	Textbooks
		1- Introduction to the Theory of Computation, by Michael Sipser, 2006. 2- Introduction to Computer Theory. By Daniel I. A.Cohen. Prentice-Hall, Second Edition, 1997	Recourses
	Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
	60	40	

Week	syllabus	Subject
	The Pushdown automata and context-free languages.	Introduction to PDA and Context free languages
	The Pushdown automata and context-free languages.	Introduction to PDA and Context free languages
	Properties of context free languages, the pumping lemma, closure properties of context free languages(union, concatenation, Kleene closure and substitutions	Context free languages
	Decision procedures on context-free languages (emptiness, empty string containment and finiteness).	Context free languages
	Turing machine, the Turing machine model, computable language and functions	Turing machine
	Turing machine, the Turing machine model, computable language and functions	Turing machine
	The Turing machine as computer of integer functions.	Turing machine
	The Turing machine as computer of integer functions.	Turing machine
	Technique for Turing machine construction (storage in finite control, multiple trucks).	Turing machine
	Technique for Turing machine construction (storage in finite control, multiple trucks).	Turing machine
	Modification of Turing machine(two ways infinite tape, Multi-tape Turing machine)	Turing machine
	Modification of Turing machine(two ways infinite tape, Multi-tape Turing machine)	Turing machine
	Recursive and recursively enumerable sets and their properties.	Recursively enumerable Languages
	Recursive and recursively enumerable sets and properties.	Recursively enumerable Languages



وزارة التعليم العالي والبحث العلمي
جامعة الموصل
كلية علوم الحاسوب والرياضيات
قسم : علوم الحاسوب
المرحلة : second

		Data Structures 2 هياكل البيانات ٢	subject name
			subject code
		Covering advanced concepts in data structures. How to design and analyze major types of algorithms. This course also focuses on computational complexity theory and how to calculate the big O code for different algorithms. This course uses a high-level language in the course implementation and aims to graduate a student with programming skills that qualify him to work in the labor market as a .programmer	subject goal
		Design and analysis of basic classes of algorithms (divide and conquer, recursion, dynamic, greedy and backtracking algorithm). Theory of complexity.	Basic details
		1- A Practical Introduction to Data Structures and Algorithm Analysis Third Edition (Java) Clifford A. Shaffer Department of Computer Science Virginia Tech Blacksburg, VA 24061 April 16, 2009.	Textbooks
		Data Structures and Algorithms: Annotated Reference with Examples First Edition Copyright © Granville Barnett, and Luca Del Tongo 2008.	Recourses
	Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
	50	35	

Week	syllabus	Subject
	In order traversal, preorder traversal, post order traversal	Tree data structure traversal
	Depth first search traversal, Breadth first traversal	Graph data structure traversal
	General Properties of Spanning Tree, Minimum Spanning Tree (MST), Prim's Spanning Tree Algorithm	Spanning Tree
	Characteristics of Algorithms, Algorithm Complexity, asymptotic analysis, Asymptotic Notations	Algorithm design and analysis
	Typical Complexities of an Algorithm, how to approximate the time taken by the Algorithm,	Theory of complexity
	Recurrence Relation, Substitution Method, Iteration Method, Recursion Tree Method	Recurrence Theory
	Pros and cons of Divide and Conquer Approach, Application of Divide and Conquer approach (finding the Min-Max problem), Binary search algorithm	Algorithm Design Techniques Divide and Conquer algorithms
	Components of Greedy Algorithm, Counting coins' problem, Job Sequencing with Deadline, Optimal Merge Pattern	Greedy Algorithm1
	Solving Knapsack problem, Fractional Knapsack	Greedy Algorithm2
	Fibonacci numbers problem Recursive approach, Iterative approach	Dynamic Programming1
	0/1 knapsack problem, step-by-step algorithm	Dynamic Programming2
	Travelling Salesperson problem. Step- by-step algorithm	Travelling Salesperson algorithm
	Steps of Backtracking Algorithm, Generic problem formulation, Maze problem	Backtracking Algorithm1
	Sudoku Problem, Sudoku & Backtracking, Step-by-step algorithm,	Backtracking Algorithm2



		Advanced Calculus تفاضل وتكامل متقدم	subject name
			subject code
		Creating programs and building interactive interfaces that facilitate the user's work. Teaching computer science students the mathematical basics required in the field of computer science programmers' work, with a focus on practical matters and avoiding the theories that mathematics students usually study.	subject goal
		Creating programs and building interactive interfaces that facilitate the user's work. Teaching computer science students the mathematical basics required in the field of computer science programmers' work, with a focus on practical matters and avoiding the theories that mathematics students usually study.	Basic details
		Calculus II Syllabus: Trigonometric functions and its basic properties, the differentiation of trigonometric function, basic concepts of integration, defined and undefined integrals, some methods of integration,, basic application of integration, sequences, infinite series, alternating series, power series.	Textbooks
		Calculus volume I by Foster , 2010	Recourses
	Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
	60	40	

Week	syllabus	Subject
	Trigonometric functions and its basic properties	Trigonometric functions and its basic properties
	The differentiation of trigonometric function	The differentiation of trigonometric function
	The differentiation of trigonometric function	The differentiation of trigonometric function
	basic concepts of integration	basic concepts of integration
	defined and undefined integrals	defined and undefined integrals
	some methods of integration	some methods of integration
	some methods of integration	some methods of integration
	basic application of integration	basic application of integration
	basic application of integration	basic application of integration
	Sequences	Sequences
	infinite series	infinite series
	alternating series	alternating series
	power series	power series
	power series	power series



		Compiler1 1 مترجمات	subject name
CMCS21 F3021			subject code
The primary goal of this course is to learn the basic principles and practice of compiler construction			subject goal
This subject familiarizes students with languages and their rules as well as rules of their formulation. This course studies different phases of compiler construction.			Basic details
Basics of Compiler Design, Torben E. Mogensen, 2009.			Textbooks
1-The Essence of Compilers by Roben Hunter, Prentice–Hall 1999 . 2- Compilers , principles , Techniques and tools by Aho,Lam, Sethi and Ullman, 2 nd Ed. Addison – Wesely , 2007.			Recourses
Final Semester Grade			Graduations and Grade Distribution
50	35		

Week	syllabus	subject
	Introduction to Translators	Introduction
	The phases of compiler design	compiler design
	Compiler construction tools	compiler tools
	Lexical tokens & regular expression	Token representation
	Finite state Machine	Finite automata
	Converting RE to FSM	Conversion
	Designing lexical analysis	lexical analysis
	lexical analysis generator	lexical analysis
	The role of the parser	Syntax analysis
	Context free grammar	Types of grammars
	Top –down & bottom up parser	Types of Parsers
	LL(1) grammar	Specific Grammar
	Predicative parser	Top-down Parser
	Error recovery	Error Management



		Database1 قواعد بيانات ١	subject name
			subject code
		Subject aims to introduce the student to databases and the purpose of databases in addition to database management systems and how to program databases through SQL in addition to how to represent data.	subject goal
		Database Management Systems Analysis and Design	Basic details
		Modern Database Management Systems ,Fred R. McFadden, 5th, ed , Addison –Wesly , 1999	Textbooks
		1.Database system concepts, by Silberschatz, Korth and Sudarshan, 4th ed, McGraw-Hill, 2002 2.Security in Computing, Charles P. Pfleeger - Pfleeger Consulting Group, Shari Lawrence Pfleeger, 4th Edition, Prentice Hall ,2007	Recourses
	Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
	50	35	

Week	syllabus	Subject
	General definitions of database and its characteristics.	Database System Concepts
	The role of database management system.	DBMS and its Components
	The data independence characteristic in database system.	Data Independence
	The views of database system.	Database Architectures
	Conceptual, logical, physical levels of database system.	The Three Levels of the Architecture
	Network architecture and database system.	Client-Server Architecture
	General view of Entity Models with focus on relational database.	The Entity Relationship Data Model
	Explain basics Entity-Relational model.	Conceptual Design with ER Model
	Explain basics Entity-Relational model.	Conceptual Design with ER Model
	Candidate keys and focus on Primary Key.	Constraints and Keys
	Candidate keys and focus on Primary Key.	Constraints and Keys
	Basic concepts of Relational Algebra.	Relational Algebra
	Basic concepts of Relational Algebra.	Relational Algebra
	Exam	Exam



		Cryptography - التشفير	subject name
			subject code
		Learn about cryptography and its related algorithms (old and modern)...	subject goal
			Basic details
		"Cryptography and Network Security: Principles and Practice" , (2 nd Ed.), William Stallings, Prentice-Hall, Inc., 1999	Textbooks
		"Cryptography and Network Security: Principles and Practice", (7 th Ed.) , William Stallings , Prentice-Hall, Inc., 2016 "Computation, Cryptography, and Network Security" (1st ed.), Nicholas J. Daras & Michael Th. Rassias, Springer, 2015	Recourses
	Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
	50	35	

Week	syllabus	Subject
	Introduction to Cryptography history	Introduction, Terms and Basic Concepts
	Study techniques for the old and some new techniques	Classical Encryption Techniques (Transposition & (Substitution)
	What is about the new methods?	Modern Encryption Techniques
	Some properties like Symmetric & Asymmetric	Symmetric Crypto Primitives
	All methods that came under the term of Stream Cipher	Stream Ciphers
	Many subjects under this title	Introduction to Number Theory
	A new way for cryptography	Principles of Public key Cryptography and Cryptosystem
	What is the most important algorithm?	Public key Cryptography and RSA
	The algorithm in detail.	The RSA algorithm
	Specify what is block cipher	Block Ciphers
	The algorithm DES in detail	Data Encryption Standard, DES
	Some other important requirements	Authentication Messages and Requirements
	Very important techniques	Hash Functions Digital Signature
	Revision	Revision



		Principles of Management مبادئ الإدارة	subject name
			subject code
		The course aims to introduce students to the concept and principles of management and to learn about schools of administrative thought, the most important administrative theories and the basics of administrative work.	subject goal
		Principles of management - Manager's tasks - Decision making - Job satisfaction	Basic details
		Principles of management by Dr. Shawqi Naji Jawad	Textbooks
		Principles of business administration by Dr. Khalil Al-Shamaa	Recourses
		Final Semester Grade	Graduations and Grade Distribution
		Semester Attendance Grade	
		60	40

Week	syllabus	Subject
	تعريف الإدارة والمدير، مداخل دراسة الإدارة، نشاطات المنشأة (مجالات إدارة الأعمال)	طبيعة الإدارة ومهام المدير
	حجم المنظمة ، تخصص الموارد البشرية وصعوبة ، العمل، تغيير مكانة الافراد ، تدخل الدولة في شؤون المنظمة، التغيير المتسارع	التحديات التي تواجهها الإدارة المعاصرة
	انماط السلوك الإداري، المهارات الإدارية ،مصادر المهارات الإدارية، التفاوت في العمل الإداري إمكانية نقل المهارات الإدارية	مهام المدير
	الادوار التفاعلية، الادوار المعلوماتية، الادوار القرارية	ادوار المدير
	التخطيط واتخاذ القرار، التنظيم، القيادة والتحفيز، الرقابة	وظائف المدير
	الإدارة العليا، الإدارة الوسطى، الإدارة المباشرة والإشرافية	انواع المدراء
	مدرسة الإدارة العلمية، مدرسة التقسيمات الإدارية، المدرسة البيروقراطية	المدرسة التقليدية الكلاسيكية
	دراسة هاوثورن والتون مايو، دراسة فولت، جستربانرد دوكلاس و ماكريكر ونظرية س و ص	المدرسة الانسانية
	نظرية المنظومات المفتوحة، الإدارة الكمية ، وليم اوجي ونظرية z الإدارة اليابانية، الإدارة الموقفية	مدرسة الاتجاهات المعاصرة
	تركيبية السطح البيئي، البيئة العمومية، البيئة الخاصة، فشل المنظمة في قراءة مؤشرات البيئة	الإدارة وبيئتها
	القطاع الاقتصادي، القطاع التكنولوجي، القطاع الاجتماعي، القطاع الحكومي	مكونات البيئة العامة
	الزبائن، الموردون، المنافسون، الجماعات والاجهزة الناطمة، التكنولوجيا ذات العلاقة، الموارد البشرية	مكونات البيئة الخاصة
	طبيعة الفحص البيئي، البيئة المتحركة والمستقرة، اجراءات الفحص البيئي	استقصاء حدود البيئة
	عرض المنظمة ورسالتها، الاهداف والغايات، انواع الاهداف المنظمة، اهمية الاهداف المنظمة ، متطلبات تحديد الاهداف	الاهداف المنظمة



	Operation Research بحوث العمليات	subject name
		subject code
<p>1. Introducing the student to the nature of operations research and its history</p> <p>2. Introducing the student to operations research tools, including linear programming, transportation models, storage models, etc.</p> <p>3. Enabling the student to form a linear programming model</p> <p>4. Enabling the student to solve linear programming models using the graphical method, simplex, and Big_M</p> <p>5. Introducing the student to the binary model or (the corresponding model)</p> <p>6. Enabling the student to solve the binary model using the binary simplex method</p> <p>7. Introducing the student to transportation models and the mechanism for forming a transportation model</p> <p>Enabling the student to solve transportation models using the north-west corner method and the least cost method</p>		subject goal
Introduction to Operation Research Linear Programming Optimal Solution		Basic details
1. Introduction to Operations Research / Hamed Al-Shammari and Ali Al-Zubaidi		Textbooks
2. Operations Research / Hamdi Taha (translator)		Recourses
Final Semester Grade	Semester Attendance Grade	Graduations and Grade

60	40	Distribution
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Week	syllabus	Subject
	مقدمة عن بحوث العمليات، تعريف بحوث العمليات، الهدف من دراسة بحوث العمليات، مراحل دراسة بحوث العمليات، أدوات بحوث العمليات، تطبيقات بحوث العمليات	مقدمة عن بحوث العمليات
	مقدمة عن البرمجة الخطية، تعريف البرمجة الخطية، الصيغة العامة للبرمجة الخطية، كيفية تكوين أنموذج برمجة خطية	نموذج البرمجة الخطية
	مقدمة عن طرائق حل البرمجة الخطية، شرح للطريقة <i>first</i> وهي الطريقة البيانية مع إعطاء أمثلة وحلها شرح الحالات الخاصة لمسائل البرمجة الخطية عند حلها بالطريقة البيانية، إعطاء مثال لكل حالة من هذه الحالات	طرائق حل نماذج البرمجة الخطية
	مقدمة عن طريقة السمبلكس، خطوات الحل بطريقة السمبلكس، إعطاء أمثلة وحلها بطريقة السمبلكس	الطريقة المبسطة او طريقة السمبلكس
	مقدمة عن طريقة <i>M</i> الكبيرة، خطوات الحل بطريقة <i>M</i> الكبيرة، إعطاء أمثلة وحلها بطريقة <i>M</i> الكبيرة	طريقة <i>M</i> الكبيرة
	مقدمة عن النموذج الثنائي، مزايا النموذج الثنائي، خطوات تحويل نموذج البرمجة الخطية الى نموذج ثنائي، أمثلة لكيفية تحويل نموذج البرمجة الخطية الى النموذج الثنائي	النموذج الثنائي (أو النموذج المقابل)
	مقدمة عن طريقة السمبلكس الثنائية، خطوات طريقة السمبلكس الثنائية، إعطاء أمثلة وحلها بطريقة السمبلكس الثنائية	طريقة السمبلكس الثنائية
	مقدمة عن نماذج النقل، كيفية تكوين نموذج النقل، إعطاء أمثلة لتوضيح آلية تكوين نموذج النقل	نماذج النقل
	مقدمة عن طرائق حل نماذج النقل	طرائق حل نماذج النقل
	شرح خطوات طريقة الركن الشمالي الغربي	طرائق حل نماذج النقل
	إعطاء أمثلة وحلها بطريقة الركن الشمالي الغربي	طرائق حل نماذج النقل
	مقدمة عن طريقة أقل الكلف، شرح خطوات طريقة أقل الكلف	طريقة أقل الكلف
	إعطاء أمثلة وحلها بطريقة أقل الكلف	طريقة أقل الكلف



وزارة التعليم العالي والبحث العلمي
جامعة الموصل
كلية علوم الحاسوب والرياضيات
قسم : علوم الحاسوب
المرحلة : الثالثة

		Software Engineering هندسة البرمجيات	subject name
			subject code
<p>The course aims to introduce students to the concept of software engineering, and provide them with the necessary activities to produce various systems. It also aims to make the student aware of the stages of software development. In addition to how to design programs to solve large problems by understanding software engineering methods. The practical course is also considered one of the basic courses in computer science, through which the student is introduced to the Enterprise Architect program, which is a tool for UML (Unified Modeling Language) modeling that enables the student to manage and design large projects. The course aims to enable the student to use the diagrams, drawings and models provided by this tool in analyzing, designing and testing large systems.</p>			subject goal
<p>Managing, analyzing and designing large programs</p>			Basic details
<p>Software engineering A practitioner's approach, Third Edition, Roger S. Pressman, 2005.</p>			Textbooks
<p>Software engineering, Eighth Edition, Ian Somerville, 2007. . 2. Enterprise Architect User Guide, by Geoffrey Sparks, 2009.</p>			Recourses
Final Semester Grade	Semester Attendance Grade		Graduations and Grade Distribution
50	35		

Week	syllabus	Subject
	Software definition, applications and problems. Software engineering definition.	Introduction
	The conflicting and complementary goals of SWE. Water fall Model	Software Process
	Prototyping. Evolutionary development. Formal systems development.	Software engineering paradigms
	Objectives. Requirements Engineering Process. Types of Requirements. Software Requirement Specification. Software Requirement Validation.	Software Requirements
	Analysis Model Types and examples. Formal Specifications. Formal methods. Formal Specification Languages.	Analysis Model
	Design and Quality. Software Design Levels. Fundamental Design Concepts	Software Design
	Definition. Cohesion and its types. Coupling and its types. Effective Modular Design.	Functional independence
	Data, Architectural and procedural design. Top-Down and Bottom-Up Design. Structured Design. Transform and Transaction Mapping	Design elements
	Definition and Objectives. Exhaustive Testing. Test case design. Software Testing Strategies	Software Testing
	Basis path testing. Basis path method with examples. Condition testing. Data flow testing. Loop testing	White Box Testing
	Black box testing techniques.	Black Box Testing
	Software Project definition and goal.	SW management
	Resource management. Project Execution & Monitoring. Project Management Tools.	Project Scheduling
	Revision	Revision



		<p align="center">Artificial Intelligence ذكاء اصطناعي</p>	<p align="center">subject name</p>
			<p align="center">subject code</p>
<p>The course aims to introduce the student to the concept of artificial intelligence and the most important languages of artificial intelligence. The course also aims to teach students state space search methods and solve many problems that are solved by this type of search. And to teach students blind search methods or so-called similar search methods. Also, to teach students speculative search methods and types of algorithms and solve problems by this type of search methods as well. The course aims to introduce students to methods of representing knowledge and its types, which are logical representation, including questionnaire logic and attribution logic, as well as to teach students methods of network representation of knowledge, which includes representing knowledge by the semantic network method or network representation of knowledge by the conceptual drawing method or by the framework method. The course also aims to teach students the general concept of expert systems and how to build them, their architecture and their types. Also, to teach students the general concept of artificial neural networks and how to build them, types of learning in them and their characteristics. Solving problems by blind search methods and speculative search methods. Representing knowledge in several ways, and studying expert systems and artificial neural networks</p>			<p align="center">subject goal</p>
<p>The course aims to introduce the student to the concept of artificial intelligence and the most important languages of artificial intelligence. The course also aims to teach students state space search methods and solve many problems that are solved by this type of search. And to teach students blind search methods or so-called similar search methods. Also, to teach students speculative search methods and types of algorithms and solve problems by this type of search methods as well. The course aims to introduce students to methods of representing knowledge and its types, which are logical representation, including questionnaire logic and attribution logic, as well as to teach students methods of network representation of knowledge, which includes representing knowledge by the semantic network method or network representation of knowledge by the conceptual drawing method or by the framework method. The course also aims to teach students the general concept of expert systems and how to build them, their architecture and their types. Also, to teach students the general concept of artificial neural networks and how to build them, types of learning in them and their characteristics. Solving problems by blind</p>			<p align="center">Basic details</p>

search methods and speculative search methods. Representing knowledge in several ways, and studying expert systems and artificial neural networks		
		Textbooks
<ol style="list-style-type: none"> 1. AI Super Power(Kai- Fu Lee, 2018). 2. Artificial Intelligence Aguide for Thinking Humans(Melanie Matchell, 2019). 3. Fundamentals of Artificial Intelligence Book by K. R. Chowdhary, 2020 		Recourses
Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
50	35	

Week	syllabus	Subject
	Introduction to Artificial Intelligence. Languages and Environments for AI. AI Application Areas. Characteristics of Artificial Intelligence. Data, Information, and Knowledge.	Introduction to Artificial Intelligence
	Search Methods. Structures for state space. State Space represented of problems. State Space Search.	Search Methods
	Traveling Salesperson Problem. Water Jug Problem. Coins Problem. sliding-tile puzzle problem.	State Space Search Problem
	Blind search. Depth-First Search. Depth first search (DFS)method. Depth first search(DFS) algorithm. Depth first search(DFS) problems. Advantages of DFS. disadvantages of DFS.	Systematic Search (Blind search)
	Breadth first search(BFS). Breadth first search (BFS)method. Breadth first search(BFS) algorithm. Breadth first search(BFS) problems. Advantages of BFS disadvantages of BFS.	Systematic Search (Blind search)
	Hybrid first search (HFS). Hybrid first search (HFS) method. Hybrid first search (HFS) algorithm. Hybrid first search (HFS) problems. Advantages of HFS disadvantages of HFS.	Systematic Search (Blind search)
	Heuristic Search Techniques. Heuristic search methods. Generate and test. Hill climbing search. Hill climbing search Algorithm. Problems with hill climbing. To solving problems for hill climbing search. Best first search. A* algorithm	Heuristic Search

	Knowledge Representation. Logic Representation. Propositional Logic. Predicate Logic.	Knowledge Representation
	Some examples of knowledge representation. Clause form. Convert to clause form.	Propositional Logic And Predicate Logic
	Network Representation. Semantic Network. Examples of Semantic Network. Abstract objects.	Network Representation
	Conceptual Graph. Operations on Conceptual Graphs. Negation of conceptual graph. Representing propositions by conceptual graph.	Network Representation
	Frames. Some examples to Network Representation by Frames. Advantages and disadvantages of knowledge representation methods	Network Representation Frames
	Expert System. What are Expert Systems(ES). Architecture of Expert System. Expert System classes.	Expert System
	Artificial Neural Networks (ANNs). Introduction for ANNs. Biological Neural Network. Artificial Neuron. Learning in Neural Networks. Properties of A.N.N. Important A.N.N. parameter.	Artificial Neural Networks



		Database – 2 2 قواعد بيانات	subject name
			subject code
		The course aims to introduce the student to databases and what is the purpose of databases from the point of view of computer science. In addition to an introduction to database management systems and how to program databases through SQL, in addition to how to represent data logically and physically.	subject goal
		Relational Database Design, Functional Dependencies, Normal Forms and Normalization, Schema Refinement in Database Design,	Basic details

Normalization. First, Second, and third Normal forms. Decomposition and FDs Preservation. Boyce Codd Normal Form, Recovery. Transaction recovery, System recovery, Concurrency. Concurrency Problems Locking. Deadlock, Transaction Management, ACID properties.		
Hoffer, J. A., V. Ramesh, Heikki Topi. (2011). Modern Database Management, 10 th Edition: Pearson Education India.		Textbooks
Avi Silberschatz, Henry F. Korth and S. Sudarshan (2019) . Database System Concepts, 7 th Edition: McGraw-Hill.		Resources
Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
50	35	

Week	syllabus	Subject
	Giving an overview of concepts that dedicated for DBMSs	Database System Concepts Overview
	Detailed introduction of LDBMS's and introducing the relational model.	Logical database Design and the Relational Database Design
	Transforming EERD Into Relations - Part One	Transforming EER into Relations
	Transforming EER Into Relations - Part Two	
	Review and Quiz	
	Defining what are the anomalies that might be found in relations and how it affects the integrity and consistency of data,	Introduction to Normalization
	First, Second, and Third Normal forms, Decomposition and FDs Preservation	Introduction to Normalization
	Physical Database Design and Denormalization- Part 1	Physical Database Design and Denormalization
	Physical Database Design and Denormalization- Part 2	Physical Database Design and Denormalization
	Mid-Term Quiz	
	Boyce-Codd Normal Form	Additional Normal Forms

Week	syllabus	Subject
	Multivalued Dependency and Fourth Normal Form	Additional Normal Forms
	Concurrency, Concurrency Problems Locking, Deadlock	Concurrency, Concurrency Problems Locking, Deadlock
	Transaction Management, ACID properties	Transaction Management, ACID properties



		معالجة الإشارة الرقمية Digital Signal Processing	subject name
			subject code
		To provide students with a comprehensive understanding of various topics related to digital signal processing such as fundamentals, basic system components, transformations, filtering, signal types and operations and other fundamental topics. The field of digital signal processing (DSP) is concerned with the development, analysis and implementation of a variety of signal processing operations performed by digital arithmetic units. In this way, DSP provides analytical and computational tools for a wide range of applied disciplines including digital communications, sensor networks, robotics, control, biosystems, seismology and image processing, to name a few. This course covers the fundamental concepts and techniques of modern digital signal processing that are essential for many practical applications.	subject goal
		To provide students with a comprehensive understanding of various topics related to digital signal processing such as fundamentals, basic system components, transformations, filtering, signal types and operations and other fundamental topics. The field of digital signal processing (DSP) is concerned with the development, analysis and implementation of a variety of signal processing operations performed by digital arithmetic units. In this way, DSP	Basic details

provides analytical and computational tools for a wide range of applied disciplines including digital communications, sensor networks, robotics, control, biosystems, seismology and image processing, to name a few. This course covers the fundamental concepts and techniques of modern digital signal processing that are essential for many practical applications.		
<ul style="list-style-type: none"> ● Khan, M. N., Hasnain, S. K., & Jamil, M. (2016). Digital Signal Processing: A Breadth-first Approach. Stylus Publishing, LLC. 		Textbooks
<ul style="list-style-type: none"> ● Antoniou, A. (2006). Digital signal processing. Toronto, Canada: McGraw-Hill. ● Tan, L., & Jiang, J. (2018). Digital signal processing: fundamentals and applications. Academic Press. ● Internet Resources. 		Recourses
Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
60	40	

Week	syllabus	Subject
	Analog, Digital, ASP & DSP, Roots of DSP, Advantages & Disadvantages	Introduction to DSP
	Input, Output, ADC, DCA, LPF, Signal-Conditioning Circuit	DSP System General Model
	Deterministic, Non-deterministic, Multi-Channel, Multi-Dimensional, Applications, A/D and D/A Conversion, Quantization Error, Representing Signal	Categorization of Signals
	Step, Impulse, Signum, Exponential, Ramp, Parabolic, Rectangular, Triangular, Sinusoidal	Types of Signals
	Scaling, Addition, Subtraction, Multiplication, Shifting, Reversal	Basic Operations on Signals
	Sketching the Operations	Other Operations on Signals
	Static, Dynamic, Causal, Non-Causal, Anti-Causal, Bounded, Unbounded, Linear, Nonlinear	DSP Systems
	الامتحان الفصلي	Scheduled Test
	Linear, Circular, By Equation, By Table	Convolution
	Standard, Normalized	Correlation
	Types, Operations	Complex Numbers
	Conversion From Spatial to Frequency Domain	Discrete Fourier Transform
	Conversion From Frequency to Spatial Domain	Discrete Fourier Transform & Its Inverse
	مراجعة نهائية	Revision



		Operating Systems1 نظم التشغيل ١	subject name
			subject code
<p>Operating system is an important part of any computer system. Therefore, this course illustrates the concepts of operating systems and how they are designed and installed. It also explains how to describe the operational and practical behavior and methods of scheduling between them.</p>			subject goal
			Basic details
<p>A. Silberschatz, P. B. Galvin, and G. Gagne, <i>Operating System Concepts</i>, 9th ed., USA: John Wiley & Sons, Inc., 2013.</p>			Textbooks
			Resources
	Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
	50	35	

Week	syllabus	Subject
	Introduction, what is an operating system.	Introduction
	Batch systems, Time-sharing system, Personal computer systems, Parallel systems, Real-time systems, Distributed systems.	Types of Operating Systems
	Computer system structures.	Computer system structures.
	Computer system operation, Hardware protection, Operating system structures.	Operating System Structure
	Operating system services, System calls, System programs.	Operating system services
	System structure, Simple structure, Layered approach, Microkernels.	System Structure Types
	Process concept, Process scheduling.	Process
	Cooperating processes, Interprocess communication.	Interprocess communication
	CPU scheduling, basic concepts, scheduling criteria.	CPU Scheduling
	Scheduling algorithms, FSFC, SJF.	Scheduling algorithms
	Scheduling algorithms, Priority scheduling, Round robin.	Scheduling algorithms
	Multilevel queue scheduling, multilevel feedback queues scheduling multiple process scheduling.	Scheduling algorithms
	Review	Review
	Review	Review



		Computational Mathematics رياضيات حاسوبية	subject name
			subject code
This course aims to provide students with the main concept of Computational Mathematics by introducing them to the basic topics of : Point, Line , Circle, Coordinate Systems, 2D Transformations,3D Transformations, Line Drawing Algorithm, and Circle Derivation Algorithm.			subject goal
			Basic details
Fundamentals of Computer Graphics, by Peter Shirley and others			Textbooks
			Recourses
Final Semester Grade		Semester Attendance Grade	Graduations and Grade Distribution
50		35	

Week	syllabus	Subject
	Image and Objects, Image Representation, Pixel	Introduction
	Cartesian Coordinate System, Polar Coordinate System, 3D Cartesian Reference System	Coordinate Systems
	Point, Line, Circle, Pixel Coordinates	Graphic Basic Elements
	Bresenham's Line Algorithm, Line Mathematical Representation and Principles, Line Drawing Algorithm	Line Drawing Algorithm
	Midpoint Circle Algorithm, Circle Mathematical Representation and Principles, Circle Drawing Algorithm	Circle Derivation Algorithm
	Definition, Fundamental Transformations, Homogenous Coordinates	2D Transformations
	Translation in Vertical Direction, Translation in Horizontal Direction, Matrix Representation	Translation Transformation
	The Polar Representation of Circles, Reflection about X and Y axes, Reflection about Origin, Reflection about Line	Rotation and Reflection Transformations
	Scaling in X direction, Scaling in Y direction, Matrix Representation	Scaling Transformation
	X-Shear, Y-Shear, Matrix Representation	Shear Transformation
	Successive (Translations, Scalings, Rotations), Scaling Relative to a Fixed Point, Rotation About a Pivot Point.	Composite Transformations
	3D Transformations Types, 3D Transformations Using Matrix.	3D Transformations
	Line, Polygon	Clipping Algorithms
	Revision	Revision



		Computer Networks Lab مختبر شبكات الحواسيب	subject name
			subject code
The course aims to introduce students to the concept of computer networks in a practical way, and provide them with the necessary information about the types of computer networks and how they work and are designed. How to apply network work and unified protocols to design computer networks in an efficient manner			subject goal
The course aims to introduce students to the concept of computer networks in a practical way, and provide them with the necessary information about the types of computer networks and how they work and are designed. How to apply network work and unified protocols to design computer networks in an efficient manner			Basic details
TCP/IP Protocol Suite / Behrouze Forzan			Textbooks
Data communication and Networking / Behrouze Forzan			Recourses
Final Semester Grade		Semester Attendance Grade	Graduations and Grade Distribution
50		35	

Week	syllabus	subject
	Computer Networks Definition, types, Models	Introduction
	Guided media: UTP, STP, Coaxial	Transmission Media-1-
	Unguided media: wireless, IR, Satellite, Bluetooth	Transmission Media-2-
	Network Criteria	Network Criteria
	ARP protocol	ARP -1-
	ARP Protocol four cases	ARP -2-
	DHCP	DHCP
	ICMP protocol -1-	ICMP protocol -1-
	ICMP protocol -2-	ICMP protocol -2-
	IP routing and delivery -1-	IP routing and delivery -1-
	IP routing and delivery -2-	IP routing and delivery -2-
	IP routing and delivery -3-	IP routing and delivery -3-
	DNS Protocol	DNS protocol
	Revision	Revision



	الأنظمة الموزعة Distributed Systems	subject name
		subject code
Distributed systems are a set of computer systems that are related to a particular form. Therefore, this course explains the concepts of distributed systems and how they are designed and installed. It also explains the description of the architecture, communication, operation, methods of scheduling and methods of synchronization between them.		subject goal
		Basic details
		Textbooks
<p>Andrew S. Tanenbaum and Maarten Van Steen, <i>Distributed Systems: Principals and Paradigms</i>, 2nd ed., Upper Saddle River, New Jersey, USA: Prentice Hall, 2007.</p> <p>Marten Van Steen and Andrew S. Tanenbaum, <i>Distributed System</i>, 3rd Edition 2017.</p> <p>George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair, <i>Distributed Systems: Concepts and Design</i>, 5th ed., Addison-Wesley, 2012.</p> <p>Andrew S. Tanenbaum, <i>Modern Operating Systems</i>, 3rd Ed., USA: Prentice-Hall, Inc., 2008.</p> <p>A. Silberschatz, P. B. Galvin, and G. Gagne, <i>Operating System Concepts</i>, 9th ed., USA: John Wiley & Sons, Inc., 2013.</p>		Recourses
Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
60	40	

Week	syllabus	subject
	Definition, characteristics and goals of a distributed system.	Introduction
	Types of distributed system , clusters and grid computing system, distributed information system.	Common types of Distributed Systems
	Architecture style, system architecture, centralized and decentralized architecture.	Architecture Style
	Processes, threads implementation, multithreaded server, clients, servers, distributed servers.	Threads and Multithreaded Clients and Servers
	Virtualization, architecture of virtual machines.	Virtualization
	Code migration.	Code Migration
	Communications, layered protocols, types of communications.	Layered Protocols
	Remote procedure calls, clients and server stubs, asynchronous RPC.	Remote Procedure Calls
	Message oriented communications, message queuing model, channels.	Message oriented communications
	Stream oriented communications, quality of service, multicast communications.	Stream oriented communications
	Naming, names, identifiers, structured naming.	Naming
	The Implementation of a Name Space, The DNS Name Space.	DNS Name Space
	Synchronization, Global Positioning System.	Synchronization
	Clock Synchronization Algorithms, Network Time Protocol.	Synchronization Algorithms



Computer Modeling and Simulation نمذجة و محاكاة		subject name
		subject code
Through this course, the student learns about the basic concept of simulation, manual simulation of some examples, properties and methods of generating random numbers, generating random variables and methods of generating observations from the random variable and modeling the inputs.		subject goal
Introduction, basic definitions, model, types of models, definition of simulation, when to use simulation, steps to prepare the simulation. Examples of simulation. Generating random numbers. Linear matching method. Inverse transformation method. Modeling inputs.		Basic details
Introduction to computer stochastic simulation and its modeling using MATLAB", Author: Professor Dr. Basil Younis Dhnoon		Textbooks
Modeling and simulation using Excel, SIMAN, Arena and General Purpose Simulation System (GPSS WORLD) By Dr. Majedabdrhmanbary		Resources
Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
60	40	

Week	syllabus	subject
	Introduction and Basic Definitions	Introduction
	Models type and Simulation	Models type
	Hand Simulation Examples Single Channel Queue	Hand Simulation
	Practical examples of simulations	examples
	Methods of generating random numbers	Methods
	Properties of random numbers	random numbers
	Linear Congruential Method	Congruential Method
	Chi-square Test	Chi-square Test
	Generate Random variables Inverse transform technique	Random variables
	Generate views from random variable	Random variables
	Input Modeling	Input Modeling
	Identify and choose the distribution of views	distribution of views
	Binomial Distribution	
	Poisson distribution and Normal distribution	Distribution



		Information theory and Data Compression نظرية المعلومات وضغط البيانات	subject name
			subject code
		It enables the student to obtain knowledge and facts on how to represent data within files and the basic techniques used in data compression and data encoding that help in the process of compressing data and sending it through transmission channels.	subject goal
		This course provides an introduction to information theory, including based concepts of a information theory , brief history of information theory, applications of information theory, fundamentals of probability such as marginal probability, joint probability and conditiona, information and entropy, also we introduce data compression and data coding, and types of channel , properties of symmetric channel with examples for each type..	Basic details
		لا يوجد	Textbooks
		1- Thomas M. Cover and Joy A. Thomas, Elements of Information Theory , wileym 2006 2-David Salomon, Giovanni Motta and David Bryant, 4. Handbook of Data Compression,Fifth Edition, Springer, 2010, www.it-ebooks.info	Recourses
	Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
	60	40	

Week	syllabus	subject
	Introduction and Preview.	Introduction
	Entropy, Information defines,	Entropy_ introduction
	The Measure of Information	Information
	Examples	Information
	Data Compression introduction.	Data Compression
	Huffman codes.	Source coding
	Shannon-Fano-Elias coding.	Source coding
	Arithmetic coding.	Source coding
	Source coding	الثامن
	Preview of the channel coding theorem.	channel coding
	Preview of the channel coding theorem.	channel coding
	Hamming codes.	channel coding
	Hamming codes.	channel coding
	Revision	Revision



	<p style="text-align: center;">Operating system 2 نظم تشغيل</p>	subject name
		subject code
	<p>The main objective of this subject is to introduce the student to the basics of operating systems and to study the basic functions provided by these systems and their relationship to the physical components of the computer. An introduction to the nature of the process will be taught, as well as various techniques in the functions of operating systems, for example, the synchronization of processes and their problem, examples of solutions to this problem, which are the (Peterson's) algorithm and the use of hardware to solve the problem (Semaphore). This course focuses on reviewing the deadlock and how to prevent or avoid its occurrence in multi-process processors, memory management, secondary storage management and input/output systems management. This course focuses more on the knowledge necessary for designers and developers of operating systems. Thus, it leaves room for expansion in precise theoretical knowledge. Operating systems are considered the main basis for the operations performed by computers in general</p>	subject goal
	<p>The main objective of this subject is to introduce the student to the basics of operating systems and to study the basic functions provided by these systems and their relationship to the physical components of the computer. An introduction to the nature of the process will be taught, as well as various techniques in the functions of operating systems, for example, the synchronization of processes and their problem, examples of solutions to this problem, which are the (Peterson's) algorithm and the use of hardware to solve the problem (Semaphore). This course focuses on reviewing the deadlock and how to prevent or avoid its occurrence in multi-process processors, memory management, secondary storage management and input/output systems management. This course focuses more on the knowledge necessary for designers and developers of operating systems. Thus, it leaves room for expansion in precise theoretical knowledge. Operating systems are considered the main basis for the operations performed by computers in general</p>	Basic details
	Peterson, Operating System Concepts, Prentice Hall	Textbooks
	Tanenbaum, Andrew S. Modern Operating Systems. Prentice Hall.	Recourses

Hantelmann, Fred. Linux Start-up Guide. Springer.		
Kernighan, Brian W. e Ritchie, Dennis M. The C programming Language (ANSI C). Prentice-Hall.		
Robbins, Kay A. Practical UNIX Programming. A Guide to Concurrency, Communication, and Multithreading. Prentice-Hall.		
Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
50	35	

Week	syllabus	subject
	Introduction to process	Introduction
	Synchronization problem The Critical-Section Problem	Synchronization problem
	Examples of Synchronization Solution (Peterson's)	Synchronization Solution By Algorithm
	Examples of Synchronization Solution (Semaphore)	Synchronization Solution By Hardware
	Monitors Deadlock Characterization	The Deadlock
	Methods for Handling Deadlocks Deadlock Prevention	Handling Deadlocks
	Deadlock Avoidance Deadlock Detection and Recovery from Deadlock	The Deadlock Detection
	Introduction to Memory	Memory Management
	Management Swapping and Contiguous Memory Allocation Paging and Structure of the Page	Swapping and Contiguous Memory
	Table Segmentation, Overview of Mass-Storage	Table Segmentation
	RAID Structure Stable-Storage	RAID Structure

	Implementation,	
	Disk Structure and Disk Attachment Disk Scheduling	Disk Structure
	Disk Management The Critical-Section problem	Disk Management
	Synchronization Examples	Synchronization Examples



		Digital Image Processing معالجة الصور الرقمية	subject name
			subject code
		To describe and explain the basic principles of digital image processing.	subject goal
		• To implement basic methods and algorithms that process images.	Basic details
		• R. Gonzalez and R. Woods, Digital image processing. (3rd Edition). Prentice-Hall: USA, 2008.	Textbooks
		• Kelby, S. (2020). The digital photography book. Rocky Nook, Inc.. • Tyagi, V. (2018). Understanding digital image processing. CRC Press. • Internet resources.	Recourses
	Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
	50	35	

Week	syllabus	subject
	DIP Fundamentals – Part 1	DIP Fundamentals – Part 1
	DIP Fundamentals – Part 2	DIP Fundamentals – Part 2
	DIP Fundamentals – Part 3	DIP Fundamentals – Part 3
	Scripts, Functions & P-Codes	Scripts, Functions & P-Codes
	Color Spaces	Color Spaces
	Discrete Fourier Transform	Discrete Fourier Transform
	Image Filtering (Thresholding, Mean and Median)	Image Filtering (Thresholding, Mean and Median)
	Scheduled Test	Scheduled Test
	Edge Detection / Image Sharpening	Edge Detection / Image Sharpening
	Contrast Enhancement	Contrast Enhancement
	Image Deblurring	Image Deblurring
	Image Quality Assessment – Part 1	Image Quality Assessment – Part 1
	Image Quality Assessment – Part 2	Image Quality Assessment – Part 2
	Revision	Revision



		Computer Security امنية الحاسوب	subject name
			subject code
		- Introducing the student to the most important basic concepts of computer security,	subject goal
		- Introducing the student to security services, methods and approaches	Basic details
		William Stallings," Cryptography and Network Security Principles and Practice ", Prentice Hall, Fifth Edition 2011.	Textbooks
		<ol style="list-style-type: none"> 1. William Stallings," Cryptography and Network Security Principles and Practice ", Prentice Hall, Fifth Edition 2011. 2. Wu, Chwan-Hwa (John); Irwin, J. David (2013). Introduction to Computer Networks and Cybersecurity. Boca Raton: CRC Press. 3. "Definition of computer security". Encyclopedia. Ziff Davis, PCMag. Retrieved 6 September 2015. 	Recourses
	Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
	50	35	

Week	syllabus	subject
	What is computer security.	What is computer security.
	Introduction to security goals, threats (attacks) and mechanisms.	Introduction
	objectives of computer security: Confidentiality Privacy: integrity , Availability.	Computer Security Objective
	Classical encryption technique, Symmetric cryptography .	Introduction to cryptography (basic concepts and terms).
	Describe the style of block ciphers	Fundamental of Block, Data encryption.
	Identification and Authentication User-names and Passwords	Identification and Authentication
	Password guessing	Identification and Authentication
	Number of Passwords	Identification and Authentication
	Password spoofing,	Identification and Authentication
	User and system defenses	Identification and Authentication
	Threats Internal Threats	Threats
	Threats External Threats	Threats
	Symptoms of a Malware Infection Types of Malicious Code	Malicious Software (code)
	Computer Viruses , Worms , Trojan Horse, trapdoor	Malicious Software (code)



		Network and Multimedia Security امنية الوسائط المتعددة والشبكات	subject name
			subject code
		Enable the students to understand Digital multimedia (audio, video, still photography etc) is exposed to a broad spectrum of security problems. From the standpoint of the media provider, protection of materials from unauthorized distribution or modification is a primary concern. At the delivery end, recipients want to ensure that downloads are virus-free and legitimately obtained. Encryption and digital branding tools can be employed for securing multimedia.	subject goal
			Basic details
		Information hiding techniques for steganography and digital watermarking 2000	Textbooks
			Recourses
	Final Semester Grade	Semester Attendance Grade	Graduations and Grade Distribution
	50	35	

Week	syllabus	subject
	Introduction to Multimedia Security	Introduction
	Digital WaterMarking methods	Digital WaterMarking
	Digital WaterMarking methods	Digital WaterMarking (cont.)
	Digital Rights Management in details	Digital Rights Management
	Digital Watermarking Technologies in details with examples	Digital Watermarking Technologies
	Digital Watermarking Technologies in details with examples	Digital Watermarking Technologies (cont.)
	Types of Digital Watermarks in details with examples	Types of Digital Watermarks
	Introduction, application with examples	Image Watermarking
	Introduction, application with examples	Image Watermarking (cont.)
	Introduction, protocols, layers	Communication-based
	Introduction, applications with examples	Models of Watermarking-Geometric models
	Audio Watermarking in details with examples and applications	Audio Watermarking
	Video Watermarking in details with examples and applications	Video Watermarking
	Revision	Revision

		E-Commerce التجارة الالكترونية	subject name
			subject code
In this course, the student reviews information technology, which is essential for e-commerce, and its applications in various economic sectors. The aim behind this is for the student to realize the importance of the role of information technology in business organizations. The course also provides the student with the basic concepts and techniques of e-commerce. Explaining the concept of e-commerce, its applications, and electronic payment methods			subject goal
In this course, the student reviews information technology, which is essential for e-commerce, and its applications in various economic sectors. The aim behind this is for the student to realize the importance of the role of information technology in business organizations. The course also provides the student with the basic concepts and techniques of e-commerce. Explaining the concept of e-commerce, its applications, and electronic payment methods			Basic details
E-Commerce Fundamentals and Applications by henry chan and Raymond lee, 2002.			Textbooks
Introduction to Electronic Commerce and Social Commerce, Efraim Turban, Judy Whiteside, David King and Jon Outland -Springer (2017)			Resources
Semester Attendance Grade	Semester Attendance Grade		Grade division
60	40		

Week	syllabus	subject
	Introduction to E-commerce.	Introduction
	E-Commerce: Goods and Services.	E-Commerce
	Consumer Behavior, Marketing Research, Advertising.	E-Commerce
	Basics of graphs and networks.	Basics of E-Commerce
	Basics of game theory.	Basics of game theory.
	Notions of equilibrium.	Notions of equilibrium.
	Auctions.	Auctions.
	Matching Markets.	Matching Markets.
	Markets.	Markets.
	From stock markets to information markets.	Markets.
	Social choice and mechanism design.	Markets.
	Profit maximization in the design of auctions.	Auctions
	Incentives in peer-to-peer systems.	Advertising
	E-commerce systems.	E-commerce systems.