



**University of Al Mosul**  
**College of Engineering**  
**Computer engineering department**

**Courses**  
**for the academic year**  
**2021-2022**

**Prepared By**

المقررات الدراسية / كلية الهندسة / جامعة الموصل

المستوى الرابع للعام الدراسي 2020-2021

قسم الهندسة / الحاسوب

المستوى الدراسي الرابع ( الفصل الاول )									
الملاحظات	رمز المقرر	الممهد ان وجد	عدد الوحدات	عدد الساعات العملية	عدد الساعات النظرية	اسم المقرر		نوع المتطلب (اجباري - اختياري)	اسم المتطلب
						باللغة العربية	باللغة الإنكليزية		
اجباري لطلبة القسم	ENGE429	-	2	-	2	Public Safety	السلامة العامة	اختياري	متطلبات الكلية
		جميع متطلبات المستوى الثالث	2	-	2	Graduation Project I	مشروع تخرج I	اجباري	متطلبات القسم
	COSY403	الاشارات والأنظمة	4	2	3	Control Systems	انظمة السيطرة	اجباري	
	RETS404	الانظمة المطمورة	3	2	2	Real Time Systems	انظمة الزمن الحقيقي	اجباري	
	COGR405	-	2	-	2	Computer Graphics	الرسم بالحاسوب	اجباري	
	ARIN409	-	2	-	2	Artificial Intelligence	ذكاء صناعي	اجباري	
يختار الطالب مقرر واحد فقط ، عدد الوحدات المطلوبة =2 وحدة	WINE406	-	2	-	2	Wireless Network	الشبكات اللاسلكية	اختياري	
	ACAR408	-				Advanced Computer Architecture	معمارية حاسوب متطورة		
يختار الطالب مقرر واحد فقط ، عدد الوحدات المطلوبة =2 وحدة	OPCO407	-	2	-	2	Optical Communication	اتصالات ضوئية	اختياري	
	BIEN411	-				Biometric Engineering	هندسة القياسات الحيوية		
			19	4	17	مجموع ساعات وحدات الفصل الدراسي الأول			

University of Mosul  
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Real Time System (RETS404)

Lab	Tutorial	Theory
2		2

<b>Course Objectives:</b>	
The course teaches all principles and fundamentals of real time system and gives all hardware and software components of any real time system.	
<b>Course Details:</b>	
Article	Week
Classifying real time system, HW & SW	1
Sensors: Characteristics & types	2,3
Signal conditioning	4,5
Data buses (GPIB & RS232)	6
Types of storage devices, non-volatile memories & interconnection between them	7
Single chip computer, board comp., multitasking	8
Real time software-control & software application	9
Processes interconnections & synchronization	10
Real time scheduler, deadlocks	11
Disk scheduler, multitasking O/S	12
Real time data base	13
R/T execution (HW & SW : linker, loader, assembler, translator, editors)	14
Real time languages	15
<b>Text Books</b>	
1- Real Time Microcomputer System Design (peter D. Lawrence) McGraw-Hill Education (ISE Editions). )	
2- Measurement and Instrumentation Systems (W. Bolton) (Butterworth-Heinemann).	
3- Measurement and Instrumentation Principles (Alan S. Morris) (British Library Cataloguing in Publication Data).	
4- A practical introduction to real-time systems for undergraduate engineering (Douglas Wilhelm Harder, Jeff Zarnett, Vajih Montaghani and Allyson Giannikouris) (University of Waterloo Cinda)	



**Course Objectives:**

The description of this course provides an introduction to OpenGL graphical programming and various computer graphics algorithms in the two-dimensional space such as scanning transformation, pruning, geometric transformations with the most important characteristics and basics of the image, the human vision system, methods of representation and processing of digital images (image reduction and enlargement, damaged image recovery, noise removal, and methods for image compression by lossy and others), in addition to modern methods of pressing. This qualifies the student to deal with computer graphics and images and their processing required in computer uses and research related to this and in the labor market.

**Course Details:**

Article	Week
Introduction to computer graphics	1,2
DDA Algorithm	3,4
Bresenham Algorithm	5,6
Scan conversion Algorithm	7,8
Clipping Algorithm	9,10
Transformations	11
Introduction to OpenGL	12
OpenGL programming	13
OpenGL examples	14
OpenGL applications	15

**Text Books**

- 1- Computer Vision and Image Processing, By: Scott E. Umbaugh.
- 2- Introduction to Computer Graphics, By: F. M. Sprout.
- 3- Open G. L.- Silicon Graphics.



<b>Course Objectives:</b>	
<p>This course let the students to be familiar with some of the new algorithms and methods in artificial intelligence and machine learning. The algorithms are based on the natural behavior of the different organisms. Also, to give the ability to apply these methods in designing and understanding real-world systems.</p>	
<b>Course Details:</b>	
<b>Article</b>	<b>week</b>
Introduction to artificial intelligence and machine learning	1
Naive Bayes	2
Decision Tree	3
Gaussian Naive Bayes	4
Logistic Regression	5
Linear Regression	6
Learning Theory	7-9
Classification and Clustering	10-11
Support vector machine	12
Principle component analysis	13
Independent component analysis	14
Reinforcement Learning	15
<b>Text Books</b>	
<ol style="list-style-type: none"> <li>1. <b>Pattern Recognition And Machine Learning</b> by Christopher M. Bishop</li> <li>2. <b>Soft Computing and its Applications</b> by Kumar S. Ray</li> </ol>	





### Course Objectives:

provides the necessary knowledge to design a new computer system; to improve an existing one; to develop fast parallel computing algorithms and systems

### Course Details:

Advanced computer architecture is centered around the concept of parallel processing. The development and application of these computer systems require a broad knowledge of the underlying hardware and software structures and close interactions between parallel computing algorithms and the optimal allocation of the machine resources. This theory part of our course provides us with the necessary knowledge to design a new parallel computer system; to improve an existing one; to develop fast computing algorithms.

Article	Week
1. Computer Speed	1
2. The Architecture of Standard Computers	1
3. Flynn Classification	1
4. The Performance, Cost and Amdahl's Law	1
5. Cache Memory	2
6. Memory Interleaving	1
7. Parallel Arithmetic (Carry Save Adder , Carry Save Multiplier)	2
8. SIMD Architecture (Vector Processor)	2
9. Digital Signal Processor	1
10. Array Processor ( DFT and FFT processor)	2
11. Systolic Array Processor (1D)	1

1. K. Hwang and F.A. Briggs" computer Architecture and parallel processing"
2. Peter Pirch "Architectures for DSP"



**Course Objectives:**

Principles of fiber optics communication, system components, applications of fiber optics in data and network communication systems. Upon the successful completion of the course, the student will be able to: 1. Be familiar with the operating principles of fiber optics and its characteristics. 2. Describe the principles of data and network communications for analog and digital systems. 3. Describe modulation, multiplexing and demultiplexing in fiber optic systems. 4. Describe the systems and hardware of fiber optic communication systems. 5. Perform noise and error analysis on fiber optic communication systems.

**Course Details:**

Article	Week
<b>1. Overview of Optical Fiber Communication</b> 1. Introduction, 2. Principles of Fiber Optics & Characteristics, 3. Fundamentals of Light, 4. General System, 5. Advantages, Disadvantages, and Applications of Optical Fiber Communication, 6. Optical Fiber Waveguides, 7. Single and Multi Mode Fiber, 8. Cutoff Wave Length, 9. Modern Optical-Fiber Communication System.	3
<b>2. Transmission Characteristics of Optical Fibers:</b> 1. Introduction, 2. Attenuation, 3. Absorption, 4. Scattering Losses, 5. Bending Loss, 6. Dispersion, 7. Intra Modal Dispersion, 8. Inter Modal dispersion.	2
<b>3. Optical Sources and Transmitters</b> 1. Principle of Light Emission, 2. Principle of Lasers, 3. Light Emitting Diodes and Semiconductor Lasers, 4. Semiconductor Lasers for Optical-Fiber Communication	2
<b>4. Modulators</b> 1. Direct Modulation of Laser Diodes, 2. External Modulation, 3. Short-Pulse Techniques	1
<b>5. Photo Detectors and Detection</b> 1. Photodetectors, 2. Photo detector noise, 3. Response time, 4. Photo diodes, 5. comparison of photo detectors, 6. Optical Receivers, 7. Receiver Design and Receiver Noise.	2
<b>6. Fiber couplers and Connectors</b> 1. Introduction, 2. Fiber Alignment and Joint Loss, 3. Single Mode Fiber Joints, 4. Fiber Splices, 5. Fiber Connectors and Fiber Couplers.	1
<b>7. Optical Receiver</b> 1. Introduction, 2. Optical Receiver Operation, 3. Receiver Sensitivity, 4. Quantum Limit, 5. Eye Diagrams, 6. Coherent Detection, 7. Burst Mode Receiver Operation, 8. Analog Receivers.	2
<b>8. Optical Amplifiers and Networks</b> 1. Optical Amplifiers, 2. Basic Applications and Types, 3. Semiconductor Optical Amplifiers, 4. EDFA. 5. Optical Networks: Introduction, SONET / SDH, Optical Interfaces, SONET/SDH rings, High –speed light –waveguides.	2

**Text Books**

- 1-T. L. Singal, "Optical Fiber Communications Principles and Applications", Cambridge University Press, 2016.
- 2- Gerd Keiser, "Optical Fiber Communication", 4th Edition, McGraw Hill Education, 2008.
- 3- Max Ming-Kang Liu, "Principles and Applications of Optical Communications", First Printed Edition, McGraw Hill Education (India), 2003