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

Navigation and Guidance Engineering Branch Academic Program and Course Description Guide

2024

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious picture for the future of the academic program to be sophisticated, inspiring, stimulating, realistic and applicable.

Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

Program Objectives: They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

Academic Program Description Form

University Name: ***University of Technology***
Faculty/Institute: ***Electromechanical Eng. Dept.***
Scientific Department: ***Navigation and Guidance Engineering***
Academic or Professional Program Name: ***Navigation and Guidance Engineering***
Final Certificate Name: ***Electromechanical Eng./ Navigation and Guidance Eng.***
Academic System: ***Engineering***
Description Preparation Date: **7/2/2024**
File Completion Date: **8/2/2024**

Signature:	**Signature**:
Head of Department Name:	**Scientific Associate Name**:
Date:	**Date**:

The file is checked by:
Department of Quality Assurance and University Performance
Director of the Quality Assurance and University Performance Department:
Date:
Signature:

Approval of the Dean

1. Program Vision

Aiming to build an engineering establishment in the Electromechanical field to be an outstanding one among the top international universities.

2. Program Mission

Preparing an Electromechanical specialist having an outstanding knowledge level, keeping up with the rapid developed trends in this field and complying with the professional moral conduct in serving the work sectors and society.

3. Program Objectives

- Graduating engineers are highly qualified in the Electromechanical field, capable of developing their skills in the engineering knowledge aspects, able to utilize this in the specialized Electromechanical application and mastering the design and implementation of all devices related to this discipline.
- Feeding the society with the specialists, experts and scientific consultants in Electromechanical engineering field.
- Supporting the research scientific center and engineering industrial projects by the highly capable specialists in their fields.
- Strengthening the relation with local and international engineering and scientific establishments.

4. Program Accreditation

The program has accreditation in 2021-2022 from Iraqi Council Accreditation Engineering Education (ICAEE).

5. Program (Navigation and Guidance) Mission

1- Prepare our students for successful careers in the Navigation and Guidance profession,

2- Conduct high quality and innovative research, and

3- Serve the community and industry providing educational and research resources.

6. Other external influences

Is there a sponsor for the program?

7. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	3	6	0.05	Basic
College Requirements	4	16	0.14	Basic
Department Requirements	35	92	0.8	Basic
Summer Training	yes	–	–	–
Other	–	–	–	–

* This can include notes whether the course is basic or optional.

8. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
2nd Year, 1st Semester	UOT200	English Language II	2	–
2nd Year, 1st Semester	EME202	Advanced Mathematics I	4	–
2nd Year, 1st Semester	UOT 201	Baath Party Crimes	2	–
2nd Year, 1st Semester	EMEN206	Navigation Theory I	2	–
2nd Year, 1st Semester	EMEN208	Fluid Mechanics	2	1
2nd Year, 1st Semester	EMEN212	Measurements and Instrumentations	2	2
2nd Year, 1st Semester	EMEN211	Strength of Materials	2	1
2nd Year, 2nd Semester	UOT201	Human Rights	2	–
2nd Year, 2nd Semester	EME203	Advanced Mathematics II	4	–
2nd Year, 2nd Semester	EMEN204	Computer Sciences II	2	1
2nd Year, 2nd Semester	EMEN207	Navigation Theory II	2	-
2nd Year, 2nd Semester	EMEN209	Aerodynamic	2	2
2nd Year, 2nd Semester	EMEN210	Electrical and Electronic Circuits	2	2

2nd Year, 2nd Semester	**EMEN213**	**Digital Electronics**	**2**	**2**
3rd Year, 1st Semester	**EME301**	**Numerical Analysis**	**4**	**-**
3rd Year, 1st Semester	**EMEN303**	**Navigation Systems I**	**2**	**2**
3rd Year, 1st Semester	**EMEN305**	**Communications I**	**2**	**2**
3rd Year, 1st Semester	**EMEN310**	**Antennas and Waves Propagation**	**2**	**2**
3rd Year, 1st Semester	**EMEN308**	**Control and Guidance Theory**	**2**	**2**
3rd Year, 1st Semester	**EMEN309**	**Hydraulic and Pneumatic Systems**	**2**	**2**
3rd Year, 1st Semester	**EMEN313**	**Machines Design**	**2**	**-**
3rd Year, 2nd Semester	**EME302**	**Engineering Analysis**	**4**	**-**
3rd Year, 2nd Semester	**EMEN304**	**Navigation Systems II**	**2**	**2**
3rd Year, 2nd Semester	**EMEN306**	**Communications II**	**2**	**2**
3rd Year, 2nd Semester	**EMEN307**	**Radar Theory**	**3**	**-**
3rd Year, 2nd Semester	**EMEN311**	**Control and Guidance Systems**	**2**	**2**
3rd Year, 2nd Semester	**EMEN312**	**Vibration and Noise**	**2**	**1**
3rd Year, 2nd Semester	**EMEN314**	**Aircraft Structural Stability**	**2**	**-**
4th Year, 1st Semester	**EMEN401**	**Digital Signal Processing**	**3**	**-**
4th Year, 1st Semester	**EMEN403**	**Radar Systems**	**2**	**2**
4th Year, 1st Semester	**EMEN404**	**Robotics and Automation**	**3**	**-**
4th Year, 1st Semester	**EMEN407**	**CAD/CAM**	**2**	**2**
4th Year, 1st Semester	**EMEN409**	**Communication Networks**	**2**	**-**
4th Year, 1st Semester	**EMEN411**	**Optical Communications**	**2**	**-**
4th Year, 1st Semester	**EMEN413**	**Air Traffic Management**	**2**	**-**
4th Year, 2nd Semester	**EMEN402**	**Digital Image Processing**	**3**	**-**
4th Year, 2nd Semester	**EMEN405**	**Microwave Engineering**	**2**	**1**
4th Year, 2nd Semester	**EMEN406**	**Theory of Aeroelasticity**	**2**	**-**
4th Year, 2nd Semester	**EMEN408**	**Electromechanical Systems**	**2**	**-**
4th Year, 2nd Semester	**EMEN410**	**Microprocessor and Microcontroller**	**2**	**2**
4th Year, 2nd Semester	**EMEN412**	**Operation Research and Ethics**	**2**	**-**
4th Year, 2nd Semester	**EMEN414**	**Project**	**4**	**-**

9. Expected learning outcomes of the program

1. An ability to identify, formulate, and solve engineering in navigation and guidance engineering problems by applying principles of engineering, science, and mathematics.

2. An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.

3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

4. An ability to communicate effectively with a range of audiences

5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

6. An ability to recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge.

7. An ability to function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, and creates a collaborative and inclusive environment.

Knowledge	
Learning Outcomes (GO1)	An ability to identify, formulate, and solve engineering in navigation and guidance engineering problems by applying principles of engineering, science, and mathematics.
Learning Outcomes (GO2)	An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.
Learning Outcomes (GO3)	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
Learning Outcomes (GO6)	An ability to recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge.
Skills	
Learning Outcomes (GO4)	An ability to communicate effectively with a range of audiences
Learning Outcomes (GO7)	An ability to function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, and creates a collaborative and inclusive environment.
Ethics	
Learning Outcomes (GO5)	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

10. Teaching and Learning Strategies

Teaching and learning strategies and methods adopted in the implementation of the program in general.

11. Evaluation methods

With lab,
Mid exam 15%, student activities 15%, lab 10%, final exam 60%.
Without lab,
Mid exam 15%, student activities 15%, final exam 70%.

12. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor (2)	Electrical Eng.	communication	–	–	–	–
Prof. Assistance (3)	Electrical Eng.	communication	–	–	–	–
Prof. Assistance (2)	Electrical Eng.	Control	–	–		–
Prof. Assistance (2)	Mechanical Eng.	Applied				
Prof. Assistance (1)	Mechanical Eng.	Thermal				
Prof. Assistance (1)	Mechanical Eng.	Electromechanical				
Lecturer (2)	Electrical Eng.	communication				

Lecturer (1)	Electrical Eng.	Electronic		–	–	–
Lecturer (1)	Mechanical Eng.	Applied	–	–	–	–
Lecturer (1)	Mechanical Eng.	control	–	–	–	–
Lecturer (1)	Science	computer	–	–	–	–
Asst. Lecturer (1)	Mechanical Eng.	Applied				
Asst. Lecturer (2)	Electrical Eng.	communication				

Professional Development

Mentoring new faculty members

The scientific committee in the department mentors the new faculty by:

1- Enter the class with previous two faculties for two months as observer.

2- Enter a period of training in continuous education center in the university for a month.

3- Mentor by the chair of the branch in the first year.

Professional development of faculty members

The scientific committee in the department have a plan for developing the faculty:

1- Periodically scientific lecture by one of the staff on developing in his professional field for all faculty.

2- Periodically lecture in social field for all faculty and students.

3- Yearly conference in the department with contributions from all faculty (2020, 2021, 2022 and 2023).

4- Contribution in conferences in different universities inside and outside Iraq.

5- Contribution in publishing papers in local, regional and international journals (Scopus and Science Direct).

6- Participates in different committees in university and ministry.

7- Participates in American developing faculty origination (IREX).

8- Participate all faculty in workshop for Problem Based Learning (new teaching method).
9- All Faculty contribute in getting the accreditation from ICAEE, so the faculty became a professional in accreditation process.

13. Acceptance Criterion

Usually, central enrollment was carried by ministry of higher education based on degree, professional field, location, university requirements.

14. The most important sources of information about the program

The initiative of the program came as a result of Navigation requirements for engineers who can serve as mechanical and electrical workers together. Similar trend was observed globally in airport. The program source information based on Navigation and guidance field. Many international programs were recently created related to Navigation and guidance. Our program intends to cover all requirements in energy sectors, including navigation, communication. It is first and unique program in Iraqi universities. The information of the program were basically from international programs, then with the consultations of industrial advisory board from Electricity Ministry, the information were adopted with Iraqi Navigation and guidance requirements.

15. Program Development Plan

The field of Navigation and guidance is developing with time globally, so some program courses were changed every four years. Four mechanical courses related to Navigation and guidance were added in third and fourth years when the program changed its name from Navigation and guidance. For electrical courses, two new courses were added in the fourth year last years. The contents of the courses reviewed by advisory board every meeting and updated with requirements of Iraqi Navigation and guidan.

Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills		Ethics
				GO1	GO2	GO3	GO6	GO4	GO7	GO5
2nd Year	UOT200	English Language II					●			
	EME202	Advanced Mathematics I		●						
	UOT 201	Baath Party Crimes					●			
	EMEN206	Navigation Theory I		●						
	EMEN208	Fluid Mechanics		●						
	EMEN212	Measurements and Instrumentations					●			
	EMEN211	Strength of Materials		●						
	UOT201	Human Rights								●
	EME203	Advanced Mathematics II		●						
	EMEN204	Computer Sciences II					●			
	EMEN207	Navigation Theory II		●						
	EMEN209	Aerodynamic					●			

	EMEN210	**Electrical and Electronic Circuits**		●						
	EMEN213	**Digital Electronics**				●				
3rd Year	**EME301**	**Numerical Analysis**		●						
	EMEN303	**Navigation Systems I**		●						
	EMEN305	**Communications I**		●						
	EMEN310	**Antennas and Waves Propagation**				●				
	EMEN308	**Control and Guidance Theory**				●				
	EMEN309	**Hydraulic and Pneumatic Systems**				●				
	EMEN313	**Machines Design**				●				
	EME302	**Engineering Analysis**		●						
	EMEN304	**Navigation Systems II**		●						
	EMEN306	**Communications II**		●						
	EMEN307	**Radar Theory**				●				
	EMEN311	**Control and Guidance Systems**				●				
	EMEN312	**Vibration and Noise**				●				
	EMEN314	**Aircraft Structural Stability**				●				

4th Year	**EMEN401**	**Digital Signal Processing**		●						
	EMEN403	**Radar Systems**				●				
	EMEN404	**Robotics and Automation**				●				
	EMEN407	**CAD/CAM**					●			
	EMEN409	**Communication Networks**		●						
	EMEN411	**Optical Communications**				●				
	EMEN413	**Air Traffic Management**					●			
	EMEN402	**Digital Image Processing**		●						
	EMEN405	**Microwave Engineering**		●						
	EMEN406	**Theory of Aeroelasticity**				●				
	EMEN408	**Electromechanical Systems**				●				
	EMEN410	**Microprocessor and Microcontroller**				●				
	EMEN412	**Operation Research and Ethics**								●
	EMEN414	**Project**					●			

- **Please tick the boxes corresponding to the individual program learning outcomes under evaluation.**

Course Description Form (2nd Year)

Course Description Form (2nd Year)

1. Course Name:
Digital Electronics
2. Course Code:
EMEN213
3. Semester / Year:
1st / 2nd Year
4. Description Preparation Date:
02-2024
5. Available Attendance Forms:
Attendance lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours weekly (30 hours in course)/ 2 Units
7. Course administrator's name (mention all, if more than one name)
Name: Asst. Prof. Dr. Mohammed Qasim Mohammed Email: 50033@uotechnology.edu.iq
8. Course Objectives

Course Objectives	• **Teaching students number systems and how to convert from one system to another due to their importance in the field of specialization.** • **Teaching students about logic gates and how to deal with them.** • **Teaching students logical algebra and logical expressions and how to simplify and design them.** • **Teaching students the concept of logical expressions of the POS and SOP typ and how to make them standard, and how to convert from one type to anothe** • **Using Karnaugh maps to simplify logical expressions.**

9. Teaching and Learning Strategies

Strategy	Theoretical lectures (give the lecture to students in person) Practical lectures (work in the laboratory to achieve the practical aspect)

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	2	Introduction to digital electronics	An introduction to understanding digital electronics	Attendance lecture	Question and Answer

2nd	2	What are numl systems?	Number systems and their types	Attendance lecture	Homework
3rd	2	How to conv between numl systems	Number system conversions	Attendance lecture	Quiz
4th	2	How to represent a s with numbers?	Sign and Numbers	Attendance lecture	Question and Answer
5th	2	What are logic gates?	logic gates	Attendance lecture	Homework
6th	2	What is Boole algebra?	Boolean algebra	Attendance lecture	Question and Answer
7th	2	Learn about the operations, laws, and rules of Boolean algebra	the operations, laws, and rules of Boolean algebra	Attendance lecture	Quiz
8th	2	How to Simplify Logical Expressions Using Boolean Algebra	Simplify Logical Expressions Using Boolean Algebra	Attendance lecture	Question and Answer
9th	2	Midterm exam	Midterm exam	Midterm exam	Editorial questions
10th	2	What are universal logic gates, and how do you design other logic gates from them?	universal logic gates	Attendance lecture	Question and Answer
11	2	What is the SOP expression and how to convert it to standard form?	standard form of SOP expression	Attendance lecture	Homework
12	2	What is the POS expression and how to convert it to standard form?	standard form of POS expression	Attendance lecture	Question and Answer
13	2	How to convert the standard SOP to the standard POS form andvice versa?	convert the standard SOP to the standard POS form and vice versa	Attendance lecture	Attendance lecture
14	2	What is a Karnaugh map and how to draw it for different dimensions?	Karnaugh map and how to draw it for different dimensions	Attendance lecture	Quiz
15	2	How to simplify logic expressions using a Karnaugh map	simplify logic expressions using a Karnaugh map	Attendance lecture	Question and Answer

11. Course Evaluation	
5% attendance grade; 5% homework; 5% Quizzes; 15% midterm exam;10% Lab; 60% final exam	
12. Learning and Teaching Resources	
Required textbo (curricular books, if any)	No
Main references (sources)	Floyd, T. L. (2011). Digital fundamentals, 10/e. Pearson Education Inc
Recommended books and references (scientific journals, reports…)	"Digital Design with an introduction to the Verilog HDL", M Morris Ma & Michael D. Ciletti. 5th Edition. Saha, A., & Manna, N. (2009). Digital principles and logic design. Jone Bartlett Learning.
Electronic Referenc Websites	No

1. Course Name:	
Fluid mechanics	
2. Course Code:	
EMEN208	
3. Semester / Year:	
1st Semester / 2nd Year	
4. Description Preparation Date:	
18/2/2024	
5. Available Attendance Forms:	
Attendance lectures	
6. Number of Credit Hours (Total) / Number of Units (Total):	
30 hours,30 hours practical,2 units	
7. Course administrator's name (mention all, if more than one name)	
Name:Ass.prof.Yasser Ahmed Mahmood Email:50256@uotechnology.edu.iq	
8. Course Objectives	
Course Objectives	**To enable students to know the properties of vari fluids and how to calculate them**
9. Teaching and Learning Strategies	
Strategy	

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Learn introduction	Dimension And units	Question and example	question =====
2	2	fluid properties	properties	=====	
3	2	fluid static	fluid static	=====	======
4	2	Static pressure	static pressure	======	======
5	2	Dynamic fluid	dynamic fluid	======	======
6	2	Bernoulli's equations	Bernoulli's Equations	=======	=======
7	2	Application	Application	========	======
8	2	=====	=======	=======	=====
9	2	Momentum equations	Momentum Equations	======	=======
10	2	Application	Application	======	======
11	2	Boundary Layer	Boundary Layer	=====	======
12	2	Application	Application	======	=======
13	2	Application	Application	=======	======
14	2	Dams and Gates	Dams and Gates	=======	=====
15	2	Application	Application	=======	=======

11. Course Evaluation:25 degree mid,10 degree laboratory,5 degree evaluation,60 degree final

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	---------
Main references (sources)	Introduction to fluid mechanics

Recommended books and references (scientific journals, reports…)	----------
Electronic References, Websites	----------

13. Course Name:
Computer 2
14. Course Code:
EMEN204
15. Semester / Year:
2nd Semester / 2nd Year
16. Description Preparation Date:
February 7, 2024
17. Available Attendance Forms:
Attendance lectures
18. Number of Credit Hours (Total) / Number of Units (Total)
64 hours during one semester/4 units.
19. Course administrator's name (mention all, if more than one name)
Name: Yaser Ali Email: 50111@uotechnology.edu.iq
20. Course Objectives

Course Objectives	• To familiarize the student with the C++ language. • Writing programs. • Learn programming in C++ professionally. • Graduating engineers with competence, skill a knowledge in the field of programming.
21. Teaching and Learning Strategies	
Strategy	1- Providing the student with theoretical lectures. 2- Providing the student with laboratory experiments. 3- Providing the student with various problems and introduci him to the mechanism for solving them.

22. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Unit or subject name
1	4	Add educational outcomes	Introduction to the C++ language	Giving lectures
2	4	Add educational outcomes	Variables used in the language	Giving lectures

3	4	Add educational outcomes	Mathematical operations used in the language	Giving lectures
4	4	Add educational outcomes	Application programs based on previous lectures	Giving lectures
5	4	Add educational outcomes	Programming statements	Giving lectures
6	4	Add educational outcomes	If & Switch instructions	Giving lectures
7	4	Add educational outcomes	Repetition instructions: for, while, do-while, go to	Open discussions between the student and the lecturer
8	2			
9	4	Add educational outcomes	Different commands: break, continue, ?, constant	Giving lectures
10	4	Add educational outcomes	Introduction to language functions.	Open discussions between the student and the lecturer
11	4	Add educational outcomes	Functions	Open discussions between the student and the lecturer
12	4	Add educational outcomes	One-dimensional arrays in C++	Giving lectures
13	4	Add educational outcomes	Two-dimensional arrays in C++	Giving lectures
14	4	Add educational outcomes	Variables of pointer type	Giving lectures
15	4	Add educational outcomes	The file	Giving lectures
16	3			

23. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

24. Learning and Teaching Resources

Required textbooks (curricu books, if any)	
Main references (sources)	**PROGRAMMING WITH C++**
Recommended books and references (scientific journals, reports…)	
Electronic Referenc Websites	**ftp://ftp.gunadarma.ac.id/pub/.multimedia/Schaum's%20Programming%20with%20C++.pdf**

1.

2.

3.
4.
5.
6.
7.
8.

	The aims which can be achieved duri teaching this course program are as follows: • **Proceeding to the Student the benefits of studying English Language as Second language** • **Giving Knowledge about using the Technical Terminologies in their studies** • **Understanding of using the scienti English language in the Academic Program** • **Giving Knowledge of how to write, describe, typing the reports in English**

9.

10.

			Unit or subject name	Learning method	Evaluation method
			Introduction: Building Grammar Skills, Sentence Construction (Subject, Verb,	Examinations ,Quizzes	Lecture &p.p Show

			Object), Things to remember about subject verb agreement, Irregular Verbs, Vocabulary, Exercise 1. **Adjectives:** Types of Adjectives = Common Adjectives, Proper Adjectives, Article Adjectives (Definite, Indefinite). **Adverb:** Types of Adverbs = Ending with –ly Adverbs, Non-ly Adverbs, Conjunctive adverbs; Adverb to describe a verb, Adverb to describe an adjective, Adverb to describe another adverb. **Possessive Nouns:** With singular nouns, with plural nouns ending in s, with plural nouns not ending in s. **Plural Nouns, Listening, Speaking, Vocabulary, Exercise 2.**		
			Tenses: Present Tense = Present Simple, Present Continuous, **Tenses:** Past	Examinations ,Quizzes	Lecture &p.p Show

			Tense = Past Simple, Past Continuous, Past Perfect, P Perfect Continuc **Listening, Speaking, Vocabulary, Exercise 4.**,**Tenses:**Future Tense = Fut Simple, Fut Continuous, Fut Perfect, Fut Perfect Continuc **Listening, Speaking, Vocabulary, Exercise 5.**		
			Conditional: First Conditional, Second Conditional Third Conditional, Mixed Conditional. Using Wish (Present, Past); Even Though Vs Even If; Any Longer Vs Anymore Vs No Longer. **Listening, Speaking, Vocabulary, Exercise 6. Midterm Exam**	Examinations ,Ques	Lecture &p.p Show
			Used To Vs Be Used To Vs Get Used To. Countable or Uncountable: Irregular Plural, Nouns that can be countable or uncountable, Nouns that can change from	Examinations ,Quizzes	Lecture &p.p Show

			uncountable to countable **Listening, Speaking, Vocabulary, Exercise 7.** Think Vs Hope, Too Vs Too Much Vs Too Many, Enough + Noun & Adjective + Enough, Both Vs Either Vs Neither, Dare & Need as Auxiliary Verbs. **Listening, Speaking, Vocabulary, Exercise 8.**		
			Verb After Preposition; Subject Questions; Verbs of Feeling. Because Vs Because of, Beside Vs Besides. **Listening, Speaking, Vocabulary, Exercise 9.** **Writing:** Avoid long sentences, avoid overusing the to be verbs, Avoid ambiguity, English Capitalization Rules. **Exercise 10.** **Writing:** English Punctuation Marks = Period, Comma, Semicolon.	Examinations ,Quizzes	Lecture &p.p Show

			Applying Tenses, Subject-verb Agreement, and Conjunctions or Connectors on Writing; Who Vs. Whom. **Exercise 11.**		
			Literature Foc Writing an Essay Agree or Disagr Preferences, a Description Es Questions., **Phone Symbols:** Consonants, Vow Diphthongs (T Vowels Together)	Examinations ,Quizzes	Lecture &p.p Show
			Exam	Examinations ,Quizzes	Lecture &p.p Show
11.					
12.					
			Soars, John, and Liz Soars. New Headw PreIntermediate. Oxford University, 2003.		
			Soars, John, and Liz Soars. New Headw PreIntermediate. Oxford University, 2003.		
			Soars, John, and Liz Soars. New Headw PreIntermediate. Oxford University, 2003.		

1. Course Name:
English Language II
2. Course Code:
UOT200
3. Semester / Year:
Second Year / 1st semester
4. Description Preparation Date:
1-2-2024

5. Available Attendance Forms:
Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
15 hours / 2 units
7. Course administrator's name (mention all, if more than one name)
Name: Assit. Prof. Dr. Mohammed Jawad Mohammed Email: mohammed.j.mohammed@uotechnology.edu.iq
8. Course Objectives

Course Objectives	

9. Teaching and Learning Strategies	
Strategy	Lecturer – presentation and PBL

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**
1-2	4	Building grammar skills
3-5	6	Distinguishing between times
6-7	4	Applying conditional sentences in writing and verbally
8-9	4	Using numbers and countable in writing and verbally
10-12	6	Use verbs of feeling in writing and verbally
13-14	4	Focus on the literature
15	2	Exam

11. Course Evaluation
Mid exam 15%, student activities 15%, final exam 70%.
12. Learning and Teaching Resources
Required textbooks (curricular books, if any)
Main references (sources)
Recommended books and references (scientific journals, reports…)
Electronic References, Websites

1. Course Name:
Measurement and Instruments
2. Course Code:
EMEN212
3. Semester / Year:
First/ Second
4. Description Preparation Date:
6/2/2024
5. Available Attendance Forms:
Theoretical lecture + laboratory
6. Number of Credit Hours (Total) / Number of Units (Total)30 h/5units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Rasha Fahim Nadhim Email: rasha.f.nahdim@uotechnology.edu.iq
8. Course Objectives

Course Objectives	• **Definition of the measurement process a units of measurement** • **Definition of measurement errors, th causes, and analysis** • **Study the basics of indicating devices a design ammeters and voltmeters** • **Study the types of bridges used to meas resistance and impedance.** • **Study of Transducer and its types** • **Study digital measuring devices**

9. Teaching and Learning Strategies	
Strategy	

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	2	Understand t definition measurement process The main parts measuring devices	Introduction measurement	Theoretical explanation	An oral a written t and given Duties
		Understand a analyze units measurement	Basic a derived units measurement	Theoretical explanation problem solving	Written t and assignments
		Understanding and analyzi measurement errors	Measurement errors	Theoretical explanation problem solving	Written t and assignments
		Understanding and studying t basics of analog indicating measuring devic	Analogue measuring devices	Theoretical explanation problem solving	Written t and assignments
		Design voltmeter a ammeter	Analogue curre and volta measuring devices	Theoretical explanation problem solving	Written t and assignments
		Understanding and analyzi bridges, th	Bridges and th applications	Theoretical explanation problem solving	Written t and assignments

		types a applications			
		Understanding and analyzi Transducer, types a applications	Transducer	Theoretical explanation problem solving	Written t and assignments
		Signal analysis understanding digital current a voltage measuri devices	Signal analysis digital devices	Theoretical explanation problem solving	Written t and assignments
		Understanding measuring devi for oil and g testing	Measuring devices for and gas testing	Theoretical explanation problem solving	Written t and assignments

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc
Exam score of 15 marks
Daily exam, 5 marks
Lab 10 degrees
Rating: 10 marks
Final exam 60 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	

Main references (sources)	1-Electronic measurement systems U.A.Bakshi 2- Electrical instrument a measurement techniques.W.D.coop
Recommended books and references (scientific journals, reports…)	Electronic and electri measurement and instrumentati J.BGupta
Electronic References, Websites	

1. Course Name:
Aerodynamics
2. Course Code:
EMEN209
3. Semester / Year:
2nd semester/ 2nd Year
4. Description Preparation Date:
25/2/2024
5. Available Attendance Forms:
in class
6. Number of Credit Hours (Total) / Number of Units (Total)
30 hours, 30 hours practical, 2 un
7. Course administrator's name (mention all, if more than one name)
Name:Ass.rof. Yasser Ahmed Mahmood Email:50256@uotechnology.edu.iq
8. Course Objectives

Course Objectives	**To enable students to know the subject of Aerodynamics and how to calculate it**

9. Teaching and Learning Strategies	
Strategy	

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Learn the	The atmosphere	Explain+	question

		atmosphere		Question+ Example	
2	2	airfoils	Airfoils	=======	======
3	2	======	=======	======	=======
4	2	Learn the design of airfoils	Design of airfoils	======	======
5	2	forces on airplane	Airplane forces	======	======
6	2	=======	==========	=======	======
7	2	Types of drag	Types of drag	=====	=====
8	2	=======	=========	=====	=====
9	2	Calculate the Aerodynamic center	Aerodynamic center	======	=====
10	2	learn the Airplane moments	Airplane Moments	======	======
11	2	Learn the airplane parts	Airplane parts	=====	=====
12	2	Learn and calculate the Takeoff and landing	Takeoff and landing	=====	=====
13	2	======	=======	=====	=======
14	2	Cruise	Cruise performance	=====	=====
15	2	Learn the climb	climb phase	=======	=====

11. Course Evaluation: 25 degree mid,10 degree laboratory,5 degree evaluation,60 degree final

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	no
Main references (sources)	aerodynamic
Recommended books and references (scientific journals, reports…)	----------
Electronic References, Websites	----------

1. Course Name:
Advanced Engineering Mathematics I
2. Course Code:
EME202
3. Semester / Year:
2nd , 1st Semester
4. Description Preparation Date:
2−2024
5. Available Attendance Forms:
Attendance Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
4 units
7. Course administrator's name (mention all, if more than one name)
Name: Ghassan A. Bilal Email: ghassan.bilal@uotechnology.edu.iq
8. Course Objectives

Course Objectives	• Partial derivative • Line Integral. • Double Integral • Triple integral. • Second Order Differential Equations • Vector.

9. Teaching and Learning Strategies	
Strategy	PBL

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1, 2 3,4 5,6 7,8		GO1	• Application of partial derivative • Application of line integration. • Application of double integration. • Application of triple integration.	PBL	Quiz, Mid Exam Final Exam

9,10 11,12			• Learn many methods to solve 2nd ODE. • Application of vectors.		

11. Course Evaluation
Mid exam 15%, student activities 15%, final exam 70%.

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• Advanced Engineering Mathematics.K.A.Stroud,2003 • Advanced Engineering Mathematics, H.K. DASS. 2009
Main references (sources)	-
Recommended books and references (scientific journals, reports…)	-
Electronic References, Websites	-

1. Course Name:
Advanced Engineering Mathematics II
2. Course Code:
EME203
3. Semester / Year:
2nd Year, 2nd Semester
4. Description Preparation Date:
2−2024
5. Available Attendance Forms:
Attendance Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Units
7. Course administrator's name (mention all, if more than one name)
Name: Ghassan A. Bilal Email: ghassan.bilal@uotechnology.edu.iq Name: Noora Saleh Ekaab Email: 20112@ uotechnology.edu.iq
8. Course Objectives

Course Objectives	• Vectors

	• Laplace Transforms • Inverse Laplace Transforms • Fourier Series • Power Series

9. Teaching and Learning Strategies

Strategy	PBL

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2 3,4 5,6 7,8 9,10		GO1	• Vectors • Laplace Transforms • Inverse Laplace Transforms • Fourier Series • Power Series	PBL	Quizzes, Mid Exam, Final Exam

11. Course Evaluation

Mid exam 15%, student activities 15%, final exam 70%.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Advanced Engineering Mathematics. K.A. Stroud,2003 • Advanced Engineering Mathematics, H.K. DASS. 2009
Main references (sources)	-
Recommended books and references (scientific journals, reports…)	-
Electronic References, Websites	-

1. Course Name:

Strength of Materials

2. Course Code:

EMEN211

3. Semester / Year:

2nd Year, 2nd Semester

4. Description Preparation Date:

2−2024

5. Available Attendance Forms:

Attendance Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
3 units
7. Course administrator's name (mention all, if more than one name)
Name: Muhannad Zaidan Khalifa Email: Muhannad Zaidan Khalifa @uotechnology.edu.iq
8. Course Objectives

Course Objectives	• Introduces the fundamental concepts in mechanics of materials by study of the behavior of solid bodies under loads and deflections. • Study the simple bending theory for beams and the simple torsion theory for shafts (circular) and non-circular, deflection of beams, complex stresses, compounds beam. • Illustration and discussion the principles of free & forced vibrations and definition with and without damping. • Proceeding to the Student free & forced vibrations of single degree of freedom and two degree of freedom.

9. Teaching and Learning Strategies	
Strategy	PBL

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1 2 3 4 5 6 7 8 9 10		GO2	• Simple stress and strain • Shearing force and bending moment diagrams • Bending Theory of the beam • Deflection of beams • Torsion Theory for Circle Shaft. • Free vibration of single degree of freedom system • Forced vibration of single degree of freedom system • Free vibration with damping • Forced vibration two degree of freedom • Forced vibration with damping	PBL	Quiz, Mid Exam, Final Exam

11. Course Evaluation
Mid exam 15%, student activities 15%, 10% lab, final exam 60%.

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• Mechanics of Materials I., E. J. HEARN, THIRD EDITION, 2007. • Strength of materials, G. G. Jon, 2009. • Mechanical vibration by S.S. Rao.
Main references (sources)	-
Recommended books and references (scientific journals, reports…)	-
Electronic References, Websites	-

1. Course Name:
Navigation Theory I
2. Course Code:
EMEN206
3. Semester / Year:
First Semester/2nd Year
4. Description Preparation Date:
2 hours weekly
5. Available Attendance Forms:
Attendance Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
Two hours per week / two units
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Sameir Abd Al-khalik Aziez Email: 50067@uotechnology.edu.iq
8. Course Objectives

Course Objectives	**• Knowing the purpose and objectives of navigation** **• Knowing the fundamental theory operation o navigational systems** **• Knowing the obstacles to the operation of navigational systems** **•Learn how to find the desired location mathematically** **and in multiple ways**

9. Teaching and Learning Strategies

Strategy	Enabling students of the Navigation and Guidance Engineering branch to know the theoretical and mathematical foundations On which various navigational devices operate, with the possibil of developing some of them as much as possible

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Fundamentals of AVIONICS (Aviation Electronics)	Navigation Functions, Definition of Navigation	Attendance lecture	Question and Answe
2	2	Learn the concept of Avionics	Purpose of Navigation	Attendance lecture	Question and Answe
3	2	Learn the types of Craft that can be navigated	Craft and Environment (Craft, Land Vehicles, Marine Vessel)	Attendance lecture	Homework
4	2	Learn the types of Craft that can be navigated	Aircraft, Space Craft	Attendance lecture	Question and Answer
5	2	Study the effect of Environment on different Craft Navigation	Environment; Winds, Weather, Forecasting	Attendance lecture	Question and Answer and Quiz
6	2	Study of the effect of Geometry of The Earth on different Craft Navigation	Geometry of The Earth and Coordinate Frames: (Geometry of Earth)	Attendance lecture	Question and Answer
7	2	Learn the different types of Coordinate Frames and its Transformation	Coordinate Frames (Geocentric Spherical Coordinates, Generalized spherical coordinates, Transverse –Pole spherical coordinates)	Attendance lecture	Question and Answer and Homework
8	2	Learn the different types of Coordinate Frames and its Transformation	Tangent plane coordinates, Tangent cylinder coordinates, Tangent plane coordinates, Map-grid coordinates.	Attendance lecture	

9	2	Mid-course exam	Mid-course exam	Attendance lecture	
10	2	Learn calculation of finding the course and distance to the observation point	Navigation Quantities (Attitude and Heading, The Space-Triangle)	Attendance lecture	Written questions Question and Answer
11	2	Learn the meaning and calculations of different Navigation angles	Navigation Quantities (the Bearing and relative Bearing, Altitude, the Route, Routing)	Attendance lecture	Question and Answer
12	2	Study the different types of Navigation Aids	Navigation Aids (Fundamental Aids, Radio Aids, Inertial Aids, Satellite Aids)	Attendance lecture	Question and Answer and Homework
13	2	Learn the concept of Kinds of Navigation	Kinds of Navigation (Dead-Reckoning, Position Fixing)	Attendance lecture	
14	2	Learn the concept of different terms of Navigation	Guidance, Enroot and Terminal Phase Vertical Navigation	Attendance lecture	Question and Answer, and Quiz
15	2	Learn the types of Navigation surveillance and Communication	Navigation surveillance and Communication	Attendance lecture	Question and Answer
					Question and Answer
					Question and Answer
					Question and Answer

11. Course Evaluation

5% attendance grade; 5% homework; 5% Quizzes; 15% midterm exam; 70% final exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	AVIONICS NAVIGATION SYSTEMS

	By: Myron Kayton
Main references (sources)	AVIONICS NAVIGATION SYSTEMS By: Myron Kayton
Recommended books and references (scientific journals, reports…)	Navigation and Guidance of Orbital Transfer Vehicle (By: Xuefeng Li)
Electronic References, Websites	Next-Generation GNSS Signal Design & Global Navigation Satellite Systen and Inertial Navigation

1. Course Name:
Navigation Theory II
2. Course Code:
EMEN207
3. Semester / Year:
First Semester/2nd Year
4. Description Preparation Date:
2 hours weekly
5. Available Attendance Forms:
Attendance Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
Two hours per week / two units
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Sameir Abd Al-khalik Aziez Email: 50067@uotechnology.edu.iq
8. Course Objectives

Course Objectives	**•Knowing the location of the radio broadcast** **•Knowing the theoretical foundations of navigational systems for finding the location** **•Knowing different ways to find the location usi signal parameters** **•Identify the various types of errors in finding th desired location** **• Solve different mathematical problems using multiple methods to find the location**

9. Teaching and Learning Strategies	
Strategy	Theoretical lectures (delivering the lecture to students in person) and using (Data show), to enable students of the Navigation and Guidance Engineering Branch to know the theoretical and mathematical foundations On which various navigational devices operate, in addition to knowing t basics and concepts necessary to find the locations and determine their direction and distance.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Learning the fundamentals of Radio position fixing	Radio Position Fixing (General Principles, Position Fixing)	Attendance lecture	Question and Answer
2	2	Learning the principles of Direction-Determination From Radio station	Principle of Direction-Determination	Attendance lecture	Question and Answer Homework
3	2	Study the principles of Direction- Beacons by using method of (Amplitude-Direction Finding)	Principles of Direction-Beacons (Amplitude-Direction Finding)	Attendance lecture	Question and Answer
4	2	Study the principles of Direction- Beacons by using method of (Phase-Direction Finding)	Phase-Direction Finding	Attendance lecture	Question and Answer and Quiz
5	2	Study the principles of Direction- Beacons by using method of	Frequency(Doppler)-Direction Finding	Attendance lecture	Question and Answer

		(Phase-Direction Finding)			
6	2	Study the principles of Direction- Beacons by using method of (Amplitude-Direction Finding)	Principles of Direction-Beacons (Amplitude-Direction Finding(	Attendance lecture	Question and Answer and Homework
7	2	Study the principles of Direction- Beacons by using method of (Phase-Direction Finding)	Phase-Direction Beacons	Attendance lecture	Written questions Question and Answer
8	2	Study the principles of Direction- Beacons by using method of (Phase-Direction Finding)	Frequency(Doppler)-Direction Beacons	Attendance lecture	Question and Answer
9	2	Mid-course exam	Mid-course exam	Attendance lecture	Question and Answer
10	2	Learn calculation of finding the course and distance to the observation point	Summary of Measurements in Direction Beacons	Attendance lecture	Question and Answer, and Quiz
11	2	Learning to solved problems for finding a required position	Solved different problems	Attendance lecture	Question and Answer and Homework
12	2	Learning analysis of different errors in navigation measurements	Error Analysis of Navigation Measurements (Types of Errors)	Attendance lecture	Question and Answer and Quiz
13	2	Learning analysis errors in position fixing	Error of Position-Fixing	Attendance lecture	Question and Answer
14	2	Study the effects of Measuring Time-Duration errors	Measuring Time-Duration Effect Effect of The Angle of Cut	Attendance lecture	Question and Answer

15	2	Study the effects of Angle of Cut error		Attendance lecture	Question and Answer

11. Course Evaluation

5% attendance grade; 5% homework; 5% Quizzes; 15% midterm exam; 70% final exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	AVIONICS NAVIGATION SYSTEMS By: Myron Kayton
Main references (sources)	AVIONICS NAVIGATION SYSTEMS By: Myron Kayton
Recommended books and references (scientific journals, reports…)	Navigation and Guidance of Orbital Transfer Vehicle (By: Xuefeng Li)
Electronic References, Websites	Next-Generation GNSS Signal Design & Global Navigation Satellite System and Inertial Navigation

Course Description Form (3rd Year)

1. Course Name:
Communication I
2. Course Code:
EMEN305
3. Semester / Year:
1st / 3rd
4. Description Preparation Date:
02-2024
5. Available Attendance Forms:
Attendance lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours weekly (30 hours in course)/ 2 Units
7. Course administrator's name (mention all, if more than one name)
Name: Asst. Prof. Dr. Mohammed Qasim Mohammed Email: 50033@uotechnology.edu.iq
8. Course Objectives

Course Objectives	• **Teaching students the basic concepts of analogue communications** • **Study the analysis of signals, their types, useful signals, and the useful operations for signals** • **Study Fourier analyses and their types** • **Study the modulation and demodulation techniques and their types in detail**

9. Teaching and Learning Strategies	
Strategy	Theoretical lectures (give the lecture to students in person) Practical lectures (work in the laboratory to achieve the practical aspect)

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	An introduction to understanding the basics of analogue communications	Fundamentals of analogue communications	Attendance lecture	Question and Answer
2	2	Learn the concept of signal analysis	signal analysis	Attendance lecture	Question and Answer
3	2	Learn the types of signals, useful signals	signal analysis	Attendance lecture	Homework

4	2	Learn some operations on signals	signal analysis	Attendance lecture	Question and Answer
5	2	Study of Fourier analyzes and their types	Fourier analyzes and their types	Attendance lecture	Quiz
6	2	Applying Fourier analyzes to sinusoidal signals	Fourier analyzes and their types	Attendance lecture	Question and Answer
7	2	Applying Fourier analyzes to complex functions	Fourier analyzes and their types	Attendance lecture	Question and Answer
8	2	Learn Fourier transforms for discontinuous signals	Fourier transforms	Attendance lecture	Homework
9	2	Mid-course exam	Mid-course exam	Attendance lecture	Written questions
10	2	An introduction to embedding and de-embedding techniques and their types	embedding and de-embedding techniques	Attendance lecture	Question and Answer
11	2	Learn the concept of amplitude modulation	amplitude modulation & Demodulation	Attendance lecture	Question and Answer
12	2	Learn the concept of amplitude Demodulation	amplitude modulation & Demodulation	Attendance lecture	Quiz
13	2	Learn the types of amplitude-modulated signals	amplitude modulation & Demodulation	Attendance lecture	Question and Answer
14	2	Learn the concept of angular modulation and its types (frequency modulation)	angular modulation	Attendance lecture	Homework
15	2	Learn the concept of angular modulation and its types (phase modulation)	angular modulation	Attendance lecture	Question and Answer

11. Course Evaluation

5% attendance grade; 5% homework; 5% Quizzes; 15% midterm exam;10% Lab; 60% final exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	No
Main references (sources	B. P. Lathi, "Modern Digital And Analog Communications Systems", 3rd Edition, (The Oxford Series in Electrical and Computer Engineering).
Recommended books and references (scientific journals, reports…)	• Bruce Carlson, Paul Crilly, Janet Rutledge "Communication Systems", 4th Edition, - McGraw Hill • Simon Haykin, Barry Van Veen, "Signals and Systems", 2nd Edition-Wiley.
Electronic Referenc Websites	No

1. Course Name:
Communications II
2. Course Code:
EMEN306
3. Semester / Year:
2nd / 3rd Year
4. Description Preparation Date:
02-2024
5. Available Attendance Forms:
Attendance lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours weekly (30 hours in course)/ 2 Units
7. Course administrator's name (mention all, if more than one name)
Name: Asst. Prof. Dr. Mohammed Qasim Mohammed Email: 50033@uotechnology.edu.iq
8. Course Objectives

Course Objectives	• **Teaching students the basic concepts of digital communications and its advantages** • **Study the performance of the digital communications system and the factors affecting it** • **Studying the types of communications systems models, methods of transmission, and data selection techniques** • **Study the concept of information theory and probabilities and their importance in digital communications systems**

	• **Studying the techniques of embedding and de-embedding and their types in digital communications systems** • **Study the concept of pulse modulation and convert the analogue signal to digital through sampling, quantization and encryption processes.**

9. Teaching and Learning Strategies

Strategy	Theoretical lectures (give the lecture to students in person) Practical lectures (work in the laboratory to achieve the practical aspect)

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	An introduction to understanding the basics of digital communications	Fundamentals of digital communications	Attendance lecture	Question and Answer
2	2	Learn the concept of the performance of digital communications systems and the factors affecting them	the performance of digital communications systems	Attendance lecture	Question and Answer
3	2	Learn the types of communication models and ways to transfer information	types of communication models and types to transmit information	Attendance lecture	Homework
4	2	Learn the concept of data selector, its types, advantages and disadvantages	Multiplexing Techniques	Attendance lecture	Question and Answer
5	2	Study of information theory and its importance in digital communications	information theory	Attendance lecture	Quiz
6	2	Studying the concept of probability and its importance in digital communications	probability and its importance in digital communications	Attendance lecture	Question and Answer
7	2	Studying the types of modulation and the importance of pulse modulation to convert the signal	types of modulation	Attendance lecture	Question and Answer

		from analogue to digital			
8	2	Learn the concept of sampling and quantification	sampling and quantification	Attendance lecture	Homework
9	2	Mid-course exam	Mid-course exam	Attendance lecture	Written questions
10	2	Learn the concept of line coding and how to draw various signals	line coding	Attendance lecture	Question and Answer
11	2	Study of the types of modulation (BAFK & BFSK)	modulation (BAFK & BFSK)	Attendance lecture	Question and Answer
12	2	Study of the types of modulation (BPSK& DBPSK)	modulation (BPSK& DBPSK)	Attendance lecture	Quiz
13	2	Study of QPSK modulation and its types	QPSK modulation	Attendance lecture	Question and Answer
14	2	Learn the concept of type modulation (M-ray ASK)	modulation (M-ray ASK)	Attendance lecture	Homework
15	2	Learn the concept of type modulation (M-ray FSK & PSK)	modulation (M-ray FSK & PSK)	Attendance lecture	Question and Answer

11. Course Evaluation

5% attendance grade; 5% homework; 5% Quizzes; 15% midterm exam;10% Lab; 60% final exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	No
Main references (sources)	B. P. Lathi, "Modern Digital And Analog Communications Systems", 3rd Edition, (The Oxford Series in Electrical and Computer Engineering).
Recommended books and references (scientific journals, reports…)	• John-Proakis "Digital Communications", 4th Edition, - McGraw Hill • John-Proakis & Masoud Salehi "Digital Communications", 5th Edition, - McGraw Hill
Electronic Referenc Websites	No

1. Course Name:

Numerical Analysis

2. Course Code:
EME301
3. Semester / Year:
3rd Year, 1st Semester
4. Description Preparation Date:
2−2024
5. Available Attendance Forms:
Attendance Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Units
7. Course administrator's name (mention all, if more than one name)
Name: Hayder Qasim Email: Hayder Qasim @uotechnology.edu.iq
8. Course Objectives

Course Objectives	• Aims of the course are to graduates qualified engineers who they have theoretical experience in advanced numerical in electromechanical field. • This unit of study aims to provide theoretical knowledge and principles of advanced numerical and the ability to analysis and solve the numerical problems. • Illustration and discussion the main the application of numerical methods for the solution of equation(s) - linear, non-linear (algebraic) that occur in most numerical of electromechanical field. • The student may also go beyond the subject and perform grid sensitivity, parametric study and stability analysis. •

9. Teaching and Learning Strategies	
Strategy	PBL

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2,3 4,5,6		GO1	Solution of non –linear equations by numerical methods: • Simple Iteration Method • Bisection method • Newton –Raphson iterative Curve fitting &Interpolation a) Curve fitting : • Least square method b) Interpolation : • Newton Interpolation Polynomial	PBL	Quiz Mid Exam Final Exam

7,8 9,10 11,12			• Lagrange Interpolation Polynomial Numerical Solution of linear equations systems: • Direct method • Indirect method Numerical integration • Trapezoidal rule • Simpson's rule Solution of differential equations by numerical methods: • Modified Euler's method • Runge-Kutta method		

11. Course Evaluation	
Mid exam 15%, student activities 15%, final exam 70%.	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• Chapra, Steven C., and Raymond P. Canale., "Numerical methods for engineers," Vol. 2, New York: *McGraw-Hill*, 2012.
Main references (sources)	-
Recommended books and references (scientific journals, reports…)	-
Electronic References, Websites	-

1. Course Name:
Engineering Analysis
2. Course Code:
EME301
3. Semester / Year:
3rd Year, 2nd Semester
4. Description Preparation Date:
2−2024
5. Available Attendance Forms:
Attendance Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Units
7. Course administrator's name (mention all, if more than one name)
Name: Hayder Qasim Email: Hayder Qasim @uotechnology.edu.iq
8. Course Objectives

Course Objectives	• Aims of the course are to graduates qualified engineers who they have theoretical experience in advanced engineering in electromechanical field. • This unit of study aims to provide theoretical knowledge and principles of advanced numerical and the ability to analysis and solve the engineering problems. • Illustration and discussion the main the application of engineering methods for the solution of ordinary differential equation(power series), differentiation of complex function that occur in most engineering of electromechanical field. • The student may also go beyond the subject and perform grid sensitivity, parametric study and stability analysis.

9. Teaching and Learning Strategies

Strategy	PBL

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1,2 3,4 5,6 7,8 9,10 11,12		GO1	• Complex analysis • Complex mapping: • Differentiation of complex function: • Harmonic functions • Power series solution of ordinary differential equation • Power series solutions:	PBL	Quiz Mid Exam Final Exam

11. Course Evaluation

Mid exam 15%, student activities 15%, final exam 70%.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Stroud, Kenneth Arthur, and Dexter J. Booth., "Advanced engineering mathematics," *Palgrave Macmillan*, 2011.
Main references (sources)	-
Recommended books and references (scientific journals, reports…)	-
Electronic References, Websites	-

1. Course Name:
RADAR Theory
2. Course Code:
EMEN307
3. Semester / Year:

Second, 3rd
4. Description Preparation Date:
2−2024
5. Available Attendance Forms: In person
Attendance Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
3 Hours / W 3H(2H theory +1 H tutorial)
7. Course administrator's name (mention all, if more than one name)
Name: Jafaar Mohammed Daif Email: Jaafar.M.Dhaif@uotechnology.edu.iq
8. Course Objectives

Course Objectives	Radio detection and ranging (radar) is one of the most common sensor systems used for automatic monitoring of people, machines, and nature. And when they are placed on a platform, such as an airplane or a satellite, they are dominant. It is used to detect stationary and moving targets in addition to the formation of pictures of the Earth and its characteristics, which is called remote sensing. The aim of this course is to provide an overview of the theory of typical radar and its operational principles, starting with concepts. The basics include wave propagation, types of resolution, and specifications. It is required to be available in signal-receiving systems and then to know how to derive the radar equation according to the nature of its work.

9. Teaching and Learning Strategies

Strategy	Theoretical lectures (giving the lecture to students in person) and including da .exams, homework, reports, and assignments

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	• Acquire- basic knowledge • The concept radar Understanding basic principles • To make radar • Classification shapes Ra waves	Introduction to the nat of radar,maxim unambiguous range, ra waveforms, the sim form of radar, in addit .to radar applications	Giving the le+cture Discussic and exercises	The extent of student's interact with the lecture the extent of understanding through it Questions and answ

		• Get to know the main parts of a syste .Radar			
2	3	The student will le :about • Frequency bea of the radar syst • The studer understanding the types systems Radar problems according to package Freque • The student acquire conce Basics of ra .theory	• Classify ra according to the t of operating signa • Radar classificat according to frequency level • Recognize maximum detect range and the fact .involved	Giving the le+cture Discussic and exercises	The extent of student's interact with the lecture the extent of understanding through it Questions and answ
3	3	The student wil understand the mos important factor that are associate with proces detection, includin and the exter accuracy of detectio Also, t he studer will be able t visualise th technologies used i .scanning operations The student wil learn about the type of signals used b .radar systems	• Classification radar according to type of signal • Classification radar according to frequency band • Maximum detect range and the fact .involved	Giving the le+cture Discussic and exercises	The extent of student's interact with the lecture the extent of understanding through it Questions and answ
4	3	• The student understand most crit factors associa with a detect process, includ the extent accuracy .detection • The student wil able to recogr the technolog used in ra	• Continuing with topic of maxim detection range factors associa .with it • Prediction of Ra ,Performance Minimum Detecta ,Signal Recei .Noise, and SNR	Giving the le+cture Discussic and exercises	The extent of student's interact with the lecture the extent of understanding through it Questions and answ

		scanning .operations • The student v learn about types of sign used in ra .systems			
5	2	First month Exam	First month Exam	First month Exam	First month Exam
6	3	• Advantages and disadvantages of each type of scanning method. • Advantages and disadvantages of transmitter methods.	• The student will g knowledge of advantages a disadvantages .scanning methods • The student v understand the ty of transmitters a the advantages .each kind	Giving the le+cture Discussio and exercises	The extent of student's interact with the lecture a the extent of understanding through it Questions and answ
7	3	• Radar Horizon • Weather fact and their imp on the detection • Physical phenomena t that impact detection proces	The student v understand some phys phenomena and th .impact on radar operat	Giving the le+cture Discussio and exercises	The extent of student's interact with the lecture a the extent of understanding through it Questions and answ
8	3	:Radar range equat ,simple mo ,detection predict .noise at the receiver	The student will le Basic ideas of the proc of Derivation of the ra equation, characteristics, a .relevant factors	Giving the le+cture Discussio and exercises	The extent of student's interact with the lecture a the extent of understanding through it Questions and answ
9	3	,Signal-to-noise ra Integration of ra pulses, Cross sect ,of the target, its ty and the characteris .of each kind	The student will hav more accur understanding of the ra ,equation. In addit detection depends on .targets	Giving the le+cture Discussio and exercises	The extent of student's interact with the lecture a the extent of understanding through it Questions and answ
10	2	Second month Exam	Second month Exam	Second month Exam	Second month Exam
11	3	,Transmission pov frequency, pu ,repetition freque	The impact of student's ability will understood in transmitted signal and	Giving the le+cture Discussio and exercises	The extent of student's interact with the lecture a the extent of

		and losses wl .propagation	effect of value freque pulse as a result of natu .propagation		understanding through it Questions and answ
12	3	Types of modulat signals in the radar a understanding Doppler freque effect	The student will know advantages, modulat type, and characteris of the Dopp .phenomenon	Giving the le+cture Discussic and exercises	The extent of student's interact with the lecture a the extent of understanding through it Questions and answ
13	3	Radar systems t work with continu signals and th .characteristics	The student v understand how the ra systems work w .continuous waves	Giving the le+cture Discussic and exercises	The extent of student's interact with the lecture a the extent of understanding through it Questions a answers
14	3	The separat between transmi and receiver, requirements frequency, a applications of C Radar	The student will rea separation betw ,transmitter and recei the requireme frequency, a .applications of CW Ra	Giving the le+cture Discussic and exercises	The extent of student's interact with the lecture a the extent of understanding through it Questions a answers
15	3	Final Semester Exam	Final Semester Exam	Final Semester Exam	Final Semester Exam

11. Course Evaluation
Distributing the score out of 100 according to the tasks assigned to the student such as daily activity, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Not available
Main references (sources)	Introduction to Radar Systems – Merrill I. Skolnik, SECOND EDITION, McGraw-Hill 1981.
Recommended books and references (scientific journals, reports…)	Not available
Electronic References, Websites	Introduction to Radar Systems – Merrill I. SKolnik, THIRD EDITION, T McGraw-Hill, 2001.

1. Course Name:
Structural stability
2. Course Code:

EMEN314
3. Semester / Year:
2nd / 3rd
4. Description Preparation Date:
02-2024
5. Available Attendance Forms:
Attendance lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours weekly (30 hours in course)/ 2 Units
7. Course administrator's name (mention all, if more than one name)
Name: **Asst. Prof. Dr. hatam kareem kadhom** Email: **hatam.k.kadhom@uotechnology.edu.iq**
8. Course Objectives

Course Objectives	1. **Stability of structures** : *definition of stability ,type of stability* 2. **Basic principles of structures**: *idealization of structures, free body diagrams* 3. **The work of equation:** *work of externally applied forces (linear spring, virtual work, the principle superposition of mechanical work), work of internal forces (strain energy).* 4. **Energy theorems of elasticity system:** potential energy, total potential energy of a deformable body. 5. **Stability analysis of beam – columns:** *beam – column with concentrated load, beam –column with an interior moment, beam –column subjected to end moments, beam –column subjected distributed loads, rotationally restrained beam – column*. 6. **Structural design for stability of members :** *local plate buckling of structural members , stiffeners* 7. **Structural analysis of frames and truss :***classical approach , rigid –frames ,stiffness method , criterion for determination of critical load , stiffness matrix including axial force effects , stability of truss , internal stability , geometric stability* 8. **Stability analysis of arches ,rings and shells :***Stability of arches , stability of rings and tubes, stability of elastic instability of thin shells* 9. **Stability of floating structures:** *static stability of floating body*

9. Teaching and Learning Strategies	
Strategy	Theoretical lectures (give the lecture to students in person) Practical lectures (work in the laboratory to achieve the practical aspect)

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	2	Stability of structures	• *definition of stability* • *type of stability*	Attendance lecture	Question and answer an homework
2nd	2	**Basic principle of structures**	• *idealization of structures* • *free body diagrams*	Attendance lecture	Question and answer an homework
3rd	2	**The work of equation:**	• *work of externally applied forces (linear spring, virtual work, the principle superposition of mechanical work),* • *work of internal forces (strain energy).*	Attendance lecture	Question and answer an homework
4th	2	**Energy theore of elasticity system**	• potential energy, • total potential energy of a deformable body.	Attendance lecture	Question and answer an homework
5th	2	tutorial	tutorial	Attendance lecture	Question and answer an homework
6th	2			1st Quiz	1st Quiz
7th	2	**Stability analy of beam – columns**	• *beam –column with concentrated load,* • *beam –column with an inter moment,*	Attendance lecture	Question and answer and homework
8th	2	**Stability analy of beam – columns**	• *beam –column subjected t end moments,* • *beam –column subjected distributed loads, rotation restrained beam – column.*	Attendance lecture	Question and answer an homework
9th	2	**Structural desi for stability of members**	• *local plate buckling of structural members ,* • *stiffeners*	Attendance lecture	Question and answer an homework
10th	2	**Structural analysis of fra and truss**	• *classical approach* • *rigid –frames ,* • *stiffness method ,*	Attendance lecture	Question and answer an homework

			• *criterion for determinatior critical load*		
11th	2			Mid -exam	Mid –exam
12th	2	**Structural analysis of frar and truss**	• *stiffness matrix including axial force effects ,* • *stability of truss ,* • *internal stability ,* • *geometric stability*	Attendance lecture	Question and answer an homework
13th	2	**Stability analy of arches ,ring and shells**	• *Stability of arches ,* • *stability of rings and tubes,* • *stability of elastic instability of thin shells*	Attendance lecture	Question and answer an homework
14th	2	**Stability of floating structures**	*static stability of floating body*	Attendance lecture	Question and answer an homework
15th	2			2nd Quiz	2nd Quiz

11. Course Evaluation

Two quizzes (one hour: 10%), Mid exam (2 hours: 15%), Design project (4 weeks: 5%), and final exam (3 hours 70%)

12. Learning and Teaching Resources

Required textbooks (curricular books, if ar	No
Main references (sources)	STABILITY OF STRUCTURES Principles and Applications CHAI H. YOO & SUNG C. LEE 2011
Recommended books and references (scientific journals, reports…)	Ziemian, RD. Guide to stability design criteria for metal structures Bazant, Z., and Cedolin, L. Stability of structures Chen, WF., Him, EM. Structural stability: Theory and Implementation
Electronic References, Websites	No

1. Course Name:

Hydraulic and Pneumatic systems

2. Course Code:

EMEN309

3. Semester / Year:

First/ 3rd

4. Description Preparation Date:

4/2/2024
5. Available Attendance Forms:
Attendance Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
30 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Waleed Yousif Shehab Email: 50195@uotechnology.edu.iq

8. Course Objectives

Course Objectives	• Defining the principle of **Hydraulic and Pneumatic systems** systems concepts. • Defining the construction of hydraulic systems coincided with a laboratory experiment. • Defining the **Hydraulic and Pneumatic systems** pumps: Theory of pumping- Types of pumps coincided with a laboratory experiment. • Defining the controlling valves like Direction control valve- Pressure control valve- Flow control valve. • Defining the actuators (hydraulic cylinder) with a laboratory experiment. • Defining the auxiliary hydraulic systems like accumulators.

9. Teaching and Learning Strategies

Strategy	Teaching **Hydraulic and Pneumatic systems** as theory and mathematically, the constructions of hydraulic systems as pumps, control valves, and actuators with accessories devices like accumulators. Exams (Mid. Exam, quiz, and other activities for evaluation, Lab with exam and three hours final exam).

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
3	6		Principles of **Hydraulic and Pneumatic systems** specification- Principle of hydraulic systems- Construction of hydraulic systems- Advantages and disadvantage of **Hydraulic and**		

3 3 3 3	6 6 6 6	An ability to identify, fundamental, formulate, and solve hydraulic system engineering problems by applying principles of engineering, science, and mathematics.	**Pneumatic systems** Symbols of hydraulic circuits- Examples and application. Hydraulic pumps: Theory of pumping- Types of pumps- Gear pumps- Blades pumps- Screw pumps- Piston pumps. Controlling valves: Direction control valve- Pressure control valve- Flow control valve. Actuators: Hydraulic cylinder (types and principle circuit)- Hydraulic motors- Moment, velocity, power and efficiency- Output performance and testing. Auxiliary hydraulic systems: Pipes- Filters- Measurement gauges- Heat exchangers-Accumulators.	Attendant Scientific lectures with method of problem-based learning (Pbl) and lectures video	Quizzes, exams, and other activities.

11. Course Evaluation

Exams (Mid. Exam and quiz and other activities 25%, lecturer evaluation 5%, Lab 10% and three hours final exam 60%).

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	None
Main references (sources)	Fluid Power: Theory and Application, James A. Sullivan. Third Edition, A Reston Book Prentice Hall, Englewood Cliffs, New Jersey 1989

Recommended books and references (scientific journals, reports…)	• Practical hydraulic system, Ravi Doddannavar. Elsevier Science & Technology Books, 2005 • International Journal of Fluid Power
Electronic References, Websites	ALL academic Publications in Scopus and Web of Science.

1. Course Name:
Navigation systems I
2. Course Code:
EMEN303
3. Semester / Year:
1st Semester / 3rd year
4. Description Preparation Date:
2−2024
5. Available Attendance Forms:
Attendance Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
30 theory + 30 Lab
7. Course administrator's name (mention all, if more than one name)
Name:Dr.Ekbal Hussein Ali Email: ekbal.h.ali@outechnology.edu.iq
8. Course Objectives

Course Objectives	**• Learn about the types of navigational systems.** **• How to deal with each other…** **• Learn about the factors affect performance……**
9. Teaching and Learning Strategies	
Strategy	Th branch use a problem based learning which new and student active meth The method help the student getting the program outcor

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week1			Introduction to Navigation Syste		
Week2			Doppler Effect		
Week3			Doppler Radar		
Week4			Airborne Doppler Radar		
Week5			Relative Navigation Systems		
Week6			Nondirection Beacon (NDB)		
Week7			Automatic Direction Finder		
Week8			Distance Measuring Equipmer		
Week9			Advantage and disadvantage of I		
Week10			VHF Omni direction Range (VO		
Week11			Advantage and disadvantage of		
Week12			Hyperbola methods		
Week13			Instrument Landing System (ILS		
Week14			Instrument Landing System (ILS		
Week15			Radar altimeeter		

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Avionics Navigation Systems, 2nd Edition Kayton Myron Et.Al, 2010
Main references (sources)	Electronic Navigation Systems
Recommended books and references (scientific journals, reports…)	NAVIGATION SYSTEMS
Electronic References, Websites	https://www.wiley.com/en-gb/Avionics+Navigation+Systems%C+2nd+Edition-p-9780471547952

1. Course Name:

Navigation Systems II

2. Course Code:

EMEN304

3. Semester / Year:

2nd Semester / 3rd year

4. Description Preparation Date:

2−2024

5. Available Attendance Forms:

Attendance Lectures

6. Number of Credit Hours (Total) / Number of Units (Total)

30 theory + 30 Lab

7. Course administrator's name (mention all, if more than one name)

Name:Dr.Ekbal Hussein Ali
Email: ekbal.h.ali@outechnology.edu.iq

8. Course Objectives

Course Objectives	**•Learn about the types of satellite navigation systems…..** **•How to interact with each other in determining location** **• Learn about the factors affecting performance determining location accuracy.**

9. Teaching and Learning Strategies

Strategy	Th branch use a problem based learning which new and student active meth The method help the student getting the program outcor

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week1			Weather Radar		
Week2			Introduction for satellite		
Week3			Satellite Coordinate System		
Week4			Satellite Weight and Orbital		
Week5			Global Position System (GPS)		
Week6			Determining Satellite To-User Ra		
Week7			GPS coordinate		
Week8			GPS Navigation Signals		
Week9			GPS Navigation Message		
Week10			Factors Affecting on GPSAccurac		
Week11			Error Correction In GPS		
Week12			Differential GPS DGPS)		
Week13			GNSS Navigation		
Week14			Other Satellite Navigation Systemster		
Week15					

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Understanding GPS Principles and Applications Sec Edition 2006 Elliott D. Kaplan Christopher J. Hegarty
Main references (sources)	Global Positioning System: Theory and Applicatic Volume I James J. Spilker Jr., Penina Axelrad, Bradford Parkinson and Per Enge
Recommended books and references (scientific journals, reports…)	erstanding GPS/GNSS: Principles and Applicati Third Edi
Electronic References, Websites	https://onlinelibrary.wiley.com/dc book/10.1002/04717125822

1. Course Name:	
Machine Design	
2. Course Code:	
EMEN313	
3. Semester / Year:	
1st / 3rd	
4. Description Preparation Date:	
02-2024	
5. Available Attendance Forms:	
Attendance lectures	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 hours weekly (30 hours in course)/ 2 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: **Asst. Prof. Dr. Bassam Ali Ahmed** Email: **10480@uotechnology.edu.iq**	
8. Course Objectives	
Course Objectives	• **Introduction of the Machine Design and Selection of Materials:** Mechanical Design Definition, Knowledge of Mechanical Design, Classification of Mechanical Design, Design Process Steps, Mechanical Properties of Materials, Stress-Strain Diagram, Designation Systems, and Using Tables and Figures. • **Simple Stresses:** Types of the Stresses, Tensile and Compressive Stresses, Direct Shear Stress, Crushing or Bearing Stress, Torsion Stress, Bending Stress, Vertical Shearing Stress, and Concentration Stress. • **Combined Stresses:** Procedure for Analyzing Combined Stresses, Maximum Normal Stresses: (Principal stresses), Maximum Shear Stress, Combined Stresses Cases, Axial Load only, Bending only, Torsion only, Bending & Torsion, Bending & Axial Load, Torsion & Axial Load, Bending, and Axial Load & Torsion. • **Variable Stresses:** Types of Cycles, Stresses used, Endurance Strength, Actual Endurance Strength, Sections, Combined Variable Stresses, Bending and Axial, Bending or Axial and Torsion, Bending, Axial & Torsion, and Predictions of Failure. • **Power Screw Design:** Power Screw Definition, Power Screw Applications, Types of Power Screw Threads, Torque Calculations, Collar Friction Torque, Design of Power

	Screw, Bush Nut Design, Stresses induced between power screw and nut, Lever Screw Design, Power Screw Efficiency, and Buckling. • **Columns:** Column Definition, Properties of the cross-section of a column, Type of Connections (End Fixity), Procedures (Analysis) of Straight Centrally Loaded Columns, Procedures (Design) of Straight Centrally Loaded Columns, Crooked Columns, Crooked Column Formula, Eccentrically Loaded Columns, Secant Formula for Eccentrically Loaded Columns, and Design Equation for Eccentrically Loaded Columns. • **Flywheel Design:** Flywheel Definition, Flywheel Construction, Coefficient of Fluctuation of Speed, Fluctuation of Energy, Coefficient of Fluctuation of Energy, Energy Stored in a Flywheel, Stresses in a Flywheel Rim, Stresses Analysis in Flywheel Arms & Arms Design, Flywheel shaft diameter, and Hub diameter.

9. Teaching and Learning Strategies

Strategy	Theoretical lectures (give the lecture to students in person)

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st	2	Introduction of the Machine Design and Selection of Materials	Introduction	Attendance lecture	Question and Answer
2nd	2	How to compute the simple stresses	Simple Stresses	Attendance lecture	Question and Answer
3rd	2	How to compute the simple stresses	Simple Stresses	Attendance lecture	Homework
4th	2	How to compute the combined stresses	Combined Stresses	Attendance lecture	Question and Answer
5th	2	How to compute the combined stresses	Combined Stresses	Attendance lecture	Homework
6th	2	1st Quiz	(1st to 5th)	1st Quiz	1st Quiz
7th	2	How to compute the variable stresses	Variable Stresses	Attendance lecture	Question and Answer
8th	2	How to compute the variable stresses	Variable Stresses	Attendance lecture	Homework
9th	2	Power Screw Analysis and Design	Power Screw Design	Attendance lecture	Question and Answer
10th	2				Homework

11th	2	Power Screw Analysis and Design Midterm exam	Power Screw Design (1st to 10th)	Attendance lecture Midterm exam	Midterm exam
12th	2	How to Columns Design And Analysis	Columns Design	Attendance lecture	Question and Answer
13th	2	How to Flywheel Design	Flywheel Design	Attendance lecture	Question and Answer Homework
14th	2	How to Flywheel Design	Flywheel Design	Attendance lecture	
15th	2	2nd Quiz	(12th to 14th)	2nd Quiz	2nd Quiz

11. Course Evaluation

Two quizzes (one hour: 10%), Mid exam (2 hours: 15%), Design project (4 weeks: 5%), and final exam (3 hours 70%)

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	No
Main references (sources)	• Robert L. Mott, Edward M. Vavrek, and Jyhwen Wang, "Machine Elements in Mechanical Design", Pearson 2018.
Recommended books and references (scientific journals, reports...)	• Robert C. Juvinall, and Kurt M. Marshek, "Fundamentals of Machine Component Design", Wiley sixth edition. • Robert L. Mott, "Machine Element in Mechanical Design", Pearson 2014. • R.S. Khurmi, and J.K. Gupta, "Machine Design", 2005
Electronic References, Website	No

1. Course Name:
Antenna and Wave propagation
2. Course Code:
EMEN310
3. Semester / Year:
First, 3rd
4. Description Preparation Date:
2-2024
5. Available Attendance Forms: In person
Attendance Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
2 Hours in Week / 30 total
7. Course administrator's name (mention all, if more than one name)
Name: Jafaar Mohammed Daif Email: Jaafar.M.Dhaif@uotechnology.edu.iq

8. Course Objectives					
Course Objectives			To provide the student with an understanding of antennas, EM wave propagation		
9. Teaching and Learning Strategies					
Strategy		It will be evaluated based on research projects. In addition, the class will utilise the "interac learning" concept, such as discussions in class, question and answer during lectures, .interaction between students with homework assignment presentations			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understanding the b principles and radiation .antennas	:Basic antenna conc Definition and functions an antenna, compar & between an ante transmission line, r communication link transmitting antenna an receiving antenna, radia patterns of antennas-field power patterns, all ante .types	Giving the le+cture Discussion and exercises	The extent of student's interac with the lecture and extent of understanding throug Questions and answe
2	2	Recognizing fundame .parameters of anter Overview of antennas types applications in wire systems.	Potential functions and ,electromagnetic f Oscillating elec dipolederivations for E ar field components in spher coordinate systems, Po Radiated by a cur element, Application antennas, Radiation f quarter wave monopole half wave dipoles, Deriva ,for radiation resista application of recipro theorem to antennas, equa of directional patterns effective lengths transmitting and recei antennas, directi ,properties of dipole anter antenna feeding methods	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions and answe
3	2	To understand the variou methods involved in th measurement of antenn parameters	beam area, beam width- H Power Beam w (HPBW)and First Null B ,width(FNBW) ,Polarisa Radiation Intensity ,B Efficiency, Directivity directive gain, radia resistance, radia ,efficiency, resolu Antenna 5 10% apert physical and effec ,apertures, effective he ,transmission form ,antenna field zo Transmission loss as .function of freque Antenna temperature .signal to noise ratio	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions and answe
4	2	To introduce the stud various types of antennas	: Arrays of point sou Expression for electric fi	Giving the le+cture Discussion	The extent of student's interac

		their performa .Characteristics	from two, three and :element arrays- linear ar Broad-side array and E Fire array- Method of pat multiplicationBinomial ar Horizontal and Ver Antennas above the gro plane, Effect of ground ,ungrounded ante Schelkunoff theorems linear arrays, Do Tchebysheff distribution .linear arrays	and exerci	with the lecture and extent of understanding throug Questions and answe
5	2	First month Exam	First month Exam	First month Exam	First month Exam
6	2	To understand the various methods involved in the measurement of antenna parameters	Loop Antenna: Small l ,short magnetic di comparison of far field small loop and short di loop antennas, field patter & circular loop ante radiation resistance of l antenna, directivity circular loop antennas v .uniform current	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions and answe
7	2	Explain the structure of b .antenna and Helical antenn	Helical antenna: He geometry, transmis radiation modes, prac design considerations, v band characteristics of he .antenna	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions and answe
8	2	To understand var antennas, arrays and radia .pattern of antennas	& Arrays of dip apertures: 3 element di Array with para elements, Yagi-Uda ar ,function and its de Phased arrays, freque scanning arrays, sı ,antennas, long wire anter location methods of fee antennas, folded di antennas, matcl arrangements	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions and answe
9	2	Explain the structure of b .antenna and Reflector anter	Reflector antennas: Parab reflector, paraboli reflector, aperture Patter large circular apertures v uniform illumination, off operation of paraboli reflectors, Cassegrain system	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions and answe
10	2	Second month Exam	Second month Exam	Second month Exam	Second month Exam
11	2	Explain the structure of b .antenna and antenna array	:Slot patch & Horn anter ,Slot antenna, its pat Babinet's principle ,complementary anter ,impedance of slot anter and horn antenna-func .and types	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions and answe

12	2	Explain the structure of b antenna and Microstrip (pa antenna	: Microstrip (patch) anter Rectangular and circ types-function, feat analysis ,de considerations applications	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions and answe
13	2	Graduates are effec problems-solvers, able to a critical, creative and evide based thinking to conc innovative responses to fu .challenges	:Antennas measurem Experimental set ups measurement of radia patterns, gain, pl polarization, term .impedance	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions answers
14	2	Knowing the basic propaga models and propaga mechanisms/impairments .radio waves Identify atmospheric and terres effects on radio w propagation.	: Radio wave propaga ,Modes of propaga ,Ground Wave Propaga Structure of troposphere ionosphere, Characteristi Ionospheric layers, Sky w propagation, Definitions Virtual height, MUF ,Skip distance, OWF, Fa ,ionospheric absorpt ,Multi-hop propaga Space wave propagation .Super refraction	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions answers
15	3	Final Semester Exam	Final Semester Exam	Final Semester Exam	Final Semester Exam

11. Course Evaluation

,The course grade is based upon attendance and participation, homework assignments and presentations, midterms and the final exam. Take home the final exam to include "Technical Report" and it will be weighted more heavily .in the final exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Not available
Main references (sources)	Antennas and Wave Propagationintroduction to Radar Syst 3rd Edition, 2002. K.D. Prasad, Satya Prakashan, Tech I Publications, New Delhi, 2001. Transmission Lines & Waveguides, Late Ajay V. Bakshi, U A. Bakshi ,Technical Publication. "Microstrip Antenna Design Handbook ", Artech House (20 Garg, R., Bhartia, P., Bahl, I. and Ittipiboon,
Recommended books and references (scientific journals, reports...)	Not available
Electronic References, Websites	ANTENNA AND WAVE PROPAGATION Kindle Edition by R. L. Yadava (Author)

1. Course Name:

Control and Guidance Theory

2. Course Code:

EMEN308

3. Semester / Year:
1st course/3rd Year
4. Description Preparation Date:
2024-2-8
5. Available Attendance Forms:
Attendance lectures
6. Number of Credit Hours (Total) / Number of Units (Total)30H
7. Course administrator's name (mention all, if more than one name)
Name: Iman Saleh Kareem Email: 50071@uotechnology.edu.iq
8. Course Objectives

Course Objectives	Aims of the course are to graduates a qualified engineers who they have theoretical experience in control and guidance system theory - This unit of study aims to provide theoretical knowledge and principles of with the ability to understand the theoretical principles for a first order ,second order systems and block diagram reduction laws moreover, the state-space analysis of control systems which is used in modern control theory - Illustration and discussion the Main Theoretical Principles of state space representation of systems . and finding transfer function by using the principle of state space solutions. - Understanding the above subject and using the theoretical principles to solve many problems.

9. Teaching and Learning Strategies

Strategy	The course in Engineering control and guidance theory is covered by classical lecture and after each topic , examples and titorial will be provide to the student , and during tutorial hours the students will be able to apply the theories and principles for solving the problems in electromechanically field. Presentation of seminars on all curriculum vocabulary of control and guidance systems.

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**

1 2 3 4	2 2 2 2	Knowledge a under stand Knowledge a under stand Knowledge a under stand Knowledge a under stand	Introduction in control system concepts Basic concept in feedback control system and transfer function Block diagram reduction laws examples	Lecture Lecture Lecture lecture	Homework and discussion Homework and discussion Exam, Homework Exam, Homework
5	2	Knowledge a under stand	First order systems	lecture	Homework, report, exam
6	2	Knowledge a under stand	examples	lecture	Homework,report,exam
7	2	Knowledge a under stand	Second order systems	lecture	Homework, report, exam
8	2	Knowledge a under stand	examples	lecture	Homework, report, exam
9	2	Knowledge a under stand	Transient steady state analysis	lecture	Homework, report, exam
10	2	Knowledge a under stand	Servo system with velocity F.B.	lecture	Homework, report, exam
11	2	Knowledge a under stand	Steady state errors	lecture	Homework, report, exam
12	2	Knowledge a under stand	State space representation of control and guidance system	lecture	Homework, report, exam
13	2	Knowledge a under stand	Solution of state space	lecture	Homework, report, exam

			:transition matrix and block diagram		
14	2	Knowledge a under stand	Examples	lecture	Homework, report, exam
15	2	Knowledge a under stand	exam	lecture	Homework, report, exam

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Control system"katsuhiko ogata
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	file:///E:/%D9Guidance%20and%20Control.html

1. Course Name:
Control and Guidance System
2. Course Code:
EMEN311
3. Semester / Year:
2nd Course/3rd Year
4. Description Preparation Date:
2-2024
5. Available Attendance Forms:
Attendance lectures
6. Number of Credit Hours (Total) / Number of Units (Total)30H
7. Course administrator's name (mention all, if more than one name)
Name: Iman Saleh Kareem Email: 50071@uotechnology.edu.iq
8. Course Objectives

Course Objectives	Aims of the course are to graduates a qualified engineer's who they have theoretical experience in modern control systems and guidance system like autopilot in electromechanical field. - This unit of study aims to provide theoretical knowledge and principles of with the ability to understand the theoretical modern control system and structure of the autopilot - Illustration and discussion the main component of autopilot with maintenance the overall system.

9. Teaching and Learning Strategies

Strategy	The course in Engineering control and guidance systems is covered by classical lecture and after each topic , examples and simulator will be provide to the student , and during tutorial hours the students will be able to apply the theories and principles for solving the problems in electromechanically field. Presentation of seminars on all curriculum vocabulary of control and guidance systems.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Knowledge a under standi	Introduction in control system concepts	Lecture	Homework and discussion
2	2	Knowledge a under standi	Basic concept in PID controller	Lecture	Homework and discussion
3	2	Knowledge a under standi	PID tunning methods	Lecture	Exam, Homework
4	2	Knowledge a under standi	examples	lecture	Exam, Homework
5	2	Knowledge a under standi	Guide aircraft	lecture	Homework, report, exam

6	2	Knowledge a under standi	Fundamentals of guidance System	lecture	Homework,report,exam
7	2	Knowledge a under standi	sensors	lecture	Homework, report, exam
8	2	Knowledge a under standi	examples	lecture	Homework, report, exam
9	2	Knowledge a under standi	Categories of guidance	lecture	Homework, report, exam
10	2	Knowledge a under standi	Type of autopilot	lecture	Homework, report, exam
11	2	Knowledge a under standi	Basic autopilot operation	lecture	Homework, report, exam
12	2	Knowledge a under standi	aircraft autopilot components	lecture	Homework, report, exam
13	2	Knowledge a under standi	Flight management system, Automatic director systems	lecture	Homework, report, exam
14	2	Knowledge a under standi	Autopilot maintenance	lecture	Homework, report, exam
15	2	Knowledge a under standi	exam	lecture	exam

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. " Literatures in different kinds of aircraft autopilot and control" 2-"Modern Control Engineering" by Ogata,
Main references (sources)	

Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	Internet web sites.

Course Description Form (4th Year)

Course Description Form (4th Year)

1. Course Name:
Communication Networks
2. Course Code:
EMEN409
3. Semester / Year:
First Semester / Year Four
4. Description Preparation Date:
4–Feb–2024
5. Available Attendance Forms:
Attendance Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
30 Hours through one semester /2 Units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Wajdi Rasheed Ismaeel Email: 50132@uotechnology.edu.iq
8. Course Objectives

Course Objectives	• Explaining wired and wireless communications. • Explaining wired networks architectures. • Explaining digital linking media types. • Explaining network OSI layers and their functions. • Explaining error detection and correction techniques.

9. Teaching and Learning Strategies	
Strategy	1- Provide the student theoretical lectures and practical experiments. 2- Asking students to analyze and solve different problems related to networks.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Add educational outcomes	Digital communication techniques.	Giving lectures	Students' interaction within the lecture
2	2	Add educational outcomes	Evaluating digital communication techniques.	Giving lectures	Students' interaction within the lecture
3	2	Add educational outcomes	Presenting different network architectures.	Giving lectures	Students' interaction within the lecture
4	2	Add educational outcomes	What are the OSI layers of the networks.	Giving lectures	Students' interaction within the lecture
5	2	Add educational outcomes	Functions of the OSI layers.	Giving lectures	Students' interaction within the lecture

6	2	Add educational outcomes	Protocols acting in networks	Giving lectures	Students' interaction within the lecture
7	2	Add educational outcomes	Terminals addressing in networks.	Open discussions between the student and the lecturer	Giving the student an incentive reward (grades) and urging him to excel
8	2	Mid-Term Exam			
9	2	Add educational outcomes	Study of serial communication techniques	Giving lectures	Students' interaction within the lecture
10	2	Add educational outcomes	Multiplexing and de-multiplexing techniques.	Open discussions between the student and the lecturer	Giving the student an incentive reward (grades) and urging him to excel
11	2	Add educational outcomes	Switching and routing in networks.	Open discussions between the student and the lecturer	Giving the student an incentive reward (grades) and urging him to excel
12	2	Add educational outcomes	Ethernet cables and optical fibers.	Giving lectures	Students' interaction within the lecture
13	2	Add educational outcomes	Switching Techniques optimization.	Giving lectures	Students' interaction within the lecture
14	2	Add educational outcomes	Error detection and correction in digital communications.	Giving lectures	Students' interaction within the lecture
15	2	Add educational outcomes	Signals in Ethernet networks.	Giving lectures	Students' interaction within the lecture
16	2	End of the term Exam			

11. Course Evaluation

The final score is out of 100, collected according to the different tasks assigned to the student such as daily preparation, oral presentations, daily quizzes, monthly exams, reports.... etc.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Non
Main references (sources)	**DATA COMMUNICATIONS AND NETWORKING**, McGraw-Hill, Forouzan Networking Series, 2007
Recommended books and references (scientific journals, reports…)	Non
Electronic References, Websites	Non

1. Course Name:

Microprocessors

2. Course Code:

EMEN410
3. Semester / Year:
Second Semester / Fourth Year
4. Description Preparation Date:
4-Feb-2024
5. Available Attendance Forms:
Attendance Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
30 Hours through one semester /2 Units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Wajdi Rasheed Ismaeel Email: 50132@uotechnology.edu.iq
8. Course Objectives

Course Objectives	• Revising the common numbering system then generalizing to hybrid numbering systems. • Explaining microprocessors architectures. • Explaining internal registers of the 8086 microprocessor. • Explaining assembly language instructions l of the 8086 microprocessor. • Practice designing and programming small system based on 8086 CPU.

9. Teaching and Learning Strategies	
Strategy	1- Provide the student theoretical lectures. 2- Asking students to analyze and solve different problems related microprocessors.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Add educational outcomes	Reviewing basic and hybrid numbering systems.	Giving lectures	Students' interaction within the lecture
2	2	Add educational outcomes	8086 Microprocessor architecture reviewed	Giving lectures	Students' interaction within the lecture
3	2	Add educational outcomes	Why assembly language is important	Giving lectures	Students' interaction within the lecture
4	2	Add educational outcomes	Explain the registers of the 8086	Giving lectures	Students' interaction within the lecture
5	2	Add educational outcomes	Review of the addressing modes	Giving lectures	Students' interaction within the lecture
6	2	Add educational outcomes	Review the arithmetic instructions	Giving lectures	Students' interaction within the lecture

7	2	Add educational outcomes	Review of logical instruction	Open discussions between the student and the lecturer	Giving the student an incentive reward (grades) and urging him to excel
8	2	Mid-Term Exam			
9	2	Add educational outcomes	Multiplexing and de-multiplexing techniques.	Giving lectures	Students' interaction within the lecture
10	2	Add educational outcomes	Review of conditional and jump instructions	Open discussions between the student and the lecturer	Giving the student an incentive reward (grades) and urging him to excel
11	2	Add educational outcomes	Review of the loop instructions	Open discussions between the student and the lecturer	Giving the student an incentive reward (grades) and urging him to excel
12	2	Add educational outcomes	Practical example (1) to design and program 8086	Giving lectures	Students' interaction within the lecture
13	2	Add educational outcomes	Practical example (2) to design and program 8086	Giving lectures	Students' interaction within the lecture
14	2	Add educational outcomes	Practical example (3) to design and program 8086	Giving lectures	Students' interaction within the lecture
15	2	End of the term Exam			In class, paper based exam

11. Course Evaluation

The final score is out of 100, collected according to the different tasks assigned to the student such as daily preparation, oral presentations, daily quizzes, monthly exams, reports.... etc.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Non
Main references (sources)	**The Intel microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro processor, Pentium II, Pentium III, Pentium 4, and Core2 with 64-bit extensions: Architecture, programming, and interfacing / By: Barry B. Brey—8th edition, 2009**
Recommended books and references (scientific journals, reports…)	Non
Electronic References, Websites	Non

13. Course Name:

Electromechanical Systems

14. Course Code:

EMEN408
15. Semester / Year:
2nd semester / 4th year
16. Description Preparation Date:
1−2−2024
17.Available Attendance Forms:
Attendance Lectures
18.Number of Credit Hours (Total) / Number of Units (Total)
30 hrs. / 2 credits
19. Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Dr. Mohammed Jawad Mohammed Email: mohammed.j.mohammed@uotechnology.edu.iq
20. Course Objectives

Course Objectives	• **Identify the basics of mechanical and electrical parts and convert electrical circuits into mechanical systems and vice versa.** • **identify hydraulic systems** • **Identify sensors, motors, and electrochemical controllers**

21. Teaching and Learning Strategies	
Strategy	Lecturer and presentation

22. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	4	Learn about mechanical systems and electrical circuits	-Connecting series and parallel to mechanical systems. - Connecting series and parallel electrical circuits	lecturer	quiz
3-4	4	Symmetry between mechanical and electrical systems	-Converting mechanical systems into electrical ones - Converting electrical systems to mechanical ones	lecturer	quiz

5-6	4	Applications of electromechanical devices	- Finding the transfer function for hydraulic systems	lecturer	quiz
7-8	4	Applications of electromechanical devices	AC and DC motors	lecturer	quiz
9-10	4	Identify signal conditioning functions	- op-Amp - Filters	lecturer	quiz
11-12	4	Applications of electromechanical devices	Sensors	lecturer	quiz
13-14	4	Applications of electromechanical devices	Actuators and Controllers	lecturer	quiz
15	2	Exam	Exam	Exam	Exam

23. Course Evaluation

15% mid exam – 15% student activities – 70% final Exam

24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Lyshevski, Sergey Edward. Mechatronics a control of electromechanical systems. C Press, 2017.
Main references (sources)	Raven, Francis H. Automatic con engineering. McGraw-Hill, Inc., 1995.
Recommended books and references (scientific journals, reports…)	Ogata, Katsuhiko. Modern con engineering fifth edition. 2010.
Electronic References, Websites	

1. Course Name:
AUTOMATION AND ROBOTICS
2. Course Code:
EMEN404
3. Semester /
4th Year:1st semester
4. Description Preparation Date:
2−2024
5. Available Attendance Forms:
Actual classroom learning- interactive Full Hours
6. Number of Credit Hours (Total) =45H / Number of Units (Total)
7. Course administrator's name (mention all, if more than one name)

Name: Assist Prof. Dr. Iman S.Kareem
Email:50071@uotechnology.edu.iq

8. Course Objectives

Course Objectives	-Aims of the course are: to graduates qualified engineers who they have theoretical knowledge and experience in principles of automation control systems and robotics in electromechanical field, with the ability to understand the theoretical principles for the intelligent tools which is used in control production system and structure of robotics with motion analysis. - Illustration and discussion the Main Theoretical Principles of Basic elements of automation &control production system, Advanced automation function, Hardware components for automation process control, Intelligent control system, introduction of robotics with classification and structure, ROBOTIC MOTION ANALYSIS, TRAJECTORY INTERPOLATORS , and path planning.

9. Teaching and Learning Strategies

Strategy	The course in Engineering automation and robotics is covered by classical lecture and after each topic , sample problem will be provide to the student , and during tutorial hours the students will be able to apply the theories and principles for solving the maintenance problems in electromechanically field. Presentation of seminars on all curriculum vocabulary with videos of automated systems

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Knowledge and under standing	Introduction to automation technology and Basic elements of automation	lecture	homework
2	3	Knowledge and under standing	control production system and Advanced automation functions	lecture	Discussion and

					homework
3	3	concepts, theory and application of of automation control system	Hard ware component in automation systems	Lecture	Homework and exam
4	3	knowledge of using of of automation control	Introduction to programmable logic controller(PLC)	lecture	Seminar discussion
5	3	knowledge of using of of automation control	Description of the PLC SOFTWARE	lecture	Seminar discussion
6	3	knowledge of using of automation control	PLC architecture	lecture	homework
7	3	knowledge of using of automation control	PLC architecture	lecture	Seminar discussion, exam
8	3	Knowledge and understanding	Robotics:INTRODUCTION:	lecture	homework
9	3	Knowledge understanding	robotic classification-robotic applications.	lecture	Seminar discussion, exam
10	3	Knowledge understanding	Study of- robot links, and joints with Autonomy of robot system	lecture	Seminar discussion, exam
11	3	Knowledge understanding	robot joint-specification-robot drives systems	lecture	Seminar discussion, exam
12	3	Knowledge understanding	Forward kinematics examples	lecture	Seminar discussion, exam
13	3	Knowledge understanding	- inverse kinematics examples	lecture	Seminar discussion, exam
14	3	Knowledge understanding	robot task planning	lecture	Seminar discussion, exam
15	3	evaluation	Exam.	lecture	exam

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc
Seminar or report (10), daily preparation(5), written exams(15)

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	no
Main references (sources)	automation production system &computer intecrated manufacturing " by Mikell P.Groover book3rd Prentice Hall 2008
Recommended books and references (scientific journals, reports…)	Internet web sites.
Electronic References, Websites	Internet web sites.

1. Course Name:					
RADAR Systems					
2. Course Code:					
EMEN403					
3. Semester / Year:					
1st semester/ 4th year					
4. Description Preparation Date:					
2/11/2024					
5. Available Attendance Forms:					
Attendance Lectures					
6. Number of Credit Hours (Total) / Number of Units (Total)					
2 Hours / Week					
7. Course administrator's name (mention all, if more than one name)					
Name: Jafaar Mohammed Daif Email: Jaafar.M.Dhaif@uotechnology.edu.iq					
8. Course Objectives					
Course Objectives	The primary objective of this course is to introduce radar concepts, technologies, challenges, and applications that .address the increasingly complex operational environment ,Lectures will be based on recent research activities presentations, and publications to gain an understanding of recent radar capabilities and continual improvements to the .technology, including modern threat systems				
9. Teaching and Learning Strategies					
Strategy	It will be evaluated based on research projects. In addition, the class will utilise the "interac learning" concept, such as discussions in class, question and answer during lectures, .interaction between students with homework assignment presentations				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	The moving ta indicator radar type be reviewed. It include learning about ,most important feat which include the met ,of operation, its ty blind speed, and .method of mitigating i	Moving target indicator ra	Giving the le+cture Discussion and exercises	The extent of the stude interaction with the lec and the extent of understanding through Questions and answers
2	3	The student will l :about	● Double delay-canceller	Giving the le+cture Discussion	The extent of the stude interaction with the lec

		● Double delay-canceller ● Staggered P Repetition Frequencies. ● Pulse Doppler Ra ● MTI and Dop RADAR compari ● Range and Dop ,Ambiguities Resolving Ra ,Ambiguity Resolving Dop Ambiguity	● Staggered P Repetition Frequenci ● ,Pulse Doppler R .Working ● MTI and Dop RADAR comparison ● Range and Dop Ambiguities, Resol ,Range Ambig Resolving Dop Ambiguity	and exercise	and the extent of understanding through Questions and answers
3	3	The student wi understand th importance of puls compression in rada systems. Beside, th match filter is a essential part of th ;detection sid therefore, it will enabl the students t recognise the purpos of using the pusl compression. And hov the pulse compressio can be applied to frequency modulatio .signal	● Pulse Compression RADAR ● Motivation for P Compression ● The Matched Filter ● Pulse Compres Process ● Frequency Modula In Pulse Compressio ● Matched Filter Anal of LFM P Compression	Giving the le+cture Discussion and exercise	The extent of the stude interaction with the lec and the extent of understanding through Questions and answers
4	3	● The students gain knowledge how to make derivation based certain type of r according to .operation	● T he RADAR Equa with Pulse Compress	Giving the le+cture Discussion and exercise	The extent of the stude interaction with the lec and the extent of understanding through Questions and answers
5	2	First month Exam	First month Exam	First month Exam	First month Exam
6	3	● Active Processing in LFM Pulse Compression ● Correlation Processing ● Stretch Processing ● Synthetic Aperture Radars ● Resolution along the XLOS Axis	● The student will knowledge on how different types of p compression work understand the r differences betw .them	Giving the le+cture Discussion and exercise	The extent of the stude interaction with the lec and the extent of understanding through Questions and answers
7	3	● Radar Equation the Sar System	Understanding the b derivation of the SAR r range equation and the rel .parameters	Giving the le+cture Discussion and exercise	The extent of the stude interaction with the lec and the extent of understanding through Questions and answers
8	3	Tracking Radars	The student will learn a how this type of trac	Giving the le+cture Discussion	The extent of the stude interaction with the lec

			radar system works, addition to the factors .affect its calculations	and exercise	and the extent of understanding through Questions and answers
9	3	Tracking Ra calculations	In more detail,the student be able to understand business rule of trac objectives as well as the er that arise according to type and based .calculations	Giving the le+cture Discussion and exercise	The extent of the stude interaction with the lec and the extent of understanding through Questions and answers
10	2	Second month Exam	Second month Exam	Second month Exam	Second month Exam
11	3	Over-the-Horizon Radar	The student learns about o the-horizon radars and they work, along mathematical calculat .based on their operations	Giving the le+cture Discussion and exercise	The extent of the stude interaction with the lec and the extent of understanding through Questions and answers
12	3	Skywave OTHR System (Environmental effect the sky)	In this lesson, environmental effects of sky will be covered on signals throughout r .operation	Giving the le+cture Discussion and exercise	The extent of the stude interaction with the lec and the extent of understanding through Questions and answers
13	3	Secondary Surveilla Radar	The student will unders the basic operation of secondary surveillance r .Radar, its applications	Giving the le+cture Discussion and exercise	The extent of the stude interaction with the lec and the extent of understanding through Questions answers
14	3	Secondary Surveilla Radar Equation	Starting from the b principle of derivation, students will be able recognise how to start mal the derivation into the r equation of the Secon .Surveillance Radar Equa This comes with s .mathematical examples	Giving the le+cture Discussion and exercise	The extent of the stude interaction with the lec and the extent of understanding through Questions answers
15	3	Final Semester Exam	Final Semester Exam	Final Semester Exam	Final Semester Exam

11. Course Evaluation

,The course grade is based upon attendance and participation, homework assignments and presentations, midterms and the final exam. Take home the final exam to include “Technical Report” and it will be weighted more heavily .in the final exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Not available
Main references (sources)	Radar Systems And Components, 2022 Radar and Communication Spectrum Sharing, 2018 introduction to Radar Systems 3rd Edition, 2002..
Recommended books and references (scientific journals, reports...)	Not available
Electronic References, Websites	https://radar-engineer.com/pages/resources.html An interactive introduction to Radar - http://media.thales-nederland.nl/thisisradar/ThisIsRadar.html Radar Tutorial notes with diagrams - http://www.radartutorial.eu/index.en.html

	IET, Radar Sonar and Navigation. - http://www.ietdl.org/IET-RSN IEEE, Aerospace and Electronic Systems Magazine - http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=62

1. Course Name:					
Ethics in Engineering					
2. Course Code:					
EMEN412					
3. Semester / Year:					
4th Year, 2nd semester					
4. Description Preparation Date:					
2−2024					
5. Available Attendance Forms:					
Attendance Lectures					
6. Number of Credit Hours (Total) / Number of Units (Total)					
2 units					
7. Course administrator's name (mention all, if more than one name)					
Name: Jalal M. Jalil Email: 50003@uotechnology.edu.iq					
8. Course Objectives					
Course Objectives	• Moral Sensitivity • Moral Reasoning • Ethical Theories • Increased knowledge of the Ethical Codes				
9. Teaching and Learning Strategies					
Strategy	Problem Based Learning				
10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1 2		GO5	• Moral Reasoning, • Being a Professional • Codes of Ethics,	PBL	Report, Mid Exam, Seminar, Final Exam

3 4 5 6 7 8 9 10 11 12 13 14			• Ethical Problem Solving Techniques • Ethical concerns Related to Engineering Organizations • Conflicts of interest • Safety, Risk and accidents • Informed Consent • Legal liability • Whistleblowing • Research Ethics • Global Issues • Emerging Technology and Ethics • Environmental Ethics		

11. Course Evaluation	
Mid exam 15%, student activities 15%, final exam 70%.	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Engineering Ethics, Fourth Edition, Charles B. Fledderma University of New Mexico.
Main references (sources)	-
Recommended books and references (scientific journals, reports…)	-
Electronic References, Websites	-

1. Course Name:
Aeroelasticity
2. Course Code:
EMEN406
3. Semester / Year:
2nd Semester / 4th Year

4. Description Preparation Date:
2−2024
5. Available Attendance Forms:
Attendance Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
2 Hours /Week Theoretical, 30 Hours (Total) 2 Units (Total)
7. Course administrator's name (mention all, if more than one name)
Name: Akeel Abdulkareem Abtan Email: Akeel.A.Abtan@uotechnology.edu.iq
8. Course Objectives

Course Objectives	• **−Introduces the fundamental concepts in Aeroelasticity** • **− Understand the concepts of flutter (self−excited oscillations) and divergence (unbounded structural deformation) and their significance in aircraft design and safety.** • **Learn analytical methods used to model and analyze aeroelastic systems**

9. Teaching and Learning Strategies	
Strategy	Problem Based Learning (PBL)

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2 3,4 5 6 7,8 8,9 10,11 12,13	2 Hours /Week	An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.	• Mechanics Fundamentals ▪ Modeling the Dynamics of Strings • Elementary Beam Theory • Composite Beams • The Notion of Stability • Static Aeroelasticity ▪ Wind-Tunnel Models ▪ Wall-Mounted Model ▪ Sting-Mounted Model ▪ Strut-Mounted Model ▪ Wall-Mounted Model for Application to Aileron Reversal • Uniform Lifting Surface	PBL	Quiz Mid Exam Final Exam

14,15			▪ Steady-Flow Strip Theory ▪ Divergence ▪ Aileron Reversal		

11. Course Evaluation
Mid exam 15%, student activities 15%, Final exam 70%.

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	1. Introduction to Structural Dynamics and Aeroelasticity, Dewey H. Hodges, G. Alvin Pierce, 2011 2. Introduction to Aircraft Aeroelasticity and Loads, Jan R. Wright, 2007
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1. Course Name:
Computer Aided Design and Manufacturing (CAD/CAM)
2. Course Code:
EMEN407
3. Semester / Year:
1st Semester / 4th Year
4. Description Preparation Date:
2−2024
5. Available Attendance Forms:
Attendance Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
2 Hours /Week Theoretical, 1 Hours /Week Practical, 45 Hours (Total) 3Units (Total)
7. Course administrator's name (mention all, if more than one name)
Name: Akeel Abdulkareem Abtan Email: Akeel.A.Abtan@uotechnology.edu.iq
8. Course Objectives

Course Objectives	• **−Introduces the fundamental concepts in CAD/CAM systems**

	• **–Transferring part geometry from CAD to CAM for the development of a CNC–ready program.** • **–Use CAD/CAM software**

9. Teaching and Learning Strategies

Strategy	Problem Based Learning (PBL)

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1,2 3,4,5 6,7,8 8,9 10,11,12 13,14,15	3 Hours /Week	An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.	• The Design Process ▪ The Product Cycle and CAD/CAM ▪ Benefits of Computer in Industry • Geometrical Transformations ▪ Mathematical elements in 2-D graphics ▪ Mathematical elements in 3-D graphics • Finite Element Method ▪ Spring Element ▪ Bar Element • System Design and Manufacture ▪ Manufacturing Production Cycle ▪ Method of Workpiece Transport ▪ An Automation Block Building • Fundamental of Numerical Control ▪ Basic Component Of (NC) System ▪ Classification of Numerical Control • CNC Machines Part Programming ▪ Automatic Tool Changer ▪ Coordinate Systems	PBL	Quiz Mid Exam Final Exam

			▪ An Introduction to Part Programming		

11. Course Evaluation

Mid exam 15%, student activities 15%, LAB 10%, final exam 60%.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	1.Computer Aided Manufacturing, Chien, Richard and Wang, 2006 2.CAD/CAM Principles and applications, Pnrao, 2010
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1. Course Name:	
Microwave and RADAR Engineering	
2. Course Code:	
EMEN405	
3. Semester / Year:	
Second, 4th	
4. Description Preparation Date:	
2-2024	
5. Available Attendance Forms:	
Attendance Lectures	
6. Number of Credit Hours (Total) / Number of Units (Total)	
2 Hours / Week	
7. Course administrator's name (mention all, if more than one name)	
Name: Jafaar Mohammed Daif Email: Jaafar.M.Dhaif@uotechnology.edu.iq	
8. Course Objectives	
Course Objectives	,This course introduces the basics of microwaves devices, circuits, and passive devices. These are used in the front-end of all telecommunication transmitters and .receivers and are thus extensively used in the industry Also, the course covers radar engineering. Radar is a basic device used in military and civil applications and has a large market. This course makes students industry-.ready in the microwave field
9. Teaching and Learning Strategies	
Strategy	It will be evaluated based on research projects. In addition, the class will utilise the "interac learning" concept, such as discussions in class, question and answer during lectures, .interaction between students with homework assignment presentations

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Microwaves: frequency band, EM waves, General applications of microwaves	Describe EM wave frequency bands and spectrum	Giving the le+cture Discussion and exercises	The extent of student's interac with the lecture and extent of understanding throug

			State the strengths and limitations of microwave communication		Questions and answe
2	2	Transmission lines: Parameters, general line equation, lossless line, λ/4 line, standing waves , VSWR, reflection coefficient ,stub matching (single and double) , skin effect	Explain the equivalent circuit of a two wire transmission line. Obtain the general equation for a two wire transmission line. State characteristics of lossless transmission line. Explain impedance matching using stub Using design equations solve example of single stub matching	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions and answe
3	2	Waveguides: Wave propagation through guided medium, reflections of waves	Describe propagation of microwaves through waveguide and explain cutoff wavelength. Differentiate between transmission line and waveguide. Calculate cut off wavelength, group and phase velocities, characteristics wave impedance of any waveguide parameters.	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions and answe
4	2	Rectangular waveguide : structure , cut off wavelength , group and phase velocities, characteristic wave impedance , TE ,TM modes , field patterns , examples, S Parameters basics	Distinguish the following: cut off wavelength, group and phase velocities, characteristics wave impedance, TE, TM modes, S Parameters.	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions and answe
5	2	First month Exam	First month Exam	First month Exam	First month Exam
6	2	Circular waveguide: structure, cut off wavelength, modes, examples, comparison with rectangular waveguide	. Compare the working of rectangular waveguide and circular waveguide.	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions and answe

7	2	Microwave Components: Tees, hybrid ring , directional coupler , Duplexer , isolator , circulator , cavity resonators	State the applications of the following microwave components: Tees, hybrid ring , directional coupler , Duplexer, isolator, circulator , cavity resonators, Explain the workings of the directional coupler, isolator, and circulator with sketches. Explain the workings of cavity resonators with sketches..	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions and answe
8	2	Microwave Accessories: corners and bends , twist and taper	Describe working of bends, corner, and twist taper with sketches. Describe the frequency limitation of vacuum tubes at microwave frequency.	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions and answe
9	2	Limitations of vacuum tubes at microwave frequency	Explain function of reflex klystron with the help apple gate diagram. Explain structure and effects of various fields' acts on electron moving in the magnetron tube. Describe working of Travelling Wave Tube as an amplifier. Explain π mode oscillation and define frequency pushing and pulling. Explain two cavity klystron with apple gate diagram. Describe working of Backward Wave Oscillator.	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions and answe
10	2	Second month Exam	Second month Exam	Second month Exam	Second month Exam
11	2	Microwave tubes	Explain microwave power	Giving the le+cture Discussion	The extent of student's interac

		amplifiers: Klystron - Two cavity and multi cavity, Travelling Wave Tube Microwave tubes oscillators: Reflex klystron, Magnetron, Backward Wave Oscillator	measurement methods. .Explain significance of VSWR measurement. Explain attenuation measurement methods. Describe Q measurement technique.	and exerci	with the lecture and extent of understanding throug Questions and answe
12	2	Explain hazards due to microwave radiation.	Microwave radiation hazards: types (HERP, HERO, HERF), and protection from hazards	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions and answe
13	2	Microwave measurement: power, frequency, wavelength (free space, guided and cutoff), VSWR, attenuation, 'Q'.	Explain the parametric amplifier with diagrams. Explain the frequency up and down conversion concepts for parametric amplifier	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions answers
14	2	The student will knowledge of how the b design is established with aid of mathema .expressions	Filter Design, Passive RC Filters Equiva Circuits Passive RLC Fi Equivalent Circuits Meaning of Distrib Elements	Giving the le+cture Discussion and exerci	The extent of student's interac with the lecture and extent of understanding throug Questions answers
15	3	Final Semester Exam	Final Semester Exam	Final Semester Exam	Final Semester Exam

11. Course Evaluation

,The course grade is based upon attendance and participation, homework assignments and presentations, midterms and the final exam. Take home the final exam to include "Technical Report" and it will be weighted more heavily .in the final exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Not available
Main references (sources)	Kulkarni M. Microwave and radar engineering. Um Publications, New Delhi; 2009. Chaturvedi PK. Microwave, Radar & RF Engineering. Sprir Singapore; 2018. Belous A. Handbook of Microwave and Radar Engineer Springer Nature; 2021 Jan 4.
Recommended books and references (scientific journals, reports...)	Not available
Electronic References, Websites	

1. Course Name:

Digital Signal Processing

2. Course Code:

EMEN401

3. Semester / Year:

First Semester / 4th Year

4. Description Preparation Date:

2024-3

5. Available Attendance Forms:

Attendance Lecture

6. Number of Credit Hours (Total) / Number of Units (Total): 3Hours \ week(2 H Theory + 1 H Tutorial \ 2 Units

7. Course administrator's name (mention all, if more than one name)

Name: Asst. Prof. Dr. Ahmed Abdulqader Hussein
Email: 50045@uotechnology.edu.iq

8. Course Objectives

Course Objectives	The primary objective of this course is to provide a thorough understanding and working knowledge of design, implementation and analysis DSP syste

9. Teaching and Learning Strategies

Strategy	The teaching strategy of the course is divided into three sections: classroom learning , home works and quizzes and finally students reports .

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Theory , Tutorial	Introduction to DSP, Real time DSP System, Applications of DSP, Sampling Theorem and ADC	Lecture	Quiz, Homework
	3	Theory , Tutorial	Discrete-time signals and systems Modeling	Lecture	Quiz, Homework

2			Properties of Discrete-Time systems, Linearity , Causality, Time Variant\Invariant, Stability		
3	3	Theory , Tutorial	DSP Operations: Convolution Linear and Circular Convolution, Correlation, Autocorrelation and Cross-correlation	Lecture	Quiz, Homework
4	3	Theory , Tutorial	Z Transform: Definition and Properties Convergence Theorems Inverse Z Transform: Computation based on residue theorem and Partial Fraction Method	Lecture	Quiz, Homework
5	3	Theory , Tutorial	Difference equations and time-domain response, Solving difference equations Impulse response and step response	Lecture	Quiz, Homework
6	3	Theory , Tutorial	Transfer Functions: first, second, and Higher order TF Frequency response	Lecture	Quiz, Homework
7	3	Theory , Tutorial	Introduction to Fourier Transform: Discrete Time Fourier Transform DTFT, Discrete Fourier Transform DFT: Definitions and calculations	Lecture	Quiz, Homework
8	3	Theory , Tutorial	Twiddle factor Matrix Discrete Fourier Transform DFT by using Matrix Formulation, DFT Properties, Time-shift theorem, Correlation, Complex conjugation, Real and imaginary sequences	Lecture	Quiz, Homework
9	3	Theory , Tutorial	Fast Fourier Transform FFT Algorithms, Decimation in Time FFT, Decimation in Frequency FFT Algorithm, Inverse Fast Fourier Transform IFFT Algorithms	Lecture	Quiz, Homework
10	3	Theory , Tutorial	Introduction to Digital Filters Types of Digital Filters	Lecture	Quiz, Homework
11	3	Theory, Tutorial	Digital Filters Realization FIR Filters Realization: Direct form , Cascade structure, linear phase structures	Lecture	Quiz, Homework
12	3	Theory , Tutorial	Digital Filters Realization IIR Filters Realization Direct form, Direct canonic form, Cascade structure parallel structures	Lecture	Quiz, Homework
13	3	Theory , Tutorial	FIR Filters Design: Window Technique Types of windows	Lecture	Quiz, Homework
14	3	Theory , Tutorial	IIR Filters Design: Analog to Digital Filter Transformation, Bilinear Transformation Method	Lecture	Quiz, Homework
15		Theory ,	Midterm Exam	Lecture	Exam

	3	Tutorial			

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books if any)	
Main references (sources)	1- Oppenheim, Alan V., Ronald W. Schafer, and John R. Buck. Discrete-time signal processing, 2nd edition, Pearson Education. 2- Monson H.Hayes "digital signal processing "schaums outline series 2007
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

25. Course Name:
Digital Image Processing
26. Course Code:
EMEN402
27. Semester / Year:
Second Semester / 4th Year
28. Description Preparation Date:
2024-3
29.Available Attendance Forms:
Attendance Lecture
30.Number of Credit Hours (Total) / Number of Units (Total): 3Hours \ week(2 H Theory + 1 H Tutorial \ 2 Units
31. Course administrator's name (mention all, if more than one name)
Name: Asst. Prof. Dr. Ahmed Abdulqader Hussein Email: 50045@uotechnology.edu.iq
32. Course Objectives

Course Objectives	• **To learn the fundamental concepts of Digital Image Processin** • **To study basic image processing operations.** • **To understand image analysis algorithms.**

33. Teaching and Learning Strategies

Strategy	The teaching strategy of the course is divided into three sections: classroom learning , home works and quizzes and finally students reports .

34. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Theory , Tutorial	**Introduction And Digital Image Fundamentals:** ▪ The origins of Digital Image Processing ▪ Examples of Fields that Use Digital Image Processing ▪ Fundamentals Steps in Image Processing ▪ Elements of Digital Image Processing Systems	Lecture	Quiz, Homework
2	3	Theory , Tutorial	▪ Image Sampling and Quantization, ▪ Some basic relationships like Neighbors Connectivity, Distance Measures between pixels ▪ Translation, Scaling, Rotation and Perspective Projection of image	Lecture	Quiz, Homework
3	3	Theory , Tutorial	**Intensity Transformation** **Image Enhancement Methods** ▪ Basic Gray Level Transformations ▪ Linear Functions ▪ Logarithmic Functions ▪ Power Law Functions	Lecture	Quiz, Homework
4	3	Theory , Tutorial	**Image Enhancement Methods** Piecewise Linear Transformation Functions ▪ Contrast Stretching , thresholding ▪ Gray – Level Slicing ▪ Bit – Plane Slicing	Lecture	Quiz, Homework
5	3	Theory , Tutorial	**Histogram Equalization** ▪ Histogram definition ▪ Histogram Processing	Lecture	Quiz, Homework

			▪ Image Enhancement using Histogram Equalization		
6	3	Theory , Tutorial	**Image Enhancement in the Spatial Domain** Basics of Spatial Filters Smoothening and Sharpening Spatial Filters ▪ Types of Smoothing Filters (Low Pass Filters) Types of Sharpening Filters (High Pass Filters	Lecture	Quiz, Homework
7	3	Theory , Tutorial	**Image Enhancement in the Frequency Domain** Introduction to Fourier Transform and the frequency Domains ▪ Computing Fourier Transform of the Image ▪ Phase, Magnitude Power Spectra of an Image	Lecture	Quiz, Homework
8	3	Theory , Tutorial	**Image Enhancement in the Frequency Domain** ▪ Smoothing Frequency Domain Filters ▪ Sharpening Frequency Domain Filters ▪ Homomorphic Filtering	Lecture	Quiz, Homework
9	3	Theory , Tutorial	**Image Restoration:** ▪ A model of The Image Degradation / Restoration Process ▪ Noise Models ▪ Restoration in the presence of Noise Only Spatial Filtering	Lecture	Quiz, Homework
10	3	Theory , Tutorial	**Image Restoration (cont.):** ▪ Periodic Noise Reduction by Frequency Domain Filtering ▪ Linear Position-Invariant Degradations ▪ Estimation of Degradation Function	Lecture	Quiz, Homework
11	3	Theory, Tutorial	**Image Restoration (cont.):** ▪ Geometric Mean Filter ▪ Geometric Transformations	Lecture	Quiz, Homework
12	3	Theory , Tutorial	**Image Compression:** ▪ Coding ▪ Interpixel and Psychovisual Redundancy ▪ Image Compression models ▪ Compression standards	Lecture	Quiz, Homework
13	3	Theory , Tutorial	**Image Compression:** ▪ Image Compression Methods ▪ Huffman Coding	Lecture	Quiz, Homework
14	3	Theory , Tutorial	**Image Segmentation:** ▪ Detection of Discontinuities ▪ Edge linking and boundary detection ▪ Thresholding	Lecture	Quiz, Homework
15	3	Theory , Tutorial	Midterm Exam	Lecture	Exam
35. Course Evaluation					

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

36. Learning and Teaching Resources

Required textbooks (curricular books if any)	
Main references (sources)	1- Gonzalez, Rafael C. *Digital image processing*. Pearson education india, 2009.. 2- Solomon, Chris, and Toby Breckon. *Fundamentals of Digital Image Processing: A practical approach with examples in Matlab*. John Wiley & Sons, 2011.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	