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

Electromechanical Engineering System Program Academic Course Description

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 theyhave 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: **Electromechanical Eng. Dept.**

Academic or Professional Program Name: **Electromechanical Eng. Dept.**

Final Certificate Name: **Electromechanical Eng./Electromechanical System Engineering**

Academic System:**Engineering**

Description Preparation Date: **6/2/2024**

File CompletionDate:**7/2/2024**

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

The file is checked by:

Departmentof Quality Assurance and University Performance

Director of the Quality Assurance and UniversityPerformance Department:

Date:

Signature:

Approval of the Dean

1. Department Vision

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

2. Department 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. Department 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 Mission

1- Prepare our students for successful careers in the electromechanical systems profession,

2- Conduct high quality and innovative research, and

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

The EMSE mission statement is published on the web site:

5. Program Accreditation

The program have not accreditation.

6. Other external influences

No sponsor for the program?

7. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	7	16	0.125	Basic
College Requirements	13	36	0.232	Basic
Department Requirements	36	97	0.642	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	
2024			theoretical	practical
1st Year, 1st Semester	EME101	Computer Sciences I	2	1
1st Year, 1st Semester	WOSH101	Workshop I	–	6
1st Year, 1st Semester	EME105	Mathematics I	4	-
1st Year, 1st Semester	EMSE110	Fundamentals of Electrical Engineering (D.C)	2	2
1st Year, 1st Semester	EMSE112	Fundamentals of Auto-CAD tool Drawing	-	3
1st Year, 1st Semester	EME107	Physics I	4	0
1st Year, 1st Semester	EME104	Sport	2	0

1st Year, 2ndSemester	EMSE109	Engineering Mechanics	2	2
1st Year, 2nd Semester	WOSH102	Workshop II	–	6
1st Year, 2nd Semester	EME106	Mathematics II	4	–
1st Year, 2nd Semester	EMSE111	Fundamentals of Electrical Engineering (A.C)	2	2
1st Year, 2nd Semester	EMSE113	Fundamentals of Engineering Drawing (Auto CAD)	–	3
1st Year, 2nd Semester	EME108	Physics II	4	–
1st Year, 2nd Semester	EME103	English Language I	2	–
2ndYear, 1stSemester	EME201	English Language II	2	–
2nd Year, 1st Semester	EME203	Advanced Mathematics I	4	–
2nd Year, 1st Semester	EME205	Computer Sciences II	2	1
2nd Year, 1st Semester	EMSE206	Electrical Machines DC	2	2
2nd Year, 1st Semester	EMSE210	Electrical Circuits	2	2
2nd Year, 1st Semester	EMSE208	Thermodynamics	2	2
2nd Year, 1st Semester	EMSE212	Strength of Material	2	2
2nd Year,2ndSemester	EME202	Human Rights	2	–
2nd Year,2nd Semester	EME204	Advanced Mathematics II	4	–
2nd Year,2nd Semester	EMSE209	Fluid Mechanics	2	2
2nd Year,2nd Semester	EMSE207	Electrical Machines AC	2	2
2nd Year,2nd Semester	EMSE211	Electronic Circuits	2	2
2nd Year,2nd Semester	EMSE213	Measurements and Instrumentations	2	2
2nd Year,2nd Semester	EMSE214	Heat Transfer	2	1
3rdYear, 1stSemester	EME301	Industrial Engineering	2	–
3rd Year, 1st Semester	EME302	Engineering Analysis	4	–
3rd Year, 1st Semester	EMSE306	Vibration Theory	2	2
3rd Year, 1st Semester	EMSE308	Hydraulic Systems	2	1
3rd Year, 1st Semester	EMSE304	Analog Communications	2	2
3rd Year, 1st Semester	EMSE312	Power Systems	2	-
3rd Year, 1st Semester	EMSE310	Digital Electronics	2	2
3rd Year, 2ndSemester	EMSE305	Digital Communications	2	2
3rd Year, 2nd Semester	EME303	Numerical Analysis	4	-
3rd Year, 2nd Semester	EMSE307	Control Systems	2	2
3rd Year, 2nd Semester	EMSE313	Protection Systems	2	-
3rd Year, 2nd Semester	EMSE309	Theory of Machines	2	1

3rd Year, 2nd Semester	EMSE314	Special Machines	2	-
3rd Year, 2nd Semester	EMSE311	Electromechanical Design	2	-
4thYear, 1stSemester	EMSE401	Power Electronics	2	2
4th Year, 1st Semester	EMSE403	Signal and Systems	2	–
4th Year, 1st Semester	EMSE405	Microprocessors	2	1
4th Year, 1st Semester	EMSE407	Automation and Control	2	–
4th Year, 1st Semester	EMSE410	Air Conditioning and Refrigeration Systems	2	2
4th Year, 1st Semester	EMSE412	Electromechanical Devices	2	2
4th Year, 1st Semester	EMSE413	Project	–	4
4th Year, 2ndSemester	EMSE402	Electric Drives	2	2
4th Year, 2nd Semester	EMSE404	Signal Processing	2	–
4th Year, 2nd Semester	EMSE406	Microcontrollers	2	1
4th Year, 2nd Semester	EMSE408	Robotic Systems	2	–
4th Year, 2nd Semester	EME409	Ethics in Engineering	2	–
4th Year, 2nd Semester	EMSE411	Computer Aided Design And Manufacturing (CAD/CAM)	2	2
4th Year, 2nd Semester	EMSE414	Project	–	4

9. Expected learning outcomes of the program

Graduate Outcomes (GOs) for engineering from ICAEE,

1. An ability to identify, formulate, and solve engineering in energy and renewable energies 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 energy and renewable energies 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

Problem Based Learning (PBL) is the new teaching and learning strategies and it is 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 (1)	Mechanical Eng.	thermal				
Prof. Assistance (2)	Mechanical Eng.	thermal				
Prof. Assistance (3)	Mechanical Eng.	applied				
Lecturer (3)	Mechanical Eng.	thermal				
Prof. assistance (4)	Electrical Engineering	power				
Professor (1)	Electrical Engineering	power				
Professor (1)	Electrical Engineering	control				
Lecturer (2)	Electrical Engineering	power				
Prof. assistance (1)	Science	Physics				

Professional Development

Mentoring new faculty members

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

1- Enter the class with previous two faculty 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).

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

Program of system engineering is one of the ABET recognized program and listed in their Web. The initiative of the program came as a result of engineers who can serve as mechanical and electrical workers together. Similar trend was observed globally. The program prepares students for technical and engineering support positions in industry. The program builds on a strong foundation of mathematics and basic sciences, with application of computers design mechanical systems and manufacturing processes using Computer Aided Design (CAD), Compute Aided Machining (CAM), and Computer Aided Engineering (CAE) tools. The program source information based. Many international programs were recently created related to system engineering. 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 many related Iraqi ministries, the information were adopted with their needs.

15. Program Development Plan

The field of system engineering is developing with time globally, so some the program courses were changed every four years. The developing of the program depends on two parameters, first duo to developing of the field globally and second is the requirements of the Iraqi ministries. The contents of the courses reviewed by advisory board every meeting and updated.

Program Skills Outline											
				Required program Learning outcomes							
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills		Ethics	
				GO1	GO2	GO3	GO6	GO4	GO7	GO5	
1st Year	EME103	English Language I						*			
	EME106	Mathematics II		*							
	EME108	Physics II		*							
	EMSE109	Engineering Mechanics		*							
	EMSE111	Fundamentals of Electrical Engineering (A.C)				*					
	EMSE113	Fundamentals of Engineering Drawing (Auto CAD)					*				
2ndYear	EME204	Advanced Mathematics II		*							
	EMSE207	Electrical Machines AC				*					

	EMSE211	Electronic Circuits				*				
	EMSE213	Measurements and Instrumentations		*						
	EMSE214	Heat Transfer		*						
3rd Year	EME302	Engineering Analysis		*						
	EMSE305	Digital Communications				*				
	EMSE307	Control Systems							*	
	EMSE309	Theory of Machines		*						
	EMSE311	Electromechanical Design			*					
	EMSE314	Special Machines		*						
4th Year	EMSE402	Electric Drives		*						
	EMSE404	Signal Processing		*						
	EMSE406	Microcontrollers				*				
	EMSE408	Robotic Systems							*	
	EMSE409	Ethics in Engineering								*
	EMSE411	Computer Aided Design And Manufacturing (CAD/CAM)			*					
	EMSE414	Project						*	*	

Course Description Forms

Second Year

1. Course Name:
English Language II
2. Course Code:
EME201
3. Semester / Year:
2st Year, 1st Semester
4. Description Preparation Date:
2023
5. Available Attendance Forms:
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: Ahlam L. Shuraiji Email:

8. Course Objectives	
Course Objectives	● Will learn English language grammar. ● Will learn reading skills. ● Will learn writing skills. ● Will be able to write his/her own CV. ● Will be able to write an easy in any given subject. ● Will learn presentation skills ● Will be able to give a short presentation.

9. Teaching and Learning Strategies	
Strategy	PBL

10. Course Structure

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

		Outcomes			
1 2 3 4 5 6 7 8 9 10 11 12 13 14		GO4	● Simple present ● Present continuous ● Present prefect ● Present perfect continuous ● Simple past ● Past prefect ● Past perfect continuous ● Future ● Adverbs ● Punctuations ● Reading skills ● Writing skills ● Oral presentation	PBL	Quiz Mid Exam Final Exam

11. Course Evaluation	
Student Activities 15%, Mid exam 15%, Final exam 70%.	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	New Headway for beginners – 4th edition
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1. Course Name:
Human Rights
2. Course Code:
EME202
3. Semester / Year:
2st Year, 2ndSemester
4. Description Preparation Date:
2023
5. Available Attendance Forms:
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: Wisam Ali Hassan
Email:

8. Course Objectives

Course Objectives	• Human rights in ancient civilizations. • Human rights in divine laws and religions. • Human rights sources. • Human rights guarantees. • The future of human rights.

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		GO5	• Human rights in ancient civilizations. • Human rights in divine laws and religions. • Human rights sources. • Human rights guarantees. • The future of human righ	PBL	Quiz Mid Exam Final Exam

11. Course Evaluation

Student Activities 15%, Mid exam 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:
Advanced Mathematics I
2. Course Code:
EME203
3. Semester / Year:
2st Year, 1st Semester
4. Description Preparation Date:
2023
5. Available Attendance Forms:
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: Ahmed KamilHasan Email:

8. Course Objectives

Course Objectives	• Series • Sequence • Fourier Series • Taylor series. • Laplace Transform • Inverse Laplace Transform. •

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 10,11,1		GO1	• Application of Series • Application of sequence. • Application of Laplace Transform. • Application of Inverse Laplace Transform.	PBL	Quiz Mid Exam Final Exam

11. Course Evaluation

Student Activities 15%, Mid exam 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 Mathematics II

2. Course Code:

EME204

3. Semester / Year:

2st Year, 2ndSemester

4. Description Preparation Date:

2023

5. Available Attendance Forms:

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: Ahmed KamilHasan
Email:

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 7,8,9 10,11,1		GO1	• Application of partial derivative • Application of line integration. • Application of double integration. • Application of triple integration.	PBL	Quiz Mid Exam Final Exam

11. Course Evaluation

Student Activities 15%, Mid exam 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:

Computer Science II

2. Course Code:

EME205

3. Semester / Year:

2st Year, 1st Semester

4. Description Preparation Date:

2023

5. Available Attendance Forms:

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: AsifaMahdi Mohammed
Email:

8. Course Objectives

Course Objectives	• Introduction & Basics in order to be apple to read and write simple programs in c++ language. • Selection tools including (if statement, if .else statement, if .else construct, switch statement & conditional operator) • Iteration tools including (while loop statement, do..while loop sta for loop statement and jumping statements) • Functions including (standard functions and user input functions) therefore students can use them to build more than one program. • Arrays tools including (one-dimensional array and two dimensional array) • Pointers • Strings to deal with characters as well as Words and sentences • Files: to deal with ways of entering and printing data and results in files and computer monitor •

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		GO6	• Pre-Increment & post - increment operators. • Conditional operator • Switch. • Loops. • Standard functions. • References • Classes	PBL	Quiz Mid Exam Final Exam

11. Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	PROGRAMMING WITH C++, JOHN R. HUBBARD, SCHAUM'S OUTLINE SERIES McGRAW-HILL, 2000.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1. Course Name:
DC Electrical Machines
2. Course Code:
EMSE206
3. Semester / Year:
3rd Year, 1st Semester
4. Description Preparation Date:
2023
5. Available Attendance Forms:
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: Abduljabbar O. Hanfesh Email:

8. Course Objectives

Course Objectives	• The basics of the electromagnetic, i.e. I-H relation, B-H relation, and magnetic equivalent circuit. • The configuration and principle operation of DC machines, armature winding, and armature reaction. • Speed control methods of the DC motors.

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	• DC machine construction • Classification of DC machine • DC generators • DC generator operation principle • EMF equation of dc generator • Characteristic of DC generator • DC Motors	PBL	Quiz Mid Exam Final Exam

9 10 11 12 13			• Torque equation of DC motor • Speed control of DC motor • Types of losses in a DC machine		

11. Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• U.A.Bakshi, 'Electrical Machines', Nobel institute of computer training (pune), 2007. • P. C. Sen, "Principles of electric machines and power electronics", John Willy and Sons Inc., 1997. • S. J. Chapman, "Electric machinery fundamentals", Mc. Graw Hill, 4th Edition, 2012.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1. Course Name:

Electrical Machines AC

2. Course Code:

EMSE207

3. Semester / Year:

3rd Year, 2nd Semester

4. Description Preparation Date:

2023

5. Available Attendance Forms:

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: ZainabBasheer Abdullah
Email:

8. Course Objectives

Course Objectives	• To develop an understanding of the fundamental laws of transformer and induction motor.

	● To learn basic working principle of transformer and induction motor. ● To develop the ability to apply circuit analysis of equivalent circuit for transformer and induction motor. ● To understand the power flow and losses of transformer and induction motor and to understand mathematical methodsof efficiency. ● To developed practical skills through the procedure experimental laboratory such as open and short circuit tests of single phase transformer.

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		GO3	• Single phase Transformer-Introduction • Transformer operating principle • E.M.F. Equation of Transformer • Equivalent circuit transformer. • Open and short circuit tests of single phase transformer • Losses and efficiency of transformer • Three phase Transformation • Three phase Induction motor • Introduction-Types - construction • Basic working principle of induction motor. • Equivalent circuit of induction motor. • Losses and power flow diagram. • Torque developed by Induction motor.	PBL	Quiz Mid Exam Final Exam

11. Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• M.N. Bandyopadhyay,"Elecrical Machines.Theory and Practice", New Delhi 2007. • D P Kothari , I J Nagrath, “Electrical

	Machines" fourth edition,Tata McGraw Hill Education Private Limited NEW DELHI ,2010. • Stephen J. Chapman, "ELECTRIC MACHINERY FUNDAMENTALS" fourth edition, Australia, 2005.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1. Course Name:	
Engineering Thermodynamic	
2. Course Code:	
EMSE208	
3. Semester / Year:	
3rd Year, 1st Semester	
4. Description Preparation Date:	
2023	
5. Available Attendance Forms:	
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: Hashim A. Hussein Email:	
8. Course Objectives	
Course Objectives	The goal of this course in engineering thermodynamic is study how the student improves the efficiency of a process for the transformation between energy and work. To study energy conservation and to study energy the entropy of a system.
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 13		GO1	- Introduction- outline of some descriptive systems - Basic concepts of thermodynamics - Properties of pure substances - 1st law in thermodynamics - 2st law in thermodynamics - Entropy - Thermodynamic Relations	PBL	Quiz Mid Exam Final Exam

11. Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	- Fundamental of engineering thermodynamics SI versition ,5 the edition ,2006 - Modern engineering thermodynamics academic press,2011 Robert balmer - T.H.Thomas and R.Hunt: applied heat Heinemann F.d.Books1976 - -Van WiylenG.andR. Fundamental of classical thermodynamics John willey 3rd edition, 1985.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1. Course Name:

Fluid Mechanics

2. Course Code:

EMSE209

3. Semester / Year:

3rd Year, 2nd Semester

4. Description Preparation Date:

2023

5. Available Attendance Forms:

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: Hashim A. Hussein
Email:

8. Course Objectives

Course Objectives	The goal of this course in fluid mechanics to analysis of any problem in fluid mechanics necessarily includes statement of the basic laws governing the fluid motion. The basic laws, which are applicable to any fluid.

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 13,14		GO1	• Introduction • Physical properties of fluids • Newtonian[s] law in viscosity and momentum transfer • Static fluids with applications • Dynamic fluids with applications • Fluid Measurements devices • Bernoulli's Equation applications	PBL	Quiz Mid Exam Final Exam

11. Course Evaluation	
Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• Pugh, E. M., and G. H. Winslow, The Analysis of Physical Measurements. Reading, MA, addison-Wesley, 1966. • Kline, S. J., and F. A. McClintock, "Describing Uncertainties in Single-Sample Experiments," Mechanical Engineering, 75, 1, January 1953, pp. 3-9. • Doebelin, E. O., Measurement Systems, 4th ed, New York: McGraw-Hill, 1990. • Young, H. D., Statistical Treatment of Experimental Data. New York: McGraw-Hill, 1962. • Rood, E. P., and D. P. Telionis, "JFE Policy on Reporting Uncertainties in Experimental measurements and Results," Transactions of ASME, Journal of Fluids Engineering, 113, 3, September 1991, pp. 313-314. • Coleman, H. W., and W. G. Steele, Experimentation and Uncertainty Analysis for Engineers, New York: Wiley, 1989. • Holman, J. P., Experimental Methods for Engineers, 5th ed. New York: McGraw-Hill, 1989.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1. Course Name:
Electrical Circuits
2. Course Code:
EMSE210
3. Semester / Year:
3rd Year, 1st Semester
4. Description Preparation Date:

2023

5. Available Attendance Forms:

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: Adel Ridha Othman
Email:

8. Course Objectives

Course Objectives	In this course, students will learn analysis and operation electrical circuits.

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, 13,14		GO1	1. Natural and step responses of an RC circuit. 2. Natural and step responses of an RL circuit. 3. Resonance in series RLC circuit. 4. Resonance in parallel RLC circuit. 5. Polyphase circuits.	PBL	Quiz Mid Exam Final Exam

11. Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Charles k. Alexander and Mathew N. O. Sadiku, "Fundamentals of Electric Circuits"Fourth Edition.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1. Course Name:
Electronic Circuits
2. Course Code:
EMSE211
3. Semester / Year:
3rd Year, 2ndSemester
4. Description Preparation Date:
2023
5. Available Attendance Forms:
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: Adel Ridha Othman Email:
8. Course Objectives

Course Objectives	In this course, students will learn analysis and operation electrical and electronic circuits.

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		GO3	1. Bipolar junction transistor (BJT) simplified structure and mode of operation. 2. Biasing in BJT amplifier circuits. 3. BJT amplifier, CE, CC, CB, multistage amplifier and differential amplifier. 4. Field Effect Transistor (FET). 5. Characteristic and biasing circuits of	PBL	Quiz Mid Exam Final Exam

			JFET.		

11. Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- Thomas L. Floyed "Electronic Devices", Seventh Edition, 2005, Pearson Prentice Hall
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1. Course Name:

Strength of Materials

2. Course Code:

EMSE212

3. Semester / Year:

3rd Year, 1st Semester

4. Description Preparation Date:

2023

5. Available Attendance Forms:

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: Faten N. Al Zubaidi
Email:

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 11 12 13 14 15		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 • Free vibration of multi degrees of freedom systems	PBL	Quiz Mid Exam Final Exam

11. Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, 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:
Measurements and Instrumentations
2. Course Code:
EMSE213
3. Semester / Year:
3rd Year, 2ndSemester
4. Description Preparation Date:
2023
5. Available Attendance Forms:
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: Najat S. Jasim Email:

8. Course Objectives	
Course Objectives	● The performance characteristics of an instruments. ● Measurement of errors and limiting error ● Statistical analysis ● Working principle for kinds of analog measuring instruments (PMMC, Moving Iron, electro-dynamometer) ● Principles design theory of various dc and ac analogue voltmeters, ammeters wattmeter. ● Analysis of DC and AC bridges

9. Teaching and Learning Strategies	
Strategy	PBL

10. Course Structure

Week	Hours	Required	Unit or subject name	Learning	Evaluation

		Learning Outcomes		method	method
1,2 3 4 5,6 7,8 9,10 11,12 13,14		GO1	• Introduction to Measurements • Measurement Error • General Theory of Analogue Measuring Instruments • Working Principle PMMC • Working PrincipleMoving Iron • Working Principleelectrodynamometer • Principles Design Theory ofDC and AC Analogue Voltmeters, Ammeters Watt meters. • DC and AC Bridges • Cathode Ray Oscilloscope	PBL	Quiz Mid Exam Final Exam

11. Course Evaluation	
Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1- P. Prithwiraj, et al. "Electrical and Electronics Measurements and Instrumentation" 2013. 2- L. D. Jones and A. F. Chin, "Electronic instruments and measurements," 1991. 3- N. D. In and E. E. Technology, "National Diploma in Electrical Engineering Technology Electrical / Electronic Instrumentation 2008.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1. Course Name:
Heat Transfer
2. Course Code:
EMSE214
3. Semester / Year:
3rd Year, 2ndSemester

4. Description Preparation Date:
2023
5. Available Attendance Forms:
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: Abduljabbar M. Ahmed Email:
8. Course Objectives

Course Objectives	• Defining the heat transfer modes concepts to the second year students. • Defining the theoretical basics of the conduction heat transfer coincided with a laboratory experiment. • Defining the theoretical basics of the forced and free convective heat transfer coincided with a laboratory experiment. • Defining the theoretical basics of the radiation heat transfer. • Defining the theoretical basics of the heat exchangers coincided with a laboratory experiment. • Defining the theoretical basics of the mixed modes of heat transfer.

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 13		GO1	• Conduction heat transfer. • Heat transfer through fins. • Two dimensional steady state heat conduction. • One and Two dimensional unsteady state heat conduction. • Convective heat transfer. • Forced convection. • Natural convection. • Thermal radiation.	PBL	Quiz Mid Exam Final Exam

14			• Heat exchangers.		

11. Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Heat Transfer, ten edition, J, P. Holman, 2002.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Third Year

1. Course Name:

Industrial Engineering

2. Course Code:

EME301

3. Semester / Year:

3rd Year, 1st Semester

4. Description Preparation Date:

2023

5. Available Attendance Forms:

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: IsraaSaad Ahmed
Email:

8. Course Objectives

Course Objectives	To develop student's practical skills and knowledge required to solve the problems in industrial Engineering.

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		GO1	• Introduction to industrial engineering. • The production and the productivity. • Linear programming (LP) models. • Assignment model • Transportation model. • Network Models. • Sequencing models. • Assembly line	PBL	Quiz Mid Exam Final Exam

12 13			balancing.		

11. Course Evaluation	
Student Activities 15%, Mid exam 15%, Final exam70%.	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1- Industrial Engineering and Management, by Dr. B. Kumar, Tenth Edition, 2019. 2- INDUSTRIAL and SYSTEMS ENGINEERING, Edited by AdedejiBadiru, 2014. 3- Introduction to Industrial Engineering, Yuval Cohen, 2017.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1. Course Name:
Engineering Analysis
2. Course Code:
EME302
3. Semester / Year:
3rd Year, 1st Semester
4. Description Preparation Date:
2023
5. Available Attendance Forms:
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: Naseer H. Farhood
Email:

8. Course Objectives

Course Objectives	• Fourier series includes: Definition- Periodic functions- Fourier series (Euler's formula) for function having period 2π.-Fourier series (Euler's formula) for function having arbitrary period T, Fourier series (Euler's formula) for Odd and even functions- Half range expansions. • Fourier integral includes: Complex Fourier series- Fourier integral theorem- Some special functions and their transforms: (Even functions- Odd functions- Top-hat function)- Properties of Fourier transform: (Linearity- Time shafting- Frequency shafting)- Convolution: (the convolution theorem). • Complex analysis includes: Functions of complex variable- Complex mapping: (Mapping of straight line in the z-transform onto the w-plane under the transformation$w = f(z)$, Types of transformation Differentiation of complex function: (Regular function, Cauchy-Riemann equation) - Harmonic functions- Complex integration: (Line integrals in the z-plane). • Power series solutions of ordinary differential equation includes: Classification of ODE according to having the ordinary and singular (regular and irregular) points- Power series solutions: (General method of power series, Solution of differential equations by the method of Frobenius) - Bessel's equation- Legendre's equations. • Partial differential equations includes: Separation of variables method- Initial and boundary conditions- Solution of wave equation- Solution of heat equation- Solution of Laplace equation- Beta and Gamma functions.

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 10,11,12,13		GO1	• Fourier series. • Fourier integral. • Complex analysis. • Power series solutions of ordinary differential equation.	PBL	Quiz Mid Exam Final Exam

11. Course Evaluation

Student Activities 15%, Mid exam 15%, Final exam70%.

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1. Fundamentals of Engineering Numerical Analysis, ParvizMoin.– 2nd edition, First published 2010, Printed in the United States of America. 2. Numerical Methods for Engineers and Scientists, Second edition, Joe D. Hoffman, New York, Basel 2001. 3. Numerical Methods for Engineers, Fifth edition, Chapra S. C. and Canale's R. P., New Delhi, McGraw-Hill education, 2006
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

13. Course Name:
Numerical Analysis
14. Course Code:
EME303
15. Semester / Year:
3rd Year, 2ndSemester
16. Description Preparation Date:
2023
17. Available Attendance Forms:
18. Number of Credit Hours (Total) / Number of Units (Total)
4 Units
19. Course administrator's name (mention all, if more than one name)
Name: Naseer H. Farhood Email:
20. 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.

21. Teaching and Learning Strategies

Strategy	PBL

22. 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 11,12,13		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 • 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	PBL	Quiz Mid Exam Final Exam

23. Course Evaluation

Student Activities 15%, Mid exam 15%, Final exam 70%.

24. 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	

25. Course Name:	
Analog Communications	
26. Course Code:	
EMSE304	
27. Semester / Year:	
3rd Year, 1st Semester	
28. Description Preparation Date:	
2023	
29. Available Attendance Forms:	
30. Number of Credit Hours (Total) / Number of Units (Total)	
3 Units	
31. Course administrator's name (mention all, if more than one name)	
Name: Murooj N. Mohammed Ali Email:	
32. Course Objectives	
Course Objectives	• Illustrating and discussing the fundamental principles of communication systems. • Proceeding to the student analysis the signals in both time and frequency domains. • Emphasis is placed on the Fourier series in linear systems analysis. • Providing the students the essential knowledge related to Analog Communication Systems and Analog Modulation Techniques. • Giving knowledge about Amplitude modulation (AM). • Giving knowledge about Frequency modulation (FM) and phase modulation (PM).
33. Teaching and Learning Strategies	

Strategy	PBL

34. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4 5 7 8 9 10 11 12 13 14			• Signals and Linear Systems • Classification of Signals • Some Important Signals and Their Properties • Fourier Series • The Effects of Symmetry on the Fourier Coefficients • Elements of communication System • Amplitude Modulation Systems (AM) • Modulation Index, Spectrum of AM Signal • Sidebands and the Frequency Domain • Frequency-Domain Representation of AM • Power calculations in AM Systems • Angle Modulation (FM and PM) • Transmission Bandwidth of FM waves		

35. Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.

36. Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Laith B.P. and Ding Z., Modern Digital and Analog Communication Systems. Oxford University Press, 4th edition, 2010. • Proakis, J.G. and Salehi M., Fundamentals Communications Systems, Pearson Education Inc., 2nd

	edition, 2014.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:
Digital Communication
2- Course Code:
EMSE305
3- Semester / Year:
3rd Year, 2ndSemester
4- Description Preparation Date:
2023
5- Available Attendance Forms:
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: Murooj N. Mohammed Ali Email:

8- Course Objectives

Course Objectives	• Illustrating and discussing the fundamental principles of communication systems. • Introducing the models for communication systems. • Understanding and analyzing multiplexing techniques. • Teaching students the basic concepts of Probability, Information theory and Entropy. • Giving knowledge about modulation techniques in telecommunication systems. • Emphasis is placed on Pulse Code Modulation (PCM) techniques. • Showing how sampling theorem, quantization process, and channel capacity play a vital role in coding schemes.

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 13 14		GO3	• Performance of Digital Communication System • Communication Systems Models • Transmission Methods in Communication systems • Multiplexing techniques • Introduction to a Probability, Information & Entropy theorems in digital communications • Modulation Techniques in Telecommunication Systems • Pulse Code Modulation (PCM) • PCM waveform types • Sampling Theorem and concept of quantization	PBL	Quiz Mid Exam Final Exam

15			• Channel Capacity • Digital Modulation Techniques (ASK, FSK and PSK)		

11- Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.

12- Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Laith B.P. and Ding Z., Modern Digital and Analog Communication Systems. Oxford University Press, 4th edition, 2010. • Proakis, J.G. and Salehi M., Fundamentals Communications Systems, Pearson Education Inc., 2nd edition, 2014.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:

Vibration Theory

2- Course Code:

EMEE306

3- Semester / Year:

3rd Year, 1st Semester

4- Description Preparation Date:

2023

5- Available Attendance Forms:

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: Anees Al-Tamimi
Email:

8- Course Objectives

Course Objectives	• Introduction to vibratory motion and definitions

	• Introduction to oscillatory motion • Free vibration of an undamped single degree of freedom system • Free vibration of viscously damped single degree of freedom system • Forced vibration of viscously damped and undamped single degree of freedom system • Transient vibration of Electromechanical systems • Simple energy method (Raleigh principle) • Lagrange's equation • Eigen values and Eigenvectors • Free vibration of an undamped two degree of freedom system • Free vibration of viscously damped two degree of freedom system • Forced vibration of viscously damped and undamped two degree of freedom system • Torsional vibration • Free vibrations of an undamped and viscously damped multi degrees of freedom systems • Forced vibration of an undamped and viscously damped multi degrees of freedom systems

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		GO1	• Introduction to vibratory motion and definitions • Introduction to oscillatory motion • Free vibration of an undamped single degree of freedom system • Free vibration of viscously damped single degree of freedom system • Forced vibration of viscously damped and undamped single degree of freedom	PBL	Quiz Mid Exam Final Exam

6 7 8 9 10 11 12 13 14			system • Transient vibration of Electromechanical systems • Simple energy method (Raleigh principle) • Lagrange's equation • Eigen values and Eigenvectors • Free vibration of an undamped two degree of freedom system • Free vibration of viscously damped two degree of freedom system • Forced vibration of viscously damped and undamped two degree of freedom system • Torsional vibration • Free vibrations of an undamped and viscously damped multi degrees of freedom systems • Forced vibration of an undamped and viscously damped multi degrees of freedom systems		

11- Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.

12- Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Benaroya, Haym, Mark Nagurka, and SeonMi Han. Mechanical Vibration: Theory and Application. Rutgers University Press, 2022. • Benaroya, Haym, Mark Nagurka, and SeonMi Han. Mechanical Vibration: Theory and Application. Rutgers

	University Press, 2022. • Tse, Francis Sing, Ivan E. Morse, and Rolland Theodore Hinkle. Mechanical vibrations. Boston: Allyn and Bacon, 1963.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

13- Course Name:	
Control Systems	
14- Course Code:	
EMSE307	
15- Semester / Year:	
3rd Year, 2nd Semester	
16- Description Preparation Date:	
2023	
17- Available Attendance Forms:	
18- Number of Credit Hours (Total) / Number of Units (Total)	
3 Units	
19- Course administrator's name (mention all, if more than one name)	
Name: Anees Al-Tamimi Email:	
20- Course Objectives	
Course Objectives	1. Introduction to control system, Basic definition and idea for the control system. 2. Types of control system 3. Block Diagram 4. Single flow graph 5. Modelling of control system 6. Time response analysis 7. Stability Analysis

21- Teaching and Learning Strategies

Strategy	PBL

22- 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		GO7	1- Introduction to control system, Basic definition and idea for the control system. **2-** Types of control system 3- Block Diagram 4- Single flow graph 5- Modelling of control system 6- Time response analysis 7- Stability Analysis	PBL	Quiz Mid Exam Final Exam

23- Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.

24- Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Automatic Control Engineering, Francis H. Raven. • Automatic Control System, 9th Edition-solutions manual,2009 • Control Systems Engineering, Norman S. Nise.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:
Hydraulic System
2- Course Code:
EMSE308
3- Semester / Year:
3rd Year, 1st Semester
4- Description Preparation Date:
2023
5- Available Attendance Forms:
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: Abduljabbar M. Ahmed Email:
8- Course Objectives

Course Objectives	1- Defining the principle of hydraulic systems concepts to the third year students. 2- Defining the construction of hydraulic systems coincided with a laboratory experiment. 3- Defining the hydraulic pumps: Theory of pumping- Types of pumps coincided with a laboratory experiment. 4- Defining the controlling valves like Direction control valve- Pressure control valve- Flow control valve. 5- Defining the actuators (hydraulic cylinder) with a laboratory experiment. 6- Defining the auxiliary hydraulic systems like accumulators. 7- Torsional vibration 8- Free vibrations of an undamped and viscously damped multi degrees of freedom systems 9- Forced vibration of an undamped and viscously damped multi degrees of freedom systems

10- Teaching and Learning Strategies	
Strategy	PBL

11- 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	• Principles of hydraulic systems. • Advantages and disadvantage of hydraulic systems. • 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). • Auxiliary hydraulic systems (Accumulators).	PBL	Quiz Mid Exam Final Exam

12- Course Evaluation
Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.

13- Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Fluid Power: Theory and Application, James A. Sullivan, Third Edition, A Reston Book Prentice Hall, Englewood Cliffs, New Jersey, 1989.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:
Theory of Machine
2- Course Code:
EMSE309
3- Semester / Year:
3rd Year, 2ndSemester
4- Description Preparation Date:
2023
5- Available Attendance Forms:

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: EneemObiedHassoun
Email:

8- Course Objectives

Course Objectives	To develop student's practical skills and knowledge required to solve the problems with differentiation, Integration, differential equations and some applications each of them.

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	• Distance, • Speed , • Acceleration • Balance. • Belt • Gear • Fly Wheel • Came	PBL	Quiz Mid Exam Final Exam

11- Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.

12- Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Theory of machines, R.S Khurmi&J.K.Gupta 2010. • Theory of Machines and Mechanisms, John J. Uicker, Gordon R. Pennock, Joseph E. Shigley.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

13- Course Name:
Digital Electronics
14- Course Code:
EMSE310
15- Semester / Year:
3rd Year, 1st Semester
16- Description Preparation Date:
2023
17- Available Attendance Forms:
18- Number of Credit Hours (Total) / Number of Units (Total)
3 Units
19- Course administrator's name (mention all, if more than one name)
Name: Mohammed QasimSulttan Email:
20- Course Objectives

Course Objectives	1- An introduction to learning the Fundamentals Digital Electronics. 2- Learn the Numbers Systems and their conversions. 3- Learn the signed binary number representation. 4- Study and analysis logic gates and their classifications. 5- Learn the mathematics of digital systems (Boolean algebra and their expressions). 6- Learn the logic simplification of digital circuits. 7- Learn to design the logic gates by using universal logic gates. 8- Study and learn the standard forms of Boolean expressions. 9- Learning simplifying Boolean expressions by using Karnaugh map.

10- Teaching and Learning Strategies	
Strategy	PBL

11- Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2		GO1	• Fundamentals of	PBL	Quiz

3,4 5,6 7 8 9 10 11 12			Digital Electronics • Numbers Systems "Decimal, Binary, Hexadecimal, Octal Numbers, and Binary Codes" • Numbers Conversions • Signed Numbers Representation • Logic Gates • Boolean Algebra and Logic Representation • Universal Logic Gates • Standard Forms of Boolean Expression • TheKarnaugh Map		Mid Exam Final Exam

12- Course Evaluation	
Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.	
13- Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1. Floyd, T. L. (2011). Digital fundamentals, 10/e. Pearson Education India. 2. "Digital Design with an introduction to the Verilog HDL", M Morris Mano & Michael D. Ciletti. 5th Edition. 3. Saha, A., & Manna, N. (2009). Digital principles and logic design. Jones & Bartlett Learning.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

14- Course Name:
Electromechanical Design
15- Course Code:
EMSE311
16- Semester / Year:
3rd Year, 1st Semester
17- Description Preparation Date:
2023

18- Available Attendance Forms:
19- Number of Credit Hours (Total) / Number of Units (Total)
2 Units
20- Course administrator's name (mention all, if more than one name)
Name: Bassam Ali Ahmed Email:
21- Course Objectives

Course Objectives	1- Electromechanical 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. 2- Spur Gear Definition, Spur Gear Applications, Advantages and Disadvantages of Spur Gears, Spur Gear Geometry, Forces Acting on Spur Gears, Spur Gear Terminologies, and Procedures for Design Spur Gears. 3- Helical Gear Definition, Helical Gear Applications, Advantages and Disadvantages of Helical Gears, Helical Gear Geometry, Forces Acting on Helical Gears, Helical Gear Terminologies, and Procedures for Design Helical Gears. 4- Bevel Gear Definition, Bevel Gear Applications, Advantages and Disadvantages of Bevel Gears, Types of Bevel Gears, Bevel Gear Geometry, Forces Acting on Bevel Gears, Bevel Gear Terminologies, and Procedures for Design Bevel Gears. 5- Worm Gear Definition, Worm Gear Applications, Advantages and Disadvantages of Worm Gears, Worm Types, Worm Gears Types, Worm Gear Geometry, Forces Acting on Worm Gears, Worm Gear Terminologies, and Procedures for Design Worm Gears. 6- Belt Drive Definition, Belt Drive Applications, Advantages and Disadvantages of V- Belt Drive, V- Belt Drive Types, Belt Drive Geometry, Belts types, Belt Drive Mechanism, and Procedures for Designing V- Belt Drive. 7- Chain Drive Definition, Chain Drive Applications, Advantages and Disadvantages of Chain Drive, Types of Chain Drive, Roller Chain Construction, Forces Acting on the Chain Sprockets, and Procedures for Designing Chain Drive. 8- Gears, Belt & Chain Forces, Power, Torque, and Velocity Transmission, Axle Design, Shaft Subject to Torsion only, Shaft Subject to Torsion and Bending, Shaft Subject to Torsion, Bending, and axial load. 9- Rolling Contact Bearings Types, Calculations of Ball Bearings, Design Life, Compute Design Load, Selection Type of Deep Groove Ball Bearing, Calculations of Taper Roller Bearing, Life Prediction Under Varying Loads, and Fixing Internal and External Racing of Bearing with Shaft and Housing.

10- Teaching and Learning Strategies	
Strategy	PBL

11- Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2,3 4,5,6 7,8,9 10,11,12,13		GO2	• Introduction of the Electromechanical Design and Selection of Materials • Spur Gear Design, Helical Gear Design, Bevel Gear Design, Worm Gear Design • Belt Drive Design, Chain Drive Design, Forces Exerted on the Shaft & Shaft Design • Rolling Contact Bearings, Flywheel Design, Clutch and Brake Design, Spring Design	PBL	Quiz Mid Exam Final Exam

12- Course Evaluation

Student Activities 15%, Mid exam 15%, Final exam 70%.

13- Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Robert L. Mott, Edward M. Vavrek, and Jyhwen Wang, "Machine Elements in Mechanical Design", Pearson 2018. • 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
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:
Power System
2- Course Code:
EMSE312
3- Semester / Year:
3rd Year, 1st Semester
4- Description Preparation Date:
2023
5- Available Attendance Forms:
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: Samar Jaafar Ismael Email:
8- Course Objectives

Course Objectives	1- Illustration and discussion the principles of power systems generation stations and some factors affecting when load changes. 2- Proceeding to the student analysis the electrical component of power systems. 3- Illustration and discussion the main theoretical principles of the electrical design of overhead transmission line in power systems. 4- Giving Knowledge the main components of the Mechanical Design of the overhead transmission line 5- Proceeding to the student analysis about the distribution System in DC and AC.

6– Teaching and Learning Strategies	
Strategy	PBL

7– 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 13 14 15		GO1	• Generation of • Sources of energy • Generating • Economical • Load curves and • Base load and • Performance of • Overhead • Transmission line • Generalized • Mechanical design • Insulators (pin • Calculation of • Calculation of • Construction of • Insulating • Electrical • Type of • Insulators, Main • Potential • Mathematical • Method of	PBL	Quiz Mid Exam Final Exam

8- Course Evaluation
Student Activities 15%, Mid exam 15%, Final exam70%.

9- Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• Principles of Power system by V.K Mehta. • Electrical power by M.L. Anand.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:
Protection Systems
2- Course Code:
EMSE313
3- Semester / Year:
3rd Year, 2ndSemester

4- Description Preparation Date:
2023
5- Available Attendance Forms:
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: Hussein T. R Email:
8- Course Objectives

Course Objectives	-Protection principles and components. -Power system network. -Types of electrical faults. -Purpose of protection system. -Requirements of a protection system. -Fuse element material. -Operating principle. -Circuit breakers. -Operating principle. -ARC phenomenon. -Methods of ARC extinction. -Classification of C.B. -Protective relays. -Fundamental requirements of protective relaying. -Functional relay types. -Voltage transformers. -Current transformers.

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	-Rated carrying current. -Fusing current. -Fusing factor. -Prospective current and cut off current. -Pre-arcing time(melting time).	PBL	Quiz Mid Exam Final Exam

7 8 9 10 11 12 13 14 15			-Arcing-time. -Total operating time. -Breaking capacity of fuse. -Circuit breakers. -Operating principle. -Circuit breaker ratings. -Breaking capacity. -Marking capacity. -Short time rating. -Normal current rating. -Difference between a fus and circuit breaker ratings, -Fundamental requirements of protective relaying. -Selectivity, speed, sensitivity, reliability, simplicity, economy. -Relay timing.		

11- Course Evaluation	
Student Activities 15%, Mid exam 15%, Final exam 70%.	
12- Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• Power System Protection by L.G Hewitson Mark Brown • Switchgear & protection (J.B. Gupta).
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:
Special Electrical Machines
2- Course Code:
EMSE314
3- Semester / Year:
3rd Year, 1st Semester
4- Description Preparation Date:
2023
5- Available Attendance Forms:

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: Abduljabbar O. Hanfesh
Email:

8- Course Objectives

Course Objectives	• Construction, principle of operation, control and performance of stepping motors. • Construction, principle of operation, control and performance of switched reluctance motors. • Construction, principle of operation, control and performance of permanent magnet brushless D.C. motors. • Construction, principle of operation and performance of Linear Motor. • Construction, principle of operation and performance of other special Machines.

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	• Stepper Motors. • Switched Reluctance Motors. • Brushless DC Motors. • Permanent Magnet Synchronous Motors. • Linear Motors. • Repulsion Motor. • AC series Motors.	PBL	Quiz Mid Exam Final Exam

11- Course Evaluation

Student Activities 15%, Mid exam 15%, Final exam70%.

12- Learning and Teaching Resources

Required textbooks (curricular books, if any)	• K.Venkataratnam, 'Special Electrical Machines', Universities Press (India) Private Limited, 2008. • T. Kenjo, 'Stepping Motors and Their

	Microprocessor Controls', Clarendon Press London, 1984 • E.G. Janardanan, 'Special electrical machines', PHI learning Private Limited, Delhi, 2014. •
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Fourth Year

1- Course Name:
Power Electronics
2- Course Code:
EMSE401

3- Semester / Year:
4thYear, 1st Semester
4- Description Preparation Date:
2023
5- Available Attendance Forms:
6- Number of Credit Hours (Total) / Number of Units (Total)
3Units
7- Course administrator's name (mention all, if more than one name)
Name: Jamal A.-K. Mohammed Email:

8- Course Objectives

Course Objectives	a. have an in-depth understanding of the theory of electrical energy conversion using power electronic systems that perform AC/DC, DC/DC, DC/AC, or AC/AC conversion b. Understand operating principles and modulation strategies for 1-phase and 3-phase diode rectifiers, thyristor-based converters, switch-mode DC/DC power electronic converters and DC/AC inverters. c. Understand modeling and control of power electronic converters.

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	▪ Principles of Power Electronics ▪ DC-to-AC Converters (Rectifiers) ▪ DC-to-AC Converters (Inverters) ▪ DC-to-DC Converters (Coppers) ▪ AC-to-AC Converters (Cycloconverters)	PBL	Quiz Mid Exam Final Exam

11- Course Evaluation
Student Activities 15%, Mid exam 15%, lab 10%,Final exam60%.

12- Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• Muhammad H. Rashid, Narendra Kumar, Ashish R. Kulkarni, Power Electronics Devices, Circuits, and Applications, Fourth Editionm Pearson Education Limited 2014. • V. Kumar, Ranjan K. Beheram, D. Joshi, R, Bansal, Power Electronics, Drives, and Advanced Applications, Taylor & Francis Group, LLC, 2020.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:
Electric Drives
2- Course Code:
EMSE402
3- Semester / Year:
4th Year, 2ndSemester
4- Description Preparation Date:
2023
5- Available Attendance Forms:
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: Jamal A.-K. Mohammed Email:

8- Course Objectives	
Course Objectives	a. Understanding of control principles used in modern electrical motor drives. b. Understanding of rotating electrical machines and their application - common load models for electrical motor drives. c. be introduced to various types of electric drives (AC and DC drives)

	d. be able to select a particular type of electric drive for a given application e. be able to control position, speed and torque of the drive system using Power Electronics and Control Circuits.

9- Teaching and Learning Strategies

Strategy	PBL

10- Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-15		GO1	▪ AC Drives & DC Drives	PBL	Quiz Mid Exam Final Exam

11- Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.

12- Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Muhammad H. Rashid, Narendra Kumar, Ashish R. Kulkarni, Power Electronics Devices, Circuits, and Applications, Fourth Editionm Pearson Education Limited 2014. • V. Kumar, Ranjan K. Beheram, D. Joshi, R, Bansal, Power Electronics, Drives, and Advanced Applications, Taylor & Francis Group, LLC, 2020.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:

Signals and Systems
2- Course Code:
EMSE403
3- Semester / Year:
4th Year, 1st Semester
4- Description Preparation Date:
2023
5- Available Attendance Forms:
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: Manal K. Oudah Email:
8- Course Objectives

Course Objectives	1- The objectives of this course are: 2- To introduce students to the basic concepts of signals and explore various types of signals. 3- To explore the concept of a system, systems classification and define linear time invariant (LTI) systems. 4- To develop students' understanding of time-domain and frequency domain representation of signals. 5- To analysis of continuous and discrete systems and to provide students with necessary tools and techniques to analyze electrical networks and systems.

6– Teaching and Learning Strategies

Strategy	PBL

7– Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2,3 4,5,6		GO1	• Introduction to signals, classification of signals, elementary signals, and operations on signals. • Classification of systems, interconnection of systems, examples of	PBL	Quiz Mid Exam Final Exam

7,8 9,10 11,12			systems. • Time Domain Analysis of LTI Systems, Representation of LTI systems,Impulse response of a system. • Continuous Time Fourier Transform (CTFT) and application, CTFT Definition, inverse Fourier transform, properties of the CTFT, applications of CTFT, Parseval's energy theorem • LTI systems analysis using CTFT		

8- Course Evaluation	
Student Activities 15%, Mid exam 15%, Final exam 70%.	
9- Learning and Teaching Resources	
Required textbooks (curricular books, if any)	○ B. P. Lathi, Signal Processing and Linear Systems, 1st Indian Edition, Oxford University Press, 2006. ○ A. V. Oppenheim and A. S. Willsky, Signals and Systems, Prentice Hall, 2nd ed., 1997. ○ Hwei P. Hsu,Theory and Problems of Signals and Systems, McGraw-Hill, (1995).
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:
Signal Processing
2- Course Code:
EMSE404
3- Semester / Year:

4th Year, 2nd Semester

4- Description Preparation Date:

2023

5- Available Attendance Forms:

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: Manal K. Oudah
Email:

8- Course Objectives

Course Objectives	1- Introduce the basic concepts and techniques for processing signals and digital signal processing fundamentals 2- Understand the processes of analog-to-digital and digital-to-analog conversion. 3- Apply correlation process to analyzing signal and find the similarity exists between two signals. 4- Represent of discrete-time signals in the frequency domain, using z-transform, discrete Fourier transforms (DFT) 5- Understand the implementation of the DFT in terms of the FFT, as well as some of its applications in signal processing (computation of convolution sums, spectral analysis) 6- provide knowledge of digital filter a.

7– Teaching and Learning Strategies

Strategy	PBL

8– Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2 3,4 5,6		GO1	• Principles of Power Basic element of Signal Processing • Digital Against Analog Signal Processing • Sampling, aliasing and the relationship between discrete and continuous signals	PBL	Quiz Mid Exam Final Exam

7 8,9 10,11 12 13 14			• Convolution and spectral analysis • Correlation of Continuous Time Signal • Discrete Fourier Transform (DFT) • Fast Fourier Transform • z-Transform • Digital Filters design techniques		

9- Course Evaluation	
Student Activities 15%, Mid exam 15%, Final exam 70%.	
10- Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1- L. Stankovi´c, Digital Signal Processing Basic Theory and Applications, Independent Publishing Platform, Amazon.com Company,2020. 2- Sophocles J. Orfanidis, Introductory to Signal Processing, Prentice Hall, Inc, 2010 3- A. V. Oppenheim and R.W. Schaffer,Discrete Time Signal Processing, PHI, 2009.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:
Microprocessors
2- Course Code:
EMSE405
3- Semester / Year:
4th Year, 1st Semester
4- Description Preparation Date:
2023
5- Available Attendance Forms:

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:Rafah K. Mahmood
Email:

8- Course Objectives

Course Objectives	**1- program** and debug in assembly language **2- understand** the basic computer architecture **3- understand** the memory organization and memory interfacing **4- perform** input/output device programming in assembly **5- understand** the hardware and software interrupts and their applications.

6- Teaching and Learning Strategies

Strategy	PBL

7- 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 13		GO1	• Introduction to Microprocessor and An Overview of 8086 Microprocessor • Architecture of 8086 Microprocessor • Register Organization of 8086 • Memory Segmentation • Brief idea of machine and assembly languages • 8086 Instruction Set and Assembly Language Programming • Addressing Modes • Data transfer Instructions: MOV, JMP • Arithmetic and Logic Instructions • PUSH/POP Instruction with Stack	PBL	Quiz Mid Exam Final Exam

8- Course Evaluation	
Student Activities 15%, Mid exam 15%, lab 10%, Final exam60%.	
9- Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design, Second Edition, By Yu-Cheng Liu, Glenn A. Gibson, Prentice Hall of India, 2011.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:	
Microcontrollers	
2- Course Code:	
EMSE406	
3- Semester / Year:	
4th Year, 2ndSemester	
4- Description Preparation Date:	
2023	
5- Available Attendance Forms:	
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: Rafah K. Mahmood Email:	
8- Course Objectives	
Course Objectives	**1- understand** the basic computer architecture **2- understand** the memory organization and memory interfacing **3- perform** input/output device programming in assembly **4- understand** the hardware and software interrupts and their applications. a.
5- Teaching and Learning Strategies	

Strategy	PBL

6- 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 13 14		GO3	• Introduction to Microprocessor and an Overview of 8086 Microprocessor • Architecture of 8086 Microprocessor • Register Organization of 8086 • Memory Segmentation • Brief idea of machine and assembly languages • 8086 Instruction Set and Assembly Language Programming • Addressing Modes • Data transfer Instructions: MOV, JMP • Arithmetic and Logic Instructions • PUSH/POP Instruction with Stack • Solved examples • Review and examination	PBL	Quiz Mid Exam Final Exam

7- Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, Final exam60%.

8- Learning and Teaching Resources

Required textbooks (curricular books, if any)	Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design, Second Edition, By Yu-Cheng Liu, Glenn A. Gibson, Prentice Hall of India, 2011.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:	
Automation and Control	
2- Course Code:	
EMSE407	
3- Semester / Year:	
4th Year, 1st Semester	
4- Description Preparation Date:	
2023	
5- Available Attendance Forms:	
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: WisamEssmat Abdul-Lateef Email:	
8- Course Objectives	
Course Objectives	• Automation Systems Introduction. • Basic Components of Automation Systems. • Control technology of Automation Systems. • Advantages and Disadvantages of Automation Systems. • Advanced Automation Systems Functions. • Automation Pyramids Systems. • Distributed Control System (DCS) • Programmable logic controllers (PLC) • Supervisory control and data acquisition (SCADA) • Applications of Automation Systems. • Industrial Automation: How it Works, Types, and Benefits. • Industrial technological complexes with the Automation Systems. • Layouts of technological complexes with Automation Systems. • Management of technological complexes. • Stages of designing technological complexes. • Features of Automated systems in Industrial technological complexes. • Socio-economic efficiency of use the Automation Systems. • Control systems Introduction. • Fundamentals Control of systems. • Advanced techniques of Control Systems. • Observer ability and Controllability in control system • PID Controller. • Ziegler–Nichols method Tuning PID Controller. • Intelligent Control Systems. • Artificial Intelligence. • Machine Learning. • Artificial Neural Network. • Neural Network topology and Classifications.

	• Fuzzy Logic Controller. • Structure of Fuzzy Logic Controller. • Genetic Algorithm. • Particle swarm optimization (PSO).

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	• Automation Systems: Basic, Theories and applications. • Classifications, Advantages and Disadvantages of Automation Systems. • Theories of Advanced Control systems. • Theories of Artificial Intelligence. • Theories of Machine Learning.	PBL	Quiz Mid Exam Final Exam

11- Course Evaluation

Student Activities 15%, Mid exam 15%, Final exam 70%.

12- Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani and Giuseppe Oriol, Robotics Modelling, Planning and Control, 2009. 2- Nestor Eduardo Nava Rodríguez, Edition l, Advanced Mechanics in Robotic Systems, 2010. 3- Thomas R. Kurfess, Robotics and Automation Handbook, 2005.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:

Robotic Systems

2- Course Code:

EMSE408

3- Semester / Year:

4th Year, 2nd Semester

4- Description Preparation Date:

2023

5- Available Attendance Forms:

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: WisamEssmat Abdul-Lateef
Email:

8- Course Objectives

Course Objectives	1- Introductions and Definitions of Robotic Systems. 2- Advantage and disadvantage of Robotic Systems. 3- Robot Systems Classification. 4- Robotic Systems Applications. 5- Robotic Systems Structure. 6- Anatomy of Robot. 7- Robot Link. 8- Robot Joint. 9- Robot Actuators. 10- Robot Sensors. 11- Robot Motion Analysis. 12- Robot Forward Kinematic. 13- Robot Invers Kinematic. 14- Dynamic of Robot. 15- Trajectory Control of Robotic Systems. 16- Robot Trajectory Introduction and Classifications. 17- Requirements of a trajectory. 18- Path Control. 19- Trajectory Generation Planning. 20- Method of Cubic Polynomial Trajectories. 21- Robotic Systems Control. 22- Robotic Systems Programming.

23- Teaching and Learning Strategies

Strategy	PBL

24- Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2,3		GO7	• Robotic Systems:	PBL	Quiz

4,5,6 7,8 9,10 11,12			Basic, Theories and applications. • Classifications, Advantages and Disadvantages of Robotic Systems. • Analysis of Robot Motion. • Trajectory and path planning of Robot. • Theories of Robotic Systems Control.		Mid Exam Final Exam

25- Course Evaluation	
Student Activities 15%, Mid exam 15%, Final exam 70%.	
26- Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1- Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani and Giuseppe Oriol, Robotics Modelling, Planning and Control, 2009. 2- Nestor Eduardo Nava Rodríguez, Editorl, Advanced Mechanics in Robotic Systems, 2010. 3- Thomas R. Kurfess, Robotics and Automation Handbook, 2005. 4- Edited by Clarence W. de Silva, Mechatronic Systems Devices, Design, Control, Operation and Monitoring, 2008.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:
Ethics in Engineering
2- Course Code:
EMSE409
3- Semester / Year:
4th Year, 2ndSemester
4- Description Preparation Date:
2023
5- Available Attendance Forms:
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: Hashim A. Hussein
Email:

8- Course Objectives

Course Objectives	The goal of this course in engineering ethics is to sensitize student to important ethical issues before you have to confront them. Student will study important cases from the past so that student will know what situations other engineers have faced and will know what to do when similar situations arise in your professional career. Finally, student will learn techniques for analyzing and resolving ethical problems when they arise.

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 13 14		GO5	Introduction, Professionalism and codes of ethics, Understanding ethical problems, Ethical problem solving techniques, Risk, safety and accidents and the rights and responsibilities of engineers	PBL	Quiz Mid Exam Final Exam

11- Course Evaluation

Student Activities 15%, Mid exam 15%, Final exam 70%.

12- Learning and Teaching Resources

Required textbooks (curricular books, if any)	Engineering ethics, Fourth edition, Charles B.Fleddermann, University of

	New Mexico.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:
Air Conditioning and Refrigeration Systems
2- Course Code:
EMSE410
3- Semester / Year:
4th Year, 1st Semester
4- Description Preparation Date:
2023
5- Available Attendance Forms:
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: Adnan GhareebTuaamah Al-Hasnawi Email:
8- Course Objectives

Course Objectives	1- Introduction to air-conditioning and Refrigeration - Thermodynamics properties of moist air 2- Psychometric Processes- Cooling, Heating , humidification and dehumidification processes 3- Air conditioning process /summer- Air conditioning process /winter-Thermal comfort and design conditions 4- Cooling load calculation /wall and roofs- Cooling load calculation/windows- Cooling load /Ventilation , infiltration, lighting and occupancies- Heating load calculation- Application on cooling and heating load 5- Ducting Design : procedure and methods- Equal pressure drop method-Types of fan , piping and fitting a.

6– Teaching and Learning Strategies

Strategy	PBL

7- 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	• Review of fundamentals: air-conditioning and refrigeration • Psychometric Processes • Air conditioning process • Thermal loads • Design of Air-conditioning ducts	PBL	Quiz Mid Exam Final Exam

8- Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.

9- Learning and Teaching Resources

Required textbooks (curricular books, if any)	• Stoecker W. F. "Refrigeration and Air-Conditioning" 2nd Ed.,McGraw-hill,1982 • Ramgopal M. "Refrigeration and Air-Conditioning", Department Engineering Indian Institute of Technology Kharagpur,India 2012 • Khalid A. Al-Joodey,"Principle of Air-Conditioning and Refrigeration", Engineering College, Basra University, 1998
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:
Computer-Aided Design and Manufacturing
2- Course Code:
EMSE411
3- Semester / Year:
4th Year, 2nd Semester
4- Description Preparation Date:
2023
5- Available Attendance Forms:
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: Bassam Ali Ahmed Email:
8- Course Objectives

Course Objectives	1- Definitions, Benefits of CAD/CAM, General Design Process, Product Cycle by CAD/CAM, steps for Production of Mechanical Element, steps for Production of Mechanical Mechanism, steps for Creating the Geometric Model, Requirements of The Geometric Modeling, Function of the Geometric Model, Wireframe Modeling, Surface Modeling, Solid Modeling, Boundary Representation, Constructive Solid Geometry, and the Boolean Operations. 2- Types of Transformations, Basic Modeling Transformations, Translation, Scaling, Reflection or Mirror, Rotating, 2-D Rotating About an Arbitrary Point, Reflection About an Arbitrary Axis, Three-Dimensional Transformations, Window to Viewport Transformation, Clipping, and Cohen- Sutherland clipping algorithm of 2-D 3- Types of Finite Element, Spring as a Finite Element, and Bar as a Finite Element 4- Manufacturing Production Cycle, Processing operation, Assembly operation, Material handling and storage, Control, Method of workpiece Transport, Continuous transfer mechanism, Intermitted transfer mechanism, Type of Transfer Mechanism, Geneva mechanism (Indexing table), Materials Transport Equipment, and Building Blocks of Automation 5- Basic Component of an (NC) System, Classification of Numerical Control, Motion Control of (NC) System, Mathematics for programming coordinate system, and Positioning Systems 6- Automatic Tool Changer, Coordinate Systems, an Introduction to Part Programming, Preparatory functions, G-code, and Miscellaneous function

7– Teaching and Learning Strategies

Strategy	PBL

8- 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 13,14		GO2	• Introduction & Geometric Modelling • Geometrical Transformations • Finite Element Method • Manufacturing • Fundamental of Numerical Control • CNC Machines Parts Programming	PBL	Quiz Mid Exam Final Exam

9- Course Evaluation

Student Activities 15%, Mid exam 15%, Final exam 70%.

10- Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- Rao, CAD/CAM Principles and Applications, McGraw-Hill, New Delhi, 2010. 2- Chang, Richard and Wang, Computer Aided Manufacturing, Pearson Hill, 2006. 3- S. Vishal, Computer Aided Manufacturing, Katson, Delhi, 2013. 4- Goyal, Fundamental of Computer-Aided Design, Katson, Delhi, 2013.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

1- Course Name:

Electromechanical Systems and Devices

2- Course Code:

EMSE412

3- Semester / Year:

4th Year, 1st Semester

4- Description Preparation Date:

2023

5- Available Attendance Forms:

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: Mohammed J. Mohammed
Email:

8- Course Objectives

Course Objectives	1- To know the fundamental of Mechanical Components. 2- To know the fundamental of Electrical Components 3- To convert between mechanical and electrical Components 4- To find the final transfer function of hydraulic systems 5- To study the signal conditioning device 6- To explain the electromechanical sensors and actuators 7- To control the system using microcontrollers

8- Teaching and Learning Strategies

Strategy	PBL

9- 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	• Convert between Mechanical and Electrical Components • Analysis the hydraulic systems • Study the signal conditioning chip • Electrotechnical sensors • Electromechanical Actuators • Microcontroller Boards	PBL	Quiz Mid Exam Final Exam

10- Course Evaluation

Student Activities 15%, Mid exam 15%, lab 10%, Final exam 60%.

11- Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Raven, Francis H Automatic control engineering McGraw Hill, Inc 1995. Ogata, Katsuhiko "Modern control engineering Book Reviews 1999.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	