Description Of The Academic Program

This programme specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the programme.

1. Teaching institution	The University of Mosul
2. University Department /Centre	College of Engineering/ Department of Mechatronics Engineering
3. Program Title	Mechatronics Engineering
4. Title of Final Award	Bachelor of Science
5. Modes of Attendance offered	Courses
6. Accreditation	There is none - except for the instructions of the university and college. Noting that the department does not have administrative authority and funding necessary to implement such program.
7. Other external influences	Higher-level decisions
8. Date of production/ revision of this specification	2020-2021

9. Aims of the program
I. Successfully adapt to new situations in their professional careers within the global job market, by using the essential tools and fundamental background of the disciplines of Mechatronics Engineering in the areas of Electric and electronics sciences, computer sciences, Thermal and Fluid Sciences, Material Science, Machine Design and Production Engineering, robotics, communication, artificial intelligence, and automation; Or pursue additional degrees through graduate studies.
II. Apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design.
III. Engage in professional service such as participation in professional societies, and to always consider and support professional ethics.
IV. have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership.
10. Learning outcomes, Teaching, Learning and assessment methods
A. Cognitive goals A1. Basic, applied, and engineering sciences principles required for understanding of the specialization of mechatronics engineering (such as mathematics, electrical engineering, physics, mechanical engineering, and computer engineering). A2. Mechatronics engineering sciences, such as electromechanical devices, control devices, digital systems, automation, and robots. A3. Professional foundations and associated communication skills, such as perform presentation and writing reports, as well as knowledge of economic, legal, health, social, and safety limitations.
B. The skills goals special to the program. B1. Solve and formulate engineering problems in general, especially those related to mechatronics engineering B2. Identify and formulate engineering problems and apply mathematical knowledge, science, engineering methods, and creativity skills to solve problems in the field of mechatronics engineering. B3. Analyzing problems by interpreting and assessing numerical data and applying mathematical approaches. B4. Preparing technical and operational specifications of components, systems, and electrical and mechanical devices
Teaching and Learning Methods
- Theoretical lectures - Discussion sessions - Laboratory experiments - Computer laboratories
Assessment methods
- Mid-term and final exams - Short exams (quizzes) - Reports - Practical exams

- Presentations
C. Affective and value goals C1. Conducting and developing practical electromechanical system experiments, as well as analyzing and interpreting practical data linked to energy systems. C2. Developing computer program and utilizing pre-written programs to deal with issues in the subject of specialization C3. Apply cutting-edge engineering methods, skills, and equipment, as well as sophisticated intelligent approaches to control mechanical and electrical system. C4.
Teaching and learning methods
- Theoretical lectures - Discussion sessions - Laboratory experiments - Computer laboratories - Projects - Industrial training
Assessment Methods
- Semester and final exams - Short exams - Reports - Practical exams
D. General and Transferable skills (other skills relevant to employability and personal development) D1. Work professionally and ethically, either on individual projects or as part of a multidisciplinary team. D2. Writing technical reports and delivering informative presentations. D3. Effective use of information technology related to engineering applications in general and the field of mechatronics and control in particular. D4. The potential for initiating scientific research projects.
Teaching and learning Methods
- Theoretical lectures - Discussion sessions - Laboratory experiments - Computer laboratories - Projects - Industrial training
Assessment methods

- Semi-term and final exams
- Short exams
- Reports
- Practical exams
- Presentations

11. Personal Developmental Planning

Student development, the teacher's plan for student development, which includes Internet and IT use, laboratory safety procedures, and building a student's academic personality capable of competitiveness, discussion, and problem solving.

12. Admission criteria (rules governing enrollment in a college or institution)

1- Central distribution by the Ministry of Higher Education determines those accepted into the College of Engineering.
2- The departments select who are accepted, where competition takes place between them based on the total marks - in addition the total of the differentiation lessons.
3- Transfers from other departments and institutions are allowed subjected to higher regulations and instructions.

13. Key sources of information about the programme

- The programme has been developed from many sources.
- High-level Instruction.
- Recent advances and emerging sciences in the specialized field.

14. Department vision, mission and goals

https://uomosul.edu.iq/en/engineering/vision-message-and-goals-2

/

15. Programme Structure

Mechatronics Department / First Level

(Fall semester) / First Level								
	Type	**Subject**	**Theoretical hours**	**Practical hours**	**Units**	**Pre-request**	**Code**	**Notes**
University requirements	Compulsory	English language	3	-	3	-	UOMC101	
	Compulsory	Computer	2	2	3	-	UOMC102	
College requirements	Compulsory	Calculus I	3	-	3	-	ENGC121	
	Compulsory	Engineering Drawing	-	3	1	-	ENGC123	
Department requirements	Compulsory	Electric circuit analysis	2	2	3	-	0ECAN10	
	Compulsory	Engineering mechanics I (static)	3	-	3	-	EMSA101	
	Compulsory	Physics	2	-	2	-	PHY102	
	Total hours		**15**	**18**	**18**			

(Spring semester)/ First Level								
	Type	**Subject**	**Theoretical hours**	**Practical hours**	**Units**	**Pre-request**	**Code**	**Notes**
University requirements	Compulsory	Arabic language	2		2		UOMC100	
	Compulsory	Rights and freedom	2		2		UOMC103	
	Elective	Manufacturing processes	2		2		-	Student choose one
	Elective	Environmental pollution	2		2		-	
	Elective	Information technology	2		2		-	
	Elective	Electrical installation	2		2		-	
	Elective	Modelling of building materials	2		2		-	
College requirements	Compulsory	Calculus II	3		3	Calculus I	ENGC122	
	Compulsory	Auto cad		3	1	Engineering drawing	ENGC124	
Department requirements	Compulsory	Strength of materials	2		2	Engineering mechanics (static)	STMT150	
	Compulsory	Algorithm and computer programing	1	2	2	Computer	ALCP151	

	Compulsory	Engineering materials and manufacturing	3	2	4		ENMM152	
	Total hours		**15**	**7**	**18**			

Mechatronics Department / Second Level

(Fall semester)/ Second Level								
	Type	**Subject**	**Theoretical hours**	**Practical hours**	**Units**	**Pre-request**	**Code**	**Notes**
University requirements	Compulsory	Professional ethics	2		2		UOMC104	
College requirements	Compulsory	Statistics	2		2		ENGC227	
	Compulsory	Engineering math I	3		3	Calculus I,II	ENGC228	Compulsory for department student
Department requirements	Compulsory	Engineering mechanics II(dynamic)	2		2	Engineering mechanic I	EMDY201	
	Compulsory	Electrical machine	2	2	3	Electrical circuit analysis	ELMA202	
	Compulsory	Thermodynamic and heat transfer	2		2		THHT203	
	Compulsory	Electronic principle	2	2	3	Electrical circuit analysis	ELCP204	
Total hours			15	4	17			

(Spring semester)/ Second Level								
	Type	**Subject**	**Theoretical hours**	**Practical hours**	**Units**	**Pre-request**	**Code**	**Notes**
University requirements	Compulsory	English language pre intermediate	1		1			last level take 3 units
College requirements	Compulsory	Engineering economics	2		2		ENGC226	
	Compulsory	Engineering math II	3		3		ENGE230	Compulsory for dep.
Department requirements	Compulsory	Fluid mechanics	2		2	and Thermodynamic heat transfer	FLME251	
	Compulsory	Digital logic	2	2	3	Electronic principle	DILO252	
	Compulsory	Electromechanical systems	2	2	3	Electrical machine	ELES253	
	Compulsory	Signal and system	2		2	Calculus II	SISY254	
	Elective	Introduction to mechanical design	3		3	Strength of materials	INMD261	Student choose one
		Composite materials	3		3	Engineering materials and manufacturing process	COMA262	
		Advanced heat transfer	3		3	Thermodynamic and heat transfer	AHTR263	

		Renewable energy	3		3	Thermodynamic and heat transfer	RENR264	
Total hours			**17**	**4**	**19**			

Mechatronics Department / Third Level

(Fall semester) /Third Level								
	Type	**Subject**	**Theoretical hours**	**Practical hours**	**Units**	**Pre-request**	**Code**	**Notes**
University requirements	Compulsory	English language intermediate	2		2			
College requirements	Compulsory	Numerical analysis	2		2	Calculus I,II	ENGE320	Compulsory for depart.
Department requirements	Compulsory	Mechanism and vibration	2		2	Engineering mechanics II dynamics	MEVI300	
	Compulsory	Mechanics engineering lab.		2	1	Engineering mechanics II dynamics	MLAB301	
	Compulsory	Modelling and simulation	1	2	2	Signal and system	MODS302	
	Compulsory	Measurement and instrumentation	2	2	3	Electronic principle	MEIN303	
	Compulsory	Microprocessors and assembly language	2	2	3	Digital logic	MICA304	
	Elective	Signal processing	3		3	Signal and system	SPRO361	Student choose one
	Elective	Image processing	3		3		IMPR362	
	Total hours		**14**	**8**	**18**			

(Spring semester)/ Third Level								
Notes	**Type**	**Subject**	**Theoretical hours**	**Practical hours**	**Units**	**Pre-request**	**Code**	**Notes**
Department requirements	Compulsory	Design of machine element	3		3	Engineering mechanics II dynamic	DMEL350	
	Compulsory	Power electronics and drives	2	2	3	Electronic principle	PELD351	
	Compulsory	Control systems	2	2	3	Modelling and simulation	2CONS35	
	Compulsory	Microcontroller system design	2	2	3	Microprocessors and assembly language	MCSD353	
	Compulsory	Theory of machine	2		2	Engineering mechanics II dynamic	THMH354	
	Compulsory	Hydraulic and pneumatic systems	2		2	Fluid mechanics	HPNS355	
	Elective	Solid modelling	3		3		SMOD363	Student choose one
		Industrial LAN	3		3		ILAN364	
		Communication engineering	3		3		COEN365	
Total hours			**16**	**6**	**19**			

Note :Summer Training is one of the requirements that the student has to apply during July or August.

Mechatronics Department / Fourth Level

(Fall semester) / Fourth Level								
	Type	**Subject**	**Theoretical hours**	**Practical hours**	**Units**	**Pre-request**	**Code**	**Notes**
College requirements	Elective	Public safety	2		2		ENGE429	Compulsory for depa.
Department requirements	Compulsory	Robotics	2	2	3	Theory of machine	ROTI400	
	Compulsory	Design of machine elements II	3		3	Design of machine element I	DMEL401	
	Compulsory	Modern control systems	2	2	3	Control system	MOCS402	
	Compulsory	Graduation project I	2		2	All compulsory department requirements for the third level	ENGP403	
	Elective	Special topics in mechatronics	3		3		STME461	Student choose one
	Elective	CNC machine	3		3		CNCM462	
	Elective	Building management system	3		3		BMSY463	Student choose one
	Elective	PC interface and data acquisition	2	2	3	Microcontroller and system design	PCID464	

Total hours	**16/17**	**4/6**	**19**				

(Spring semester) / Fourth Level								
	Type	**Subject**	**Theoretical hours**	**Practical hours**	**Units**	**Pre-request**	**Code**	**Notes**
University requirements	Compulsory	English language upper intermediate	2		2			
College requirements	Elective	Engineering management	2		2		ENDC425	
Department requirements	Compulsory	Mechatronics systems design	2	2	3	Control system	MSTD450	
	Compulsory	Industrial automation	2	2	3	robotics	INAU451	
	Compulsory	Graduation project II	2		2	Graduation project I	ENGP452	
	Compulsory	Artificial intelligent	2		2		ARIN453	
	Elective	Mobile robot	3		3	robotics	MROB465	Student choose one
	Elective	Intelligent control	3		3	Control system	ICON464	
Total hours			**15**	**4**	**17**			

Curriculum Skills Map																		
Please tick in the relevant boxes where individual programme learning outcomes are being assessed																		
				Programme learning outcomes														
Year/ Level	Course code	Course Title	Core (C) Title or option(O)	Knowledge and Understanding			Subject-Specific skills				Thinking skills			General and transferable skills (or) other skills relevant to employability and personal development				
				A1	A2	A3	B1	B2	B3	B4	C1	C2	C3	D1	D2	D3	D4	
First year	UOMC101	English Language	Core	√		√								√	√			
	UOMC102	Computer		√		√			√			√				√		
	ENGC121	Calculus 1		√				√	√									
	ENGC123	Engineering Drawing		√														
	ECAN100	Electrical Circuit Analysis		√			√				√							
	EMSA101	Engineering Mechanics I (Static)		√			√											
	PHY102	Physics		√	√		√	√			√							
	UOMC100	Arabic Language				√									√			

	UOMC103	Democracy & Human Rights				√											
	UOMEXX	Elective	Option	√			√	√					√				
	ENGC122	Calculus 2	Core	√					√								
	ENGC124	Autocad		√	√							√				√	
	STMT150	Strength of Materials		√			√			√							
	ALCP151	Algorithm and Computer Programming		√		√			√			√				√	
				Programme learning outcomes													
Year/ Level	Course code	Course Title	Core (C) Title or option(O)	Knowledge and Understanding			Subject-Specific skills				Thinking skills			General and transferable skills (or) other skills relevant to employability and personal development			
				A1	A2	A3	B1	B2	B3	B4	C1	C2	C3	D1	D2	D3	D4
Second year	UOMC104	Professional Ethics	Core			√								√			
	ENGC227	Statistic		√		√			√			√					
	ENGE228	Engineering Mathematics 1		√					√			√					
	EMDY201	Engineering Mechanics 2		√			√										

	ELMA202	Electrical Machine		√				√			√					
	THHT203	Thermodynamic & Heat Transfer		√			√									
	ELCP204	Electronic Principles		√			√				√					
	UOMC201	English Pre-Intermediate				√								√		
	ENGC226	Engineering Economics			√	√			√	√						
	ENGE230	Engineering Mathematics 2		√				√			√					
	FLME251	Fluid Mechanics		√			√									
	DILO252	Digital Logic		√			√									
	ELES253	Electromechanical system			√			√			√					
	SISY254	Signal and Systems	Option		√			√								
	INMD261	Introduction to Mechanical Design			√			√		√						
	COMA262	Composite Materials		√						√						

	AHTR263	Advanced Heat Transfer		√			√										
	RENR264	Renewable Energy			√			√			√		√				
				Programme learning outcomes													
Year/ Level	Course code	Course Title	Core (C) Title or option(O)	Knowledge and Understanding			Subject-Specific skills				Thinking skills			General and transferable skills (or) other skills relevant to employability and personal development			
				A1	A2	A3	B1	B2	B3	B4	C1	C2	C3	D1	D2	D3	D4
Third year	UOMC301	English Language	Core			√									√		
	ENGE320	Numerical analysis		√					√			√					
	MEVI300	(Mechanism & Vibration)			√			√									
	MLAB301	Mechanical Eng. Lab.		√			√	√			√		√				
	MODS302	Modeling and Simulation			√				√			√				√	
	MEIN303	Measurements and Instrumentation			√			√			√						

	MICA304	Microprocessors & Assembly Language		√			√										
	SPRO361	Signal processing	Option	√				√			√						
	IMPR362	Image processing			√			√									
	DMEL350	Design of Machine Elements I	Core		√			√		√							
	PELD351	Power Electronics & Drive			√			√			√						
	CONS352	Control Systems			√			√		√							
	MCSD353	Microcontroller system design			√		√										
	THMH354	Theory of Machine			√			√									
	HPNS355	Hydraulic and Pneumatic Systems			√			√			√		√				

	SMOD363	Solid Modelling	Option		√			√				√				√	
	ILAN364	Industrial LAN			√			√			√						
	COEN365	Communication Engineering			√		√				√		√				
				Programme learning outcomes													
Year/ Level	Course code	Course Title	Core (C) Title or option(O)	Knowledge and Understanding			Subject-Specific skills				Thinking skills			General and transferable skills (or) other skills relevant to employability and personal development			
				A1	A2	A3	B1	B2	B3	B4	C1	C2	C3	D1	D2	D3	D4
Forth year	ENGE429	Public Safety	Core	√		√				√							
	ROTI400	Robotics			√			√			√		√				
	DMEL401	Design of Machine Elements II			√			√									
	MOCS402	Modern Control Systems			√			√			√						
	ENGP403	Graduate project I			√			√		√	√	√	√				√
	STME461	Special topics in	Option		√			√			√	√	√				√

		Mechatronics														
	CNCM462	CNC Machine			√			√				√	√			√	
	BMSY463	Building Management System				√				√							√
	PCID464	PC Interface and Data Acquisition			√			√				√				√	
	UOMC401	English Language	Core			√									√		
	ENGC425	Engineering Management			√	√				√							√
	MTSD450	Mechatronics Systems Design			√			√				√					√
	INAU451	Industrial Automation			√			√		√	√	√	√				√
	ENGP452	Graduate project II			√			√			√	√	√			√	√
	ARIN453	Artificial intelligent			√			√				√				√	
	ICON464	Intelligent control	Option		√			√				√	√			√	

Below are the curriculum for the Mechatronics Engineering Department:

University of Mosul
College of Engineering

Course Name: English Language		**Course Number: UOMC101**
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2021-2020**	**Course type: (Required / Elective): R**
Course Description: In this course, it is aimed at developing students' general English skills through the skills of reading, writing, listening, and speaking. Each unit is organized to enhance students' basic knowledge of vocabulary and grammar through reading texts. The students will learn how to form simple sentences and use them in real life situations. By the end of the course, students will be able to produce basic sentences and communicate in simple real-life situations.		
Course web page: Google Classroom		
Course Pre-requisites: None **Corequisites:** None		
Textbook(s): 1. New-headway- Beginner 2. New-headway- Beginner workbook		
Reference(s): • Archived lectures by specialist teacher for every paper or video material		

Course Outline (Topics covered and Class schedule):

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2	am/are/is/my/you. How are you. Good morning. Nu. 1- 10	Unit 1 Hello	Blackboard + Data Show screen	Oral and written exams
2	2	Countries. He /she/they/his/ her. Fantastic/awful . Nu. 11-30	Unit 2 Your world	Blackboard + Data Show screen	Oral and written exams
3	2	-	Discussion	Blackboard + Data Show screen	Oral and written exams

4	2	Jobs Am/are/is. Negative and question personal information	Unit 3 All about you	Blackboard + Data Show screen	Oral and written exams
5	2	Have/has. Our/ Their Possessive's. the family	Unit 4 Family and friends	Blackboard + Data Show screen	Oral and written exams
6	2	Sports/food/drink. language and nationalities. a/an. number and prices	Unit 5 The way I live	Blackboard + Data Show screen	Oral and written exams
7	2	First Monthly Exam	Exam 1	Blackboard + Data Show screen	Oral and written exams
8	2	The time. Present simple-he/she. Always/sometimes /Never. Days of the week	Unit 6 Every day	Blackboard + Data Show screen	Oral and written exams
9	2	Question words Me/him/us/them. This/that.	Unit 7 My favorites	Blackboard + Data Show screen	Oral and written exams
10	2	Rooms and furniture. There is/are . preposition	Unit 8 Where I live	Blackboard + Data Show screen	Oral and written exams
11	2	-	Discussion	Blackboard + Data Show screen	Oral and written exams
12	2	Saying. Was/were born. Past simple irregular verbs. Have/do/go	Unit 9 Times past	Blackboard + Data Show screen	Oral and written exams
13	1	Past simple regular and irregular. Questions and negatives.	Unit 10 We had a great time!	Blackboard + Data Show screen	Oral and written exams
14	1	Second Monthly Exam	Exam 2	Blackboard + Data Show screen	Oral and written exams
15	1	General review of the course	General Review	Blackboard + Data Show screen	Oral and written exams

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class Blackboard, data show, computer.

Course Learning outcomes (Objectives):

Student who finish this course should:
A1- Students can learn how to understand and translate articles written in English into their native language [IV,V,VI,VII]
A2 - The ability to listen to and understand the articles in English. [IV,V,VI,VII]
A3 - The ability to translate into his mother tongue. [IV ,VII]
A4- Allow students to conduct research and write research reports in English. [V,VI,VII]
A5- Learn about the English language and its role in transferring and understanding different types of science and technology. [IV,V,VI,VII]
A6 - The ability to refrain from quoting a text. [V,VI,VII]

Contribution of the course to Criterion 3:

- can have a successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies.
- engage in professional service such as participation in professional societies, and to always consider and support professional ethics.
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity, and leadership.

Relationship of the course to the Program outcomes:

IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
V: an understanding of the responsibility of engineers to always practice professionally and ethically.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:			
	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Raghad Raied Mahmood		
E-mail:	Raghad.mahmood@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 1		
Office Hours:	Sunday, 10:30 - 12:30 AM		

University of Mosul
College of Engineering

Course Name: Computer		**Course Number:**
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:** UOMC102
Credits: 3	**Year & Semester: 2021-2020**	**Course type: (Required / Elective): R**

Course Description: Computing Fundamentals and Office 2013 applications will be covered during this course. Computing Fundamentals focuses on hardware and software and how they work together. The course includes activities and exercises that guide students to explore the Windows operating system, change settings, and customize the desktop. Students also learn how to manage files and folders. On the other hand, the Key Applications focuses on two of the Microsoft Office 2013 applications: Word and Excel. The course explains the purpose of commonly used software features and step-by-step demonstrations on how to use those features. Students will practice mastering those features to complete typical day-to-day tasks at home, school, and work.

Course web page: Google Classroom

Course Pre requisites: None
Corequisites: None

Textbook(s):
Computer skill

Reference(s):

- 2015 Computer Literacy BASICS: A Comprehensive Guide to IC3 Connie Morrison, Dolores Wells, Lisa Ruffolo Cengage Learning. ISBN: 128576658X
- IC3 GS5 Certification Guide Using Windows 10 & Office 2016 Print ISBN: 978-1-55332-463-8

Course Outline (Topics covered and Class schedule):

Week 1	Computer Fundamental
Week 2	Computers and Operating System 2
Week 3	Software and Hardware Interaction
Week 4	Windows File Management
Week 5	Operating System Customization
Week 6	Computer Hardware
Week 7	Key Applications
Week 8	Exploring Microsoft Office 2013
Week 9	Getting Started with Word Essentials
Week 10	Editing and Formatting Documents
Week 11	Laptops and Other Mobile Devices: To explain how to configure, repair, upgrade, maintain and

	troubleshoot laptops and other mobile devices.
Week 12	Getting Started with Excel Essentials
Week 13	Organizing and Enhancing Worksheets
Week 14	Creating Formulas and Charting Data
Week 15	Final exam

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	30	
	Homework + project (if any)	5	
	Quizzes	5	
	Lab work	10	
	Final exam	50	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, computer, power point

Course Learning outcomes (Objectives):
The main objectives of the course are to:

1. Introduce students to the digital world. Follow the developments in computer hardware and software from the initial steps of generation to modern and future time. **[I, III, VI]**
2. Introduce the components of an information system, i.e., hardware, software, data, networks, facilities, personnel, services and partners. **[I, III, VI]**
3. Closely examine information system's hardware. Specifically consider the processing unit, input and output devices, and primary and secondary storage. Examine the technology and analyze its characteristics. **[I, III, VI]**
4. Examine information systems in organizations. Explore different types of software: applications, system software. **[I, III, VI]**
5. Introduce information systems' development. Consider the Systems Development Life Cycle (SDLC). Introduce computer programming languages and database concepts. **[I, III, VI]**
6. Introduce data communications. Focus on local area networks and consider security issues. **[I, III, VI]**
7. Explore the Internet, web resources and their use. **[I, III, VI]**
8. Address information systems security. **[I, III, VI]**

Contribution of the course to Criterion 3: Credit hours for:

- can have a successful professional career in mechatronics engineering and related fields or work as

researcher or pursue additional degrees through graduate studies.
- engage in professional service such as participation in professional societies, and to always consider and support professional ethics.
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity, and leadership.

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.

III: an ability to outline and conduct experiments as well as analyze and interpret data.

VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Dr.Firas Ahmed	Rashad Al-saigh	
E-mail:	to be specified	rashad.alsaigh@uomosul.edu.iq	
Office location:			
Office Hours:			

University of Mosul
College of Engineering

Course Name: Calculus I		**Course Number:**
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2021-2020**	**Course type: (Required / Elective): R**

Course Description: Students are expected to use their mathematical knowledge and practices to solve problems. This course strengthens students' understanding of functions in preparation for the process of differentiation. Topics in this course are functions and graphing, range and domain, limits and continuity, derivatives, derivative applications, matrix, and solution methods for systems of algebraic linear equations. Emphasis is placed on the exploration of real-world differential applications.

Course web page: Google Classroom

Course Pre requisites: None
Corequisites: None

Textbook(s):
1. George B. Thomas, Jr., Calculus, Thirteenth Edition, Pearson Education, Inc. , 2014.

Reference(s):
- Richard Courant and Fritz John, Introduction to Calculus and Analysis, Vol. 1, Springer, 1999.

Course Outline (Topics covered and Class schedule):

Week 1	Prerequisites for Calculus :Coordinates and Graphs in the Plane; Directions and Quadrants; Distance between Points; Graphs of Equations; Intercepts and More about Graphing; Slope and Equations for Lines; Slope of Non-vertical Lines; Lines That are Paralle
Week 2	Functions and Their Graphs: Domains and Ranges are Often Intervals; Even Functions and Odd Functions; Functions Defined in Pieces; How to Shift a Graph; Equations for Circles in the Plane; Equations for Parabolas.
Week 3	A Review of Trigonometric Functions: Radian Measure; The Six Basic Trigonometric Functions; Calculating Sines and Cosines; Graphs of Trigonometric Functions.
Week 4	Limits and Continuity: The Limit of a Function; The functions that haven't limits; The theories (1, 2, 3 to 6) of limit; Eliminating Common Factors from Zero Denominators; The Sandwich Theorem; sin (theta)theta theorem; Limits Involving Infinity; Asymptot
Week 5	Continuous Functions; Continuity at a Point; Continuity Test; Properties of Continuous Functions; Inverse Functions and Continuity; composites of continuous functions; Limits of Continuous Functions.
Week 6	Derivatives: mathematical definition of the derivative; Tangents and the Derivative at a Point; ; Defining Slopes and Tangent Lines; The Derivative of a function; The Slope of Lines; Differentiation Rules; Integer Powers, Multiples, Sums, and Differences;

Week 7	Velocity, Speed, and Other Rate of Change such as acceleration and jerk; Derivatives of Trigonometric Functions such as Sine, Cosine and other Basic Functions; The Chain Rule; Integer Powers of Differentiable Functions; Derivative Formulas that Include th
Week 8	Implicit Differentiation and Fractional Powers; Lenses, Tangents, and Normal Lines; Using Implicit Differentiation to Find Derivatives of Higher Order; Fractional Powers of Differentiable Functions; Linear Approximations and Differentials.
Week 9	Applications of Derivatives: Related Rates of Change; Maxima, Minima, and the Mean Value Theorem; The First Derivative Theorem; The Mean Value Theorem; Curve Sketching with y' and y"; Points of Inflection; Graphing with y' and y".
Week 10	Graphing Rational Functions Asymptotes and Dominant Terms: Horizontal and Vertical Asymptotes; Oblique Asymptotes; Optimization; Applied Examples from Mathematics; Applied Examples from Industry.
Week 11	Mid Exam : Matrices: Basic Definitions; Addition, Subtraction and Multiplication
Week 12	Transposition, Determinants and Inverse of a Matrix; System of Linear Algebraic Equation.
Week 13	Gramer's rule and Matrix inverse.
Week 14	Gauss elimination and Gauss-Jordan method.
Week 15	Final Exam.

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	30	
	Homework + project (if any)	5	
	Quizzes	5	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class projector, data show, computer,

Course Learning outcomes (Objectives):
1) The successful Calculus I student should be able to apply the following competencies to a wide variety of functions, including piecewise, polynomial, rational, algebraic, trigonometric, inverse trigonometric, exponential, and logarithmic. [I, IV, VI, VII].

2) Determine the existence of, estimate numerically and graphically, and find algebraically the limits of functions. [I, IV, VII].
3) Determine continuity at a point or on intervals and distinguish between the types of discontinuities at a point. [I, IV, VI].

4) Determine the derivative of a function using the limit definition. Interpret the derivative as the slope of a tangent line to a graph, the slope of a graph at a point, and the rate of change of a dependent variable with respect to an independent variable. [I, IV].
5) Determine the derivative and higher derivatives of a function explicitly using differentiation formulas. And determine derivatives implicitly. [I, IV, VI].
6) Solve related rate problems. And determine absolute extrema for a continuous function on a closed interval. Use these and other appropriate techniques to solve optimization problems. [I, IV, VI, VII].
7) For a given set of matrices, determine addition and multiplication using the rules. [I, IV].
8) Determine the transpose, determinant, and Inverse of a matrix. [I, IV].
9) Using Cramer's, Inverse, and Gauss elimination methods to solve the system of linear algebraic equations [I, IV, VI, VII].

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Dr. Laith Mohammed Jasim		
E-mail:	jasiml68@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 5		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Engineering drawing		**Course Number: 2023**
Department: Mechatronics Engineering Department	**Program Name:**	**Program Code:** uv3onb7
Credits:	**Year & Semester: 2021-2020**	**Course type: (Required / Elective):**

Course Description: *The course will cover the basic of engineering drawing which is how to draw line, circle, curve and angle. There are two parts in this course, first of all will be focused in engineering drawing. Students will develop understanding of fundamentals and application of the following topics: 1. Introduction to engineering drawing and its tools , Point.*

- Introduction to engineering drawing and its tools , Point. .
- Introduction to engineering drawing and its tools , Line
- The types of line and its properties , Line
- Engineering shapes and the arcs , lamina.
- Multiview projection , Projection of Lamina on Auxiliary Plane.
- Dimensions , isometric
- Isometric projection , isometric.
- conclusion the missing view , section of isometric body

Course web page: Google Classroom

Course Pre requisites: Introduction to Engineering drawing
Corequisites: None

Textbook(s):
Computer skill

Reference(s):

- "NGINEERING DRAWING AND GRAPHIC TECHNOLOGY", Thirteen Edition, By: THOMAS E.FRENCH, CHARLES .VIERCK, ROBERT J.FOSTER
- ENGINEERING DRAWING AND AUTO CAD", By:RAMZY SYHOOD HAMIED
- TECHNICAL GRAPHICS COMMUNCATION", THIRD EDITION, Gary R.

Course Outline (Topics covered and Class schedule):

Week 1	**Introduction to engineering drawing and its tools , Point**
Week 2	**The types of line and its properties , Line**

	Class worke 2 Homework 2 **First Quiz**
Week 3	**Engineering shapes and the arcs , lamina. , Dimensions**
Week 4	**Engineering shapes and the arcs , lamina. , Dimensions**
Week 5	**Engineering shapes and the arcs , lamina. , Dimensions**
	Class worke 3 Homework 3 **Second Quiz**
Week 6	**Multiview projection , Projection of Lamina on Auxiliary Plane**
Week 7	**Multiview projection , Projection of Lamina on Auxiliary Plane**
Week 8	**Multiview projection , Projection of Lamina on Auxiliary Plane**
	Class worke 3 Homework 3 **Third Quiz**
	1st Term Examination
Week 9	**Isometric**
Week 10	Isometric projection , Projection of isometric on auxiliary plane
Week 11	Isometric projection , Projection of isometric on auxiliary plane
Week 12	Isometric projection , Projection of isometric on auxiliary plane
Week 13	conclusion the missing view , section of isometric body
Week 14	conclusion the missing view , section of isometric body
Week 15	conclusion the missing view , section of isometric body
	Class worke 2 Homework 2 **Fourth Quiz**
	Final Exam

Laboratory schedule: None

	Method	**No**	**Percentage %**
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	8	
	Quizzes (3 for each)	12	
	Participation	5	

	Attendance	5	
	Final exam	50	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, computer, power point**,** Black board**.**

Course Learning outcomes (Objectives):
The main objectives of the course are to:

1. Introducing students to engineering drawing. Follow the developments in the field of engineering drawing from the initial steps of the generation to the modern and future era time. **[I, III, VI]**
2. Students acquire the necessary skill to draw shapes manually To be able to clarify and design a specific form or idea for implementation **[I, III, VI]**
3. Use different methods to draw geometric shapes. **[I, III, VI]**
4. Explanation of the engineering drawing of the different geometric. **[I, III, VI]**
5. Developing the ability to visualize the student & the student's creative abilities to be able to read engineering maps **[I, III, VI]**

Contribution of the course to Criterion 3: Credit hours for:

- engage in professional service such as participation in professional societies, and to always consider and support professional ethics
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.

III: an ability to outline and conduct experiments as well as analyze and interpret data.

VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Nooraldeen Saleh Alenazi	Anwar Mhommad Mostafa	
E-mail:	nooralelln2017@uomosul.edu.iq	anwar1964@uomosul.edu.iq	
Office location:			
Office Hours:			

University of Mosul
College of Engineering
Mechatronics Engineering Department

Course Name: Electrical circuit analysis			
Department: Mechatronics Engineering Department		**Class:** 1 **Semester:** 1	**Program Code: ECAN100**
Credits: 3 (2 +2)	**Year & Semester: 2021-2020**	**Course type: (Required / Elective): R**	
Course Description: Introduction to electrical elements, sources and interconnects. Ohm's law, Kirchoff's law, superposition, and Thévenin's and Norton theorems are introduced.			
Course Pre requisites: NONE			
Textbook(s): Irwin, J.D. and R.M. Nelms, 2011. Basic Engineering Circuit Analysis, 11th Edition, Wiley.			
Reference(s): Dorf & Svoboda, Introduction to Electric Circuits (9th edition), John Wiley, 2013. ISBN 1118477502, ISBN 9781118477502			

Weeks	**Materials and Syllabus Details**
Week 1	Introduction, Basic Concepts
Week 2	Units, Charge, Current, Voltage, Power, Conservation of Energy,
Week 3	Circuit Elements, Resistive circuits
Week 4	Ohms' law,
Week 5	Kirchhoff's Voltage Law (KVL)
Week 6	Kirchhoff's Current Law (KCL)
Week 7	The Single-Node-Pair Circuit, Series Circuits, Parallel Circuits, Voltage Division, Current Division
Week 8	Single Loop/Node Circuits
Week 9	Resistor Combinations/Transformations
Weak 10	Mesh (Current) Analysis, Mesh Analysis with Supermeshes
Week 11	Equivalent Practical Sources, Star/Delta
Week 12	Circuits with Dependent Sources
Week 13	Nodal Analysis
Week 14	Loop Analysis
Week 15	Superposition Theorem

	Method	**No**	**Percentage %**
Assignment & Grading	**Midterm exam**	25	25%
	Homework + project (if any)	5	5%
	Quizzes	5	5%
	Lab work	15	15%

	Final exam	**Theoretical Part:** 40	**Practical Lab Part:** 10	50	50%

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Data show, white board, and Labs

Course Learning outcomes (Objectives):

1)) Adequate knowledge in electrical system analysis methods and concepts ,.(**I, III, VI, VII**).

2) Ability to design and implement DC electrical circuits under realistic constraints and conditions ,. (**I, III, VI, VII**).).

3) Ability to debug, verify, simulate, synthesize electrical circuits, (**I, III, VI, VII**).

4) Ability to devise, select, and use modern techniques and tools needed for electrical system design ,. (**I, III, VI, VII**).

Contribution of the course to Criterion 3: Credit hours for:

- Can have successful professional career in mechatronics engineering and related fields or work as Researcher or pursue additional degrees through graduate studies
- Apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- Have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.

III: an ability to outline and conduct experiments as well as analyze and interpret data.

VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.

VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

-

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Dr. Muhamad Azhar Abdilatef		
E-mail:	Muhamad.azhar@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 6		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Engineering Mechanics (statics)		**Course Number:** EMSA 101
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2021-2020**	**Course type: (Required / Elective): R**

Course Description: This course gives the students some more advanced mathematical subjects required in engineering analysis such subjects ara forces system, moment, couples, centroids .

Course web page: Google Classroom

Course Pre requisites: Eng.mechanic I (statics),
Corequisites: None

Textbook(s):

1. Engineering Mechanics, STATICS, Bedford A. and Fowler W., PEARSON, Prentice Hall, 5th Edition, 2008. 3. Vector Mechanics for Engineers, STATICS, Beer F. P. , Johnston E. R., Mazurek D. F.,

Reference(s):

- Vector Mechanics for Engineers, STATICS, Beer F. P. , Johnston E. R., Mazurek D. F., Cornwell P. J. and Eisenberg E. R., McGraw-Hill, 9th Edition, 2010.

Course Outline (Topics covered and Class schedule):

Week 1-3	Forces system
Week 4-6	Moment
Week 7-8	Couple moment
Week 8-9	Equilibrum
Week 10-12	Friction
Week 13-15	Centroid

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	**20%**
	Homework + project (if any)	10	**10%**
	Quizzes	10	**10%**
	Lab work	0	

	Final exam	60	**60%**

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, power point, animations.

Course Learning outcomes (Objectives):
Student who finish this course should:
1) Recognize various types of Forces, their components, and the function of each component**[I, II].**
2) Identify the types of moments and the methods used to calculate them**[II, III,IV].**
3) Distinguish between different types of frictional forces**[II, III,IV,V]**.
4) Familiarity with the position of equilibrum and the equations used in the subject**[II, IV,V,VI]**.
5) Identify the methods used to find the center of geometric shapes**[II,VI]**..

Contribution of the course to Criterion 3: Credit hours for:
- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Islam Abdullah Aziz	None	None
E-mail:	islamabd@uomosul.edu.iq		
Office location:	Right building,2nd floor ,room 1		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Physics		**Course Number:** PHY102
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2021-2020**	**Course type: (Required / Elective): R**

Course Description: this course deals with university physics , it contains topics related to electrical and electronic field , mechanical field ,

Course web page: Google Classroom

Course Pre requisites: none
Corequisites: none

Textbook(s):
1. University Physics Volume 2 SENIOR CONTRIBUTING AUTHORS SAMUEL J. LING, TRUMAN STATE UNIVERSITY JEFF SANNY, LOYOLA MARYMOUNT UNIVERSITY .2016

Reference(s):
- OLYMPIAD PHYSICS ,The Committee of Japan Physics Olympiad2013

Course Outline (Topics covered and Class schedule):

Week 1	introduction to magnetic theory , historical , types of magnetic material
Week 2	electromagnetic theory application ,
Week 3	electromagnetic circuit analysis , field density , field intensity
Week 4	solved problem
Week 5	active material component of electric circuit (resistance) construction type characteristics
Week 6	passive material component of electric circuit (indutance) construction type characteristics
Week 7	passive material component of electric circuit (capacitance) construction type characteristics
Week 8	mid term exam
Week 9	diode , type , characteristic , construction ,
Week 10	diode application circuit clipping circuit
Week 11	diode application circuit clamping circuit
Week 12	transistor , type , characteristic , construction ,
Week 13	friction , types

Week 14	first low of newton application
Week 15	second low of newton application

Laboratory schedule: none

	Method	No	Percentage %
Assignment & Grading	Midterm exam	30	
	Homework + project (if any)	5	
	Quizzes	5	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: class projector, data show, computer

Course Learning outcomes (Objectives):
1) knowing the magnetic theory **[I,II,V]**
2) knowing magnetism theory and application**[I,II,V]**
3) knowing the active and passive component of electrical circuit**[I,II,V]**
4)knowing the component of electronic circuit**[I,II,V]**
5) knowing the friction type and newton lows**[I,II,V]**

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- engage in professional service such as participation in professional societies, and to always consider and support professional ethics
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.

VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:			
	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Dr.Myasar Salim younus		
E-mail:	myasaralattar@uomosul.edu.iq		
Office location:	2nd floor ,1st room		
Office Hours:			

University of Mosul
College of Engineering

Course Name: اللغة العربية		**Course Number:** UOMC100
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2021-2020**	**Course type: (Required / Elective): R**

Course Description:
تهتم مادة اللغة العربية بضرورة فهم الطالب وادراكه لاهمية اللغة العربية و مميزاتها وايضا التاكيد على المصطلحات النحوية التي يجب على الطالب فهمها والاهتمام ايضا بالقواعد الاملائية التي تفيد الطالب في كتابته

Course web page: Google Classroom

Course Pre requisites: None
Corequisites: None

Textbook(s):

1. جامع الدروس العربية / مصطفى الغلاييني

Reference(s):

- النحو الوافي / عباس حسن

Course Outline (Topics covered and Class schedule):

Week 1	مقدمة عن اللغة العربية : تعريف عن اللغة والكلام، الاسم، والفعل والحرف - 1
Week 2	مقدمة عن اللغة العربية : تعريف عن اللغة والكلام، الاسم، والفعل والحرف -2
Week 3	علامات الترقيم
Week 4	الفعل واقسامه - 1
Week 5	الفعل واقسامه - 2
Week 6	اخطاء شائعة في اللغة العربية - 1
Week 7	اخطاء شائعة في اللغة العربية - 2
Week 8	العدد
Week 9	قواعد كتابة الهمزة - 1
Week 10	قواعد كتابة الهمزة - 2
Week 11	التاء المربوطة والتاء المفتوحة - 1
Week 12	التاء المربوطة والتاء المفتوحة - 2
Week 13	تعريف الشعر، الشعر العمودي، والشعر الحر - 1

Week 14	2 - تعريف الشعر، الشعر العمودي، والشعر الحر
Week 15	مراجعة

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, computer

Course Learning outcomes (Objectives):

1- ان الهدف من تدريس مادة اللغه العربيه في هذا القسم هو الكفاءة اللغويه للطلبه وتمكينهم من التعبير عن أفكارهم ومشاريعهم بلغه عربية فصيحه واضحه خاليه من الغلط واللون العامي والاعجمي بابسط الطرق . فاللغة هي أداة الايصال الاولى بين أفراد المجتمع ، ومتى تمكن الانسان من لغته استطاع الوصول الىأذهان الاخرين بحيث يسهل تعامله معهم ويتمكن من تحقيق هدفه في العمل .**[V, IV, VII]**

2- وان ذلك يؤدي الى تحقيق التوازن المفترض في ثقافه الطلبه فهو يضمن نوعاً من التعادل بين مناهج الماده العلميه ووسيله ايصالها او التعبيرعنها وتتضمن هذ المحاضرات تدريس مایاتي : قواعد اللغه العربيه ، وقواعد الاملاء ، ومعالجه بعض الاغلاط اللغويهالشائعه ، فضلا عن دراسه بعض النصوص الادبيه والقرانيه **[V, IV, VII]**.

Contribution of the course to Criterion 3: Credit hours for:

- engage in professional service such as participation in professional societies, and to always consider and support professional ethics
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.

V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.

VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.			
Teaching staff:			
	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	المدرس: هند فخري احمد		
E-mail:	Hend.f.a@uomosul.edu.iq		
Office location:	to be specified		
Office Hours:	كلية الاداب قسم اللغة العربية		

University of Mosul
College of Engineering

Course Name: Democracy & Human Rights		**Course Number:** UOMC103
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2021-2020**	**Course type: (Required / Elective): R**

Course Description:
شمل المادة اساسيات عن تعريف الحق وانواع الحقوق الانسانية وضمانات حقوق الانسان على الاصعدة كافة سواء الوطنية او الدولية وكذلك اساسيات عن الديمقراطية وانواعها وموقف الدين الاسلامي منها وصور النظام الديمقراطي والتعرف على مميزات وعيوب هذا النظام.

Course web page: Google Classroom

Course Pre requisites: None
Corequisites: UOMC104

Textbook(s):
1. ضمانات حقوق الانسان وحمايتها وفقا للقانون الدولي والتشريع الوطني / نبيل عبد الرحمن ناصر الدين
2. الديمقراطية وحقوق الانسان / د. امير عبد العزيز

Reference(s):
●

Course Outline (Topics covered and Class schedule):

Week 1	تعريف حقوق الاسنان ومصادر الحقوق (المصادر الدولية / المصادر الاقليمية / المصادر الوطنية /المصادر الدينية)
Week 2	خصائص حقوق الانسان
Week 3	نشأة حقوق الانسان وتطورها
Week 4	انواع حقوق الانسان / حقوق مدنية وسياسية حقوق اقتصادية واجتماعية حقوق بيئية وثقافية وتنموية
Week 5	ضمانات لمنع الاعتداء على حقوق الانسان / ضمانات حقوق الانسان في الاسلام
Week 6	ضمانات حماية حقوق الانسان على الصعيد الوطني
Week 7	ضمانات حقوق الانسان على الصعيد الدولي
Week 8	مفهوم الديمقراطية
Week 9	خصائص النظام الديمقراطي
Week 10	صور الحكم الديمقراطي (الديمقراطية المباشرة / الديمقراطية شبه المباشرة / الديمقراطية غير المباشرة)
Week 11	الديمقراطية الرقمية / تعريفها ومزايا وعيوب الديمقراطية الرقمية / مظاهر الديمقراطية الرقمية

Week 12	موقف الاسلام من الديمقراطية
Week 13	نقد النظام الديمقراطي
Week 14	الفساد الاداري / التعريف والانواع
Week 15	طرق مكافحة ظاهرة الفساد الاداري

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam		
	Homework + project (if any)	10	
	Quizzes	30	
	Lab work		
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Data show

Course Learning outcomes (Objectives):

1. تمكين الطالب من الحصول على المعرفة والقدرات حتى يفهوا ويتمكنوا من ممارسة حقهم الديمقراطي في المجتمع. **[V, IV, VII]**
2. تمكين الطالب من الحصول على المعرفة لحقوقه الاساسية باعتباره كائن بشري له الحق في العيش والكرامة الانسانية والحرية والمساواة فاكتساب الطالب لهذه الثقافة .. **[V, IV, VII]**

Contribution of the course to Criterion 3: Credit hours for:
have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.

V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.

VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	Assistant teacher	Lab teaching

University of Mosul
College of Engineering

Name:	RIGHTS AND FREEDOOMS		
E-mail:	M2017M4@uomosul.edu.iq		
Office location:	Mechatronics Department		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Information Technology		**Course Number:** Yet to be specified
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2021-2020**	**Course type: (Required / Elective): R**

Course Description: The Information Technology course covers the fundamentals of computer and mobile devices hardware and software and advanced concepts such as security, printers, and networking. It is designed for students who want to pursue careers in IT and students who want to gain practical knowledge of how a computer and mobile devices work.
Students who complete this course should be able to describe the internal components of a computer, assemble a computer system, install an operating system, and troubleshoot using system tools and diagnostic software. Students will also be able to connect to the Internet and share resources in a networked environment.

Course web page: Google Classroom

Course Pre requisites: None
Corequisites: None

Textbook(s):
1. IT Essentials: PC Hardware and Software Companion Guide Cisco Networking Academy series Companion Guide Series, Cisco Press, 2013.

Reference(s):
- RAJARAMAN, V., Introduction to Information Technology, 3rd edition, 2018.

Course Outline (Topics covered and Class schedule):

Week 1	Introduction to the Personal Computer Hardware: Introduction to the function of the main components of Computer Hardware and their types.
Week 2	Introduction to the Personal Computer Hardware: Introduction to the function of the main components of Computer Hardware and their types.
Week 3	PC Assembly: To select and install the appropriate computer components to build, repair, or upgrade personal computers.
Week 4	PC Assembly: To select and install the appropriate computer components to build, repair, or upgrade personal computers.
Week 5	PC Assembly: To select and install the appropriate computer components to build, repair, or upgrade personal computers.
Week 6	Preventive Maintenance and the Troubleshooting Process: To explain how to perform preventive maintenance and troubleshooting on personal computers.
Week 7	Windows Installation: To perform installation of Microsoft Windows operating system.
Week 8	Windows Configuration and Management: To perform configuration, management, maintenance, and troubleshooting of Microsoft Windows operating system.
Week 9	Networking Concepts and Applied Networking: To explain the operation of networks and configure devices to connect to LANs, the Internet, and Cloud services.

Week 10	Networking Concepts and Applied Networking: To explain the operation of networks and configure devices to connect to LANs, the Internet, and Cloud services.
Week 11	Laptops and Other Mobile Devices: To explain how to configure, repair, upgrade, maintain and troubleshoot laptops and other mobile devices.
Week 12	Laptops and Other Mobile Devices: To explain how to configure, repair, upgrade, maintain and troubleshoot laptops and other mobile devices.
Week 13	Printers: To introduce the function of the components of printers, compare different types of printers, and install a typical printer device.
Week 14	Security: To implement basic host, data, and network security.
Week 15	Review

Laboratory schedule: None

	Method	**No**	**Percentage %**
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, computer, power point

Course Learning outcomes (Objectives):
Upon completion of the Information Technology course, students should be able to perform the following tasks:
1) Select the appropriate computer components to build, repair, or upgrade personal computers. **[I, II, VI]**
2) Explain how to correctly use tools and safely work in a lab. **[I, II, VI]**
3) Install components to build, repair, or upgrade personal computers. **[I, II, VI]**
4) Explain how to perform preventive maintenance and troubleshooting on personal computers. **[I, II, VI]**
5) Install Windows operation systems. **[I, II, VI]**
6) Perform management and maintenance of Windows operating systems. **[I, II, VI]**
7) Configure computers to communicate on a network. **[I, II, VI]**
8) Configure devices to connect to the Internet and Cloud services. **[I, II, VI]**
9) Explain how to use, configure, and manage laptops and mobile devices. **[I, II, VI]**
10) Install and share a printer to meet requirements**[I, II, VI]**
11) Implement basic host, data, and network security. **[I, II, VI]**
12) Troubleshoot advanced hardware and software problems**[I, II, VI]**

Contribution of the course to Criterion 3: Credit hours for:

- engage in professional service such as participation in professional societies, and to always consider and support professional ethics
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.

II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.

VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Hasan Al-layla	Noor Mowafeq	
E-mail:	to be specified	to be specified	
Office location:	to be specified	to be specified	
Office Hours:	to be specified	to be specified	

University of Mosul
College of Engineering

Course Name: **ENGC122 Calculus II**		**Course Number:** **Calculus II**
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:** **ENGC122**
Credits: 3	**Year & Semester: 2021-2020**	**Course type: (Required / Elective): R**

Course Description:
Integral Calculus:Techniques of Indefinite Integration; Definite Integrals; Properties of Definite Integrals; Solids of Revolution; Volume of Cylindrical Shell & Cross Section; Arc Length; Surface of Revolution; Center of Mass; Integration of Transcendental Functions; Indeterminate Forms and L' Hopital Rule; Trigonometric Integrals; Integrals of Rational Functions; Improper Integrals. Polar Coordinates, Graphing in Polar Coordiates

Course web page: Google Classroom

Course Pre requisites: Math -1 ENGC121
Corequisites: None

Textbook(s):
Thomas' calculus In 13th, Also the library, there are many math's books that can be used as reference books.

Reference(s):
- None

Course Outline (Topics covered and Class schedule):

Week 1	Techniques of Indefinite Integration; Definite Integrals; Properties of Definite Integrals
Week 2	Solids of Revolution; Volume of Cylindrical Shell & Cross Section
Week 3	Solids of Revolution; Volume of Cylindrical Shell & Cross Section
Week 4	Arc Length; Surface of Revolution; Center of Mass
Week 5	Integration of Transcendental Functions
Week 6	Indeterminate Forms and L' Hopital; Rule.
Week 7	Mid term exam
Week 8	Basic Integration Formulas, Integration by Parts
Week 9	Trigonometric Integrals
Week 10	Integrals of Rational Functions

Week 11	Integrals Partial Fractions
Week 12	Polar Coordinates
Week 13	Graphing in Polar Coordinates
Week 14	Graphing in Polar Coordinates
Week 15	Review

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	25	
	Homework + project (if any)	5	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class projector, data show

Course Learning outcomes (Objectives):
The students who successfully fulfill the course requirements will:

- Understand the techniques of graphic function and finding the area and the volume generated by revolving the function about the any axis's, [I, II, IV, VII]
- Gain knowledge about the techniques of differentiation and integration, [I, II, V]
- Gain an ability to apply the techniques of differentiation and integration to any type of physical problem, [I, V, VI, VII]
- Polar Coordinates, Graphing in Polar Coordinates [I, II, IV, VII]
-

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies,
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design,
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Loay B. Aldabbagh		none
E-mail:	to be specified later		
Office location:	Mechatronics Department - right building - 2nd floor - room 4		
Office Hours:			

University of Mosul
College of Engineering

Course Name: AutoCAD		**Course Number:**
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:** MEA125
Credits: 3	**Year & Semester: 2021-2020**	**Course type: (Required / Elective): R**

Course Description: Computer Aided Drawing is a scientific course with theoretical and practical parts, concerned with providing specialized information in the field of graphic computer software related to engineering and architectural drawings, especially the AutoCAD software.
The approach of the course is based on explaining the details of the drawing process and the use of the program in sequential and interrelated stages, enabling the user to use the commands gradually, according to the degree of importance of the order, its level of complexity, and the user's need for it according to the level of his capabilities and his ability of dealing with the details, orders and elements of the software.

Course web page: https://classroom.google.com **, Class code :** bhdapjl

Course Pre requisites: None
Corequisites: None

Textbook(s):
Computer skill

Reference(s):

- Dennis E. Maguire,"Engineering Drawing from First Principles Using AutoCAD", 1st Edition Butterworth..Heinemann, (Can be downloaded from the Course web page).
- Kendrol Philips," AutoCAD Beginners Guide 2D and 3D Drawings", (Can be downloaded from the Course web page).
- Lee Ambrosius and David Byrnes"AutoCAD AutoCAD LT All in One Desk Reference for Dummies", Wiley Publishing 2006, (Can be downloaded from the Course web page).

- Dennis E. Maguire,"Engineering Drawing from First Principles Using AutoCAD", 1st Edition Butterworth..Heinemann, (Can be downloaded from the Course web page).
- Kendrol Philips," AutoCAD Beginners Guide 2D and 3D Drawings", (Can be downloaded from the Course web page).
- Lee Ambrosius and David Byrnes"AutoCAD AutoCAD LT All in One Desk Reference for Dummies", Wiley Publishing 2006, (Can be downloaded from the Course web page).

Course Outline (Topics covered and Class schedule):

Week 1	**Introduction to AutoCAD software.** AutoCAD software - user interface and initial drawing settings AutoCAD program interface elements Coordinate systems in the program Angle units in the program Drafting Settings: Grid, Snap, Ortho Set Drawing Limits Working with graphic files: • Create a new file

	• Open previous file • Save the new file. • Save another copy of the file - Save As • Import an Import file • Export an Export file Drawing Utilities graphic file services • File Audit • File Recover • Remove unused items Purge • View the properties for the Drawing Properties graphic file Exit the current file - Close Exit the program.
Week 2&3	Object Snap General commands for Editing items • Undo • Redo • Cut elements • Copy items • Copy objects with Base Point • Paste items • Paste the elements according to their original coordinate • Clear objects • Find Text Objects • Scene Redraw • Scene Regeneration • Zoom in and out • Scene Offset - Pan • Expand the Clean Screen drawing field Modify the contents of the Toolbars Sort view of multiple files in Windows dropdown list • Cascade arrangement • Tile Horizontal • Tile Vertical First Quiz
Week 4	• Line • Ray line • Construction Line • Multiline line • Polyline • Polygon • Rectangle shape • Arc • Circle • Donut • Spline • Ellipse Second Quiz
Week 5	**Modify tools -first group** • Erase • Copy

	• Move • Mirror • Rotate • Scale • Offset • Rectangular and Polar Array Third Quiz
Week 6&7	• Properties • Match Properties • Stretch • Lengthen • Trim • Extend • Break • Join • Chamfer • Fillet • Explode • Align • Polyline Edit • Mline Edit Forth Quiz
Week 8	**2D Drawing Commands – second group** • Point • Modify Point Style • Divide • Measure • Hatch • Gradient • Region • Boundary • Text • Mtext Fifth Quiz
Week 9	**Create Block Drawings** • Insert pre-made graphic blocks • Insert a graphic source DWG Reference • Insert bitmap image as an external Raster Image Reference • External resource management - External reference • Dealing with ready-made blocks in Tool Palettes Sixth Quiz
Week 10	**Layers and drawing element settings** • Color • Linetype • Line Weight • Text Style

Week 11	• Quick dimensions • Linear dimensions • Aligned dimensions • Measure the arc length • Ordinate coordinates • Polar and angular measurement group • Radius measurement • Jogged distant radius measurement • Diameter dimensions • Angular measure • Baseline dimensions • Continue dimensions • Multileader • Center mark • Jogged Linear • Oblique Measuring Lines • Align Text • Dimension Style
Week 12	Main tools • Workspaces • Palettes • Design Center • Spelling correction • Quick Select • Draw Order format • Inquiry • Block Editor • Save the drawing area as a digital image • General program options - Options • Program Assistant from the Help dropdown menu • System Variables
Week 13	**Printing and output** • Introduction to switching from the Model mode to the Layout mode • Print command from the File dropdown menu
Week 14	**Final Couse Exam** **1st Term Examination**

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	30	
	Homework + project (if any)	5	
	Quizzes	5	
	Lab work	10	
	Final exam	50	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, computer, power point

Course Learning outcomes (Objectives):
Upon successful completion of this course, students will be able to

1) Describing the principles of Auto CAD software (i).
2) Describing the important tools in Auto CAD software (ii).
3) Explaining the two dimensions drawings in Auto CAD software (iii).
4) Training to draw the basic engineering geometry using Auto CAD software (iv).
5) Learning the advance tools with doing excesses using Auto CAD software (v).
6) Learning many excesses for engineering machines (vi).

Contribution of the course to Criterion 3: Credit hours for:

- engage in professional service such as participation in professional societies, and to always consider and support professional ethics
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.

Teaching staff:

	Course Instructor	Assistant teacher	Lab teaching
Name:	Dr. Anas Obeed Balod		
E-mail:	anasbalod@uomosul.edu.iq		
Office location:			
Office Hours:			

University of Mosul
College of Engineering

Course Name: Strength of Materials		**Course Number:** STMT150
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2021-2020**	**Course type: (Required / Elective): R**

Course Description: To study mechanical properties of materials by finding the effect of internal loads on a member and analyze related stresses and strains, to find state of stresses.

Course web page: Google Classroom

Course Pre requisites: Eng.mechanic I (statics),
Corequisites: None

Textbook(s):
1. Hibbeler, R. C. Mechanics of Materials, 8th Edition, Prentice Hall (2011).

Reference(s):
Ferdinand P. Beer, E Russell Johnston Jr., John T. DeWolf; Mechanics of Materials, Fourth edition, Mc Graw Hill. And any other mechanics of materials books can be used as reference books.

Course Outline (Topics covered and Class schedule):

Week 1-3	Stress:- Normal stress (tensile stress, compressive stress), shear stress, general state of stress, average normal stress in an axially loaded bar, average shear stress, allowable stress.
Week 4-6	Strain:- Deformation, normal strain, shear strain, general state of strain.
Week 7-8	Mechanical properties of materials:- The tension and compression test, Conventional stress-strain diagram, true stress-strain diagram, ductile materials, brittle materials, Hooke's law, Poisson's ratio, Shear stress-strain diagram, shear modulus of rigidity.
Week 8-9	Axial load:- Elastic deformation of an axially loaded member, superposition, Thermal stress.
Week 10-12	Torsion:- Torsional deformation of a circular shaft, torsion formula, power transmission, angle of twist
Week 13-15	Bending:- Shear and moment diagrams, graphical method.

Laboratory schedule: None

	Method	**No**	**Percentage %**
Assignment & Grading	Midterm exam	20	**20%**
	Homework + project (if any)	10	**10%**
	Quizzes	10	**10%**

	Lab work	0	
	Final exam	60	**60%**

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, power point, animations.

Course Learning outcomes (Objectives):
Student who finish this course should:
1) Recognize various types of stress and strain, their components, and the function of each component**[I, II,V].**
2) Be able to relate the effect of internal loads on a solid object to the strength of its material. **[II, III].**
3) Recognize between different types of torsion **[III,IV,V]**.
4) Gain knowledge about the different type of stresses and deformations related to these loads **[II, IV,V,VI]**.
5) Identify the methods for drow shear and moment diagram **[II,VI]**.
6) Gain the ability to use the principles of this subject for the use of the formulas and rules of mechanical design cited in engineering codes**[IV,V,VI]**..

Contribution of the course to Criterion 3: Credit hours for:
- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies

Relationship of the course to the Program outcomes:
- **I:** an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
  II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
  IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
  VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
  VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Islam Abdullah Aziz	None	None
E-mail:	islamabd@uomosul.edu.iq		
Office location:	Right building,2nd floor ,room 1		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Algorithm & Computer Programming		**Course Number: ALCP151**
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2021-2020**	**Course type: (Required / Elective): R**

Course Description: The course is designed to teach students the fundamental concepts of computer programming and algorithm development, with a focus on problem-solving techniques and critical thinking. The course will cover a wide range of topics, including introduction to computer programming, Students will learn about the basics of computer programming, including programming languages, syntax, and program structure. as well as data types and control structures, Students will learn about the different data types used in programming, such as integers, floats, and strings. They will also learn about control structures such as if statements, loops, and functions. and algorithm development, Students will learn how to develop algorithms to solve problems, including understanding problem specifications, developing step-by-step solutions, and implementing algorithms in code. and Debugging and testing, Students will learn about the process of debugging and testing programs, including identifying and fixing errors and using testing frameworks.

Course web page: Google Classroom

Course Pre-requisites: None
Corequisites: None

Textbook(s):
1. C++ Programming From Problem Analysis to Program Design [5th Edition] book

Reference(s):
- Archived lectures by specialist teacher for every paper or video material

Week	Hours	Topic Title	Teaching Method
1	3	Algorithms & Flowcharts	Blackboard + Data Show screen
2	3	BASIC DATA TYPES IN C++	Blackboard + Data Show screen
3	3	Numbering System	Blackboard + Data Show screen

4	3	if-else statements	Blackboard + Data Show screen
5	3	for Looping (Repetition) Structure	Blackboard + Data Show screen
6	3	CONTROL STRUCTURES II (REPETITION II)	Blackboard + Data Show screen
7	3	Exam 1	Blackboard + Data Show screen
8	3	Functions	Blackboard + Data Show screen
9	3	Recursive Functions	Blackboard + Data Show screen
10	3	Two- and Multidimensional Arrays	Blackboard + Data Show screen
11	3	Arrays as Parameters to Functions	Blackboard + Data Show screen
12	3	Records (structs)	Blackboard + Data Show screen
13	3	Tutorial	Blackboard + Data Show screen
14	3	Exam 2	Blackboard + Data Show screen
15	3	General Review	Blackboard + Data Show screen

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	30	
	Homework + project (if any)	5	
	Quizzes	5	
	Lab work	10	
	Final exam	50	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class Blackboard, data show, computer.

Course Learning outcomes (Objectives):

1. Advanced programming skills: students have a foundational understanding of programming, and learning C++ can enhance their skills and knowledge in advanced programming concepts, such as object-oriented programming and memory management. [I,II,III,VI,VII]
2. Preparation for advanced courses: C++ is a widely used programming language in many advanced computer science courses, such as algorithms, data structures, and operating systems. Learning C++ can provide university students with a strong foundation for success in these courses. [I,II,III,VI,VII]
3. Career opportunities: C++ is used in various industries, such as gaming, finance, and engineering, and learning C++ can provide university students with valuable skills that can lead to career opportunities. [I,II,III,VI,VII]
4. Understanding of computer science concepts: Learning C++ can help students understand fundamental concepts in computer science, such as algorithms, data structures, and memory management, which are critical to success in advanced courses and future careers. [I,II,III,VI,VII]
5. Improved problem-solving abilities: Programming requires a great deal of problem-solving and logical thinking, and learning C++ can help university students develop these skills, which are critical in various fields of computer science. [I,II,III,VI,VII]

Contribution of the course to Criterion 3:

- can have a successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies.
- engage in professional service such as participation in professional societies, and to always consider and support professional ethics.
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity, and leadership.

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics. II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society. III: an ability to outline and conduct experiments as well as analyze and interpret data. VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields. VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Raghad Raied Mahmood		
E-mail:	Raghad.mahmood@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 1		
Office Hours:	Sunday, 10:30 - 12:30 AM		

University of Mosul
College of Engineering

Course Name: Engineering Materials and Manufacturing Processes		Course Number: ENMM152
Department: Mechatronics Engineering Department	Program Name: Mechatronics Engineering	Program Code:
Credits: 4	Year & Semester: **2021-2020**	Course type: (Required / Elective): R
Course Description: This course is considered an introduction to manufacturing processes and its related topics. Mechanical properties and the basic tests are given in an advance. A brief but basic presentation is given about the most important materials that could be faced during career. Most of the course is intensified on the machining processes such as turning operations, milling operations, drilling operations. A brief introduction about the nontraditional machining is also given to the students. Finally CNC machining and its industrial language, gcode, is given in one week as a preparing step for next levels of studies.		
Course web page: Google Classroom		
Course Pre requisites: None. Corequisites: None.		
Textbook(s): Groover - Fundamentals of Modern Manufacturing- 5th 2013		
Reference(s): Manufacturing Processes 2nd ed - H. N. Gupta et al. (New Age, 2009)		
Course Outline (Topics covered and Class schedule):		

Week 1	Basic concepts and definitions
Week 2	Mechanical properties of materials: Fundamental tests I (Tensile Test)
Week 3	Fundamental tests II (Compression Test and Impact Test)
Week 4	Fundamental tests III (Hardness Test)
Week 5	Dimensions, measurements and measuring devices and Tolerances
Week 6	Engineering materials Part I
Week 7	Engineering materials Part II
Week 8	Cutting theory
Week 9	Mid-Term Examination
Week 10	Material removal processes (Lathe and its related operations)
Week 11	Material removal processes (Boring and drilling)
Week 12	Material removal processes (Milling) 1

Week 13	Material removal processes (Milling) 2
Week 14	Introduction to non – traditional machining
Week 15	Final Exam

Laboratory schedule: Each week contains two hours of lab work in the mechanical workshop. Each week is dedicated to certain operation such as turning, milling, drilling, grinding, filing, welding ..etc. Also, the lab works consist of doing material testing such as tensile test … etc. At the end of the course, students will be experimentally examined.

	Method	No	Percentage %
Assignment & Grading	Midterm exam	1	20
	Homework + project (if any)	2	10
	Monthly exam + Quizzes	3	10
	Lab work	4	10
	Final exam	5	50

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, animations, simulation, power point, demonstraion devices and models.

Course Learning outcomes (Objectives):
At the end of the course, student must be able to:-

1. Understand basic concepts of material machining and formation. [I], [II], [VI], [VII]
2. Gain a quick information for the available engineering CAM packages those required for obtaining the suitable strategies for machining. [II]
3. Exposed to the basic and available machining systems such as milling, turning, drilling, and grinding machines. [VI], [V]
4. Learn and gain engineering morals and ethics. [V]

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics. II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society. III: an ability to outline and conduct experiments as well as analyze and interpret data. IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences. V: an understanding of the responsibility of engineers to practice professionally and ethically at all times. VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields. VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.
Teaching staff:

	Course Instructor	Assistant teacher	Lab teaching
Name:	Ahmad Wadollah S. Al-Sabawi		
E-mail:	ahmadalsabawi@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 4		
Office Hours:	by assignment		

University of Mosul
College of Engineering

Course Name: Professional Ethics		**Course Number:** UOMC104
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**
Course Description: Professional Ethics it is for second class		
Course web page: Google Classroom		
Course Pre requisites: None **Corequisites:** UOMC104		
Textbook(s): 1. Ptofessional ethics		
Reference(s): • Ptofessional ethics		
Course Outline (Topics covered and Class schedule):		

Week 1	Professional ethics 1
Week 2	Ptofessional ethics 2
Week 3	Ptofessional ethics 3
Week 4	Ptofessional ethics 4
Week 5	Ptofessional ethics 5
Week 6	Ptofessional ethics 6
Week 7	Ptofessional ethics 7
Week 8	Ptofessional ethics 8
Week 9	Ptofessional ethics 9
Week 10	Ptofessional ethics 10
Week 11	Ptofessional ethics 11
Week 12	Ptofessional ethics 12
Week 13	Ptofessional ethics 13
Week 14	Ptofessional ethics 14

University of Mosul
College of Engineering

Week 15	Ptofessional ethics 15

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	40	
	Homework + project (if any)	50	
	Quizzes	50	
	Lab work	40	
	Final exam	35	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Data show

Course Learning outcomes (Objectives):
a. Explain the fundamentals of moral and political theory**; [V, VI, VII].**
b. Assess the strengths and weaknesses of different moral and political theories**; [V, VI, VII].**
c. Articulate the connection between political freedom and economic freedom**; [V, VI, VII].**
d. Agree to the importance of ethical reasoning in business and professional contexts**; [V, VI, VII].**
e. Identify ethical problems in complex professional and business related situations**; [V, VI, VII].**
f. Apply ethical concepts to particular business and professional situations**; [V, VI, VII].**
g. Evaluate alternative, ethically-relevant, choices and defend a plausible course of action**; [V, VI, VII].**

Contribution of the course to Criterion 3: Credit hours for:
have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:
V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	Assistant teacher	Lab teaching
Name:	Professional Ethics		
E-mail:	islamabd@uomosul.edu.iq		

University of Mosul
College of Engineering

Office location:	Department		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Engineering statistics		**Course Number:**
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code: ENGC 227**
Credits: 2	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description:
determine the value of statistics at evaluation data in study and research Among undergraduate.

Course web page: Google Classroom

Course Pre requisites: None
Corequisites: None

Textbook(s):
Introduction to Probability and Statistics for Engineers, Holický, Milan
مدخل الى الاحصاء , د. خاشع الراوي

Reference(s):
- Engineering statistics

Course Outline (Topics covered and Class schedule):

Week 1	General introduction of Engineering Statistics
Week 2	**Data Presentation:** Tabular presentation /Creating Frequency Table.
Week 3	Graphical presentation (Histogram, Frequency Polygon).
Week 4	Measures of central tendency (Arithmetic mean, median and mode, the relation between the central tendency measures for unimodal distributions
Week 5	Measurement of dispersion and variation, absolute dispersions
Week 6	**Probability:** Basic Concepts of Probability Theory
Week 7	Rule of Probability Additional rule Two events, mutually and non-mutually events - Three events, mutually and non-mutually events
Week 8	Multiplication rule, Tow events, (independent and dependent events)
Week 9	The definition of conditional probability and their properties. Bayes' theorem
Week 10	The definition and classification of random variable (Discrete and Continuous), type of discrete distribution
Week 11	**Discrete probability distributions (Binomial and Poisson distribution).**
Week 12	**Continuous distribution,(normal distribution) Normal distribution.**
Week 13	**Test of hypothesis:** Types of errors in hypothesis testing. The steps of hypothesis test.

Week 14	Test of the mean with unknown population variance using t statistic.
Week 15	Final exam

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Lectures, Classwork, Seminar

Course Learning outcomes (Objectives):

1. Introduce the student to collecting and presenting statistical data **[I, III, VI]**
2. Classifying and tabular the engineering information in a manner consistent with the data and the field of academic work **[I, III, VI]**
3. an ability to conduct experiments, analyze and interpret data **[I, III, VI]**
4. The ability to identify and solve engineering problems. **[I, III, VI]**
5. Take the appropriate decision through scientific analysis of information **[I, III, VI]**

Contribution of the course to Criterion 3: Credit hours for:

- engage in professional service such as participation in professional societies, and to always consider and support professional ethics
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.

III: an ability to outline and conduct experiments as well as analyze and interpret data.

VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.

Teaching staff:

	Course Instructor	Assistant teacher	Lab teaching
Name:	Mohammed Ghanim Jamel – M.Sc.		

University of Mosul
College of Engineering

E-mail:	mohammed_g72@uomosul.edu.iq		
Office location:			
Office Hours:			

University of Mosul
College of Engineering

Course Name: Engineering Mathematics I		**Course Number:** ENGE228
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: This course gives the students some more advanced mathematical subjects required in engineering analysis. Such subjects are multivariable functions and partial derivatives, Fourier series and introduction to Fourier Transforms, Complex analysis, and Vector analysis. This is to prepare the student for the next engineering courses and the other mathematical analysis subjects like numerical analysis.

Course web page: Google Classroom

Course Pre requisites: Calculus 2, ENGC121
Corequisites: None

Textbook(s):
1. E. Kreyszig, et al, "Advanced Engineering Mathematics," 10th ed., McGraw Hill, 2011.
2. George B. Thomas, Jr., "Thomas' Calculus Early Transcendentals," 13th Ed, 2014.

Reference(s):
- D.G. Zill, "Advanced Engineering Mathematics," 6th Ed, 2018.

Course Outline (Topics covered and Class schedule):

Week 1	Limits and continuity , Partial derivatives (definitions, functions of more than two variables), second and higher order partial derivatives.
Week 2	Chain rule for functions of two or three variables , Maxima and minima and saddle points.
Week 3	Complex analysis: Definitions and basic concepts, Cartesian form, polar form, exponential form, representations of a complex variable. Complex variables algebra, Roots of a complex number.
Week 4	Complex analysis: complex functions, limits, derivatives and continuity of complex functions. Analytic functions, Cauchy-Riemann equations, derivatives of analytic functions. Laplace equation, Harmonic and conjugate harmonic functions.
Week 5	Complex analysis: Rational functions, Logarithmic functions, Exponential functions.
Week 6	Complex analysis: Trigonometric and hyperbolic functions, General power of complex variables.
Week 7	Complex analysis: Integration along a line
Week 8	Fourier Series: even and odd function , Half Wave Symmetry, periodic functions, definition of Fourier series, Trigonometric form
Week 9	Fourier Series: Line Spectrum (harmonic) the Fourier Series, Half wave symmetry, sum and shift of functions, Complex Exponential form of the Fourier Series
Week 10	Fourier Series: introduction to Fourier Transforms

Week 11	Fourier Series: Fourier Transforms
Week 12	Introduction to Vector Analysis: definition, notation, properties, Vector algebra: addition, subtraction, multiplications
Week 13	Introduction to Vector Analysis: vector algebra (continue) with applications
Week 14	Introduction to Vector Analysis: Vectors and Geometry, equation of line, plane, curve parameterization with geometric applications.
Week 15	Introduction to Vector Analysis: vector function and field, derivative of vector functions, velocity, acceleration. introduction to gradient, Div, and Curl. Eigenvalues and Eigenvectors.

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in class data show, Computer, power point with video

Course Learning outcomes (Objectives):

1) Student will be able to identify multivariable functions and find any partial derivative of such function with understanding of geometrical meaning of these derivatives. **[I]**
2) Student can identify multivariable functions critical points (maxima, minima, and saddle points.) **[I]**
3) Study can recognize complex number, variable, various functions, and also their representation on the complex plane. Student will have the ability to manipulate functions form to transform complex function representation from Cartesian form to polar or exponential form or vice versa. Also, he/she will be able to find complex roots, and any power of a complex variable. **[I, VI]**
4) Student will be able to identify continuous and analytic functions, and test if they are harmonic or not by satisfying Laplace equation. **[I, VI]**
5) Student will be able to identify even, odd, and periodic functions. **[I, III]**
6) Student will be able to represent periodic functions using trigonometric and complex Fourier Series representation. Also, will be able to represents aperiodic functions using Half range Fourier Series representation. **[I]**
7) Student will be able to use Fourier Transforms of various engineering functions. **[I, VI]**
8) Student can recognize, understand, and implement vector quantities and algebraic operations. He/She should be able to understand and use parametric representation of line, plane and curve in space. **[I, III]**
9) student will be able to implement vector quantity derivatives to find velocity and acceleration. Also, he/she will understand the meaning of gradient, Div, and Curl of vector quantities. **[I, VI]**

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Hassan Al-Siraj		
E-mail:	saeedh81@uomosul.edu.iq		
Office location:	Right building, 2nd floor, room 2		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Engineering Mechanics II (Dynamic)		**Course Number:**
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**EMDY201
Credits: 4	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: The objective of this course is to present the basic principles of dynamics and help developing proficiency in applying these principles to formulate and solve dynamics problems. The students are expected to build upon previously acquired skills in mathematics and physics to solve practical problems of Dynamics. The course objectives are

Apply a general analysis approach to solving kinematics problems; define and calculate the displacement, distance, velocity and acceleration for particles in rectilinear and curvilinear motion. Define and calculate the linear and angular velocities and accelerations for systems of 2D rigid bodies in translation, rotation about a fixed axis, and general planar motion.

Kinetics problems: Solve 2D kinetics problems using force-acceleration, work-energy and impulse-momentum methods. Calculate the mass moment of inertia (about the center of mass and about a point other than the center of mass).

Course web page: Google Classroom

Course Pre requisites: Engineering Mechanics I STATICS

Corequisites:

Textbook(s):
Engineering Mechanics "Dynamics"
J.L. Meriam and L.D. Kraige 5th ed

Reference(s):
1. Engineering Mechanics 'Dynamics"
R. C. Hibbeler
2. Engineering Mechanics Dynamics
Andrew Pyel and Jan Kiwsalaas

Course Outline (Topics covered and Class schedule):

Week 1	Ch.1 Introduction to Dynamics
Week 2	Ch.2 Kinematics of Particles, Rectilinear Motion
Week 3	Plane Curvilinear Motion, Rectangular Coordinates (x-y)
Week 4	Normal and Tangential Coordinates (n-t)
Week 5	Polar Coordinates (r-Theta)
Week 6	Relative Motion (Translating axes)
Week 7	Ch.3 Plane Kinetics of Particles

Week 8	Direct Application of Newton's second Law (Force, Mass, and Acceleration): Rectilinear and Curvilinear Motion
Week 9	Work and Kinetic Energy
Week 10	Impulse and Momentum (Linear)
Week 11	Mid Term Examination
Week 12	Ch.5 Plane Kinetics of Rigid Bodies: Rotation
Week 13	Relative Velocity
Week 14	Ch.6 Plane Kinetics of Rigid Bodies: direct application of Newton's second Law: Translation
Week 15	Appendix B. Mass Moment of Inertia

Laboratory schedule: None

	Method	**No**	**Percentage %**
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, computer, power point

Course Learning outcomes (Objectives):
after completion of the course the student should be able to:

1. Describe and calculate the motion (position, velocity, acceleration) for particles and solids in plane motion. **[I, II, VII]**
2. Apply free-body diagrams and solve Newtons second law for plane problems. **[I, II, III, VII]**
3. Describe and explain kinetic energy, potential energy and work. Solve dynamical problems using these concepts. **[I, II, III, VI]**
4. Apply linear and angular momentum for particles and solids in plane motion. [**I, II, ,IV, VI, VII]**
5. Explain and calculate the moment of inertia for simple solids. [**I, II, ,IV, VII]**

University of Mosul
College of Engineering

Contribution of the course to Criterion 3:
Relationship of the course to the Program outcomes: **I:** an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics. **II:** an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society. **IV:** an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences. **VI:** an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields. **VII:** an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.
Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Bakr Noori Alhasan		
E-mail:	bakralhasan@uomosul.edu.iq		
Office location:			
Office Hours:			

University of Mosul
College of Engineering

Course Name: Electrical machines		**Course Number:** ELMA202
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**
Course Description: this course present a description of dc machine type ,operation principles, dc motor , types , principle operation , speed control , motor characteristics		
Course web page: Google Classroom		
Course Pre requisites: electrical circuit analysis **Corequisites:** electromechanical system		
Textbook(s): 1. Electrical Machines by S. K. Sahdev 2018 2. Electrical machines ,Fundamentals of Electromechanical Energy Conversion by Jacek F. Gieras 2017		
Reference(s): • PRINCIPLES OF ELECTRIC MACHINES AND POWER ELECTRONICS , THIRD EDITION .by P. C. SEN 2013		
Course Outline (Topics covered and Class schedule):		

Week 1	types of electric dc machine (shunt, series , compound)
Week 2	construction of dc machine
Week 3	principle operation of dc motor
Week 4	torque and voltage equation of dc motor
Week 5	dc shunt motor equivalent circuit , analysis
Week 6	dc series motor equivalent circuit , analysis
Week 7	dc compound motor equivalent circuit , analysis
Week 8	mid term exam
Week 9	losses in dc motor and efficeincy
Week 10	speed control method of dc shunt motor (flux control , armature control, voltage control)
Week 11	speed control method of dc series motor (flux control , voltage control)
Week 12	speed control method of dc compound motor (flux control , voltage control)
Week 13	characteristics of dc shunt motor

Week 14	characteristics of dc series motor
Week 15	characteristics of dc compound motor

Laboratory schedule: sunday10:30 -12:30

	Method	No	Percentage %
Assignment & Grading	Midterm exam	25	
	Homework + project (if any)	5	
	Quizzes	5	
	Lab work	25	
	Final exam	40	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Lab, in-class projector, data show, computer,

course learning outcomes (objectives):
1- make student how select motor type [I,II,III,V,VII]
2-to select motor speed method for different state[I,II,III,V,VII]
3-read and analyze motor data sheet and its characteristics [I,II,III,V,VII]

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- engage in professional service such as participation in professional societies, and to always consider and support professional ethics
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.

VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

University of Mosul
College of Engineering

Teaching staff:			
	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Dr. Myasar Salim Younus		shahad waleed /Marwan ahmed
E-mail:	myasaralattar@uomosul.edu.iq		
Office location:	2nd floor, 1st room		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Thermodynamics and heat transfer		**Course Number:** THHT204
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: Basic concepts and definitions of thermodynamics. Properties of pure substances. The first law of thermodynamics for the closed and open systems. The second law of thermodynamics. Entropy. Second-Law analysis of engineering systems, introduction to heat transfer.

Course web page: Google Classroom

Course Pre requisites: Physics, PHYS102
Corequisites: None

Textbook(s):
1. Çengel, Y. A. and Boles, M. A., Thermodynamics: an Engineering Approach, 6th ed., The McGraw-Hill Companies, New York, © 2008.

Reference(s):
- Bergman, lavine, Incropera and dewitt - Fundamentals of Heat and Mass Transfer, John Wiley & Sons, Inc., 7th Edition 2011.

Course Outline (Topics covered and Class schedule):

Week 1	Introduction to Thermodynamics
Week 2	Properties of Pure Substances
Week 3	The First Law of Thermodynamics for Closed Systems
Week 4	The First Law of Thermodynamics for Closed Systems
Week 5	The First Law of Thermodynamics for Closed Systems
Week 6	The First Law of Thermodynamics for Open Systems
Week 7	The First Law of Thermodynamics for Open Systems
Week 8	Mid-Term Examination
Week 9	Mid-Term Examination
Week 10	The Second Law of Thermodynamics
Week 11	The Second Law of Thermodynamics
Week 12	Introduction to heat transfer

Week 13	Introduction to heat transfer
Week 14	One dimensional conduction
Week 15	Final Examination

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	25	
	Homework + project (if any)	10	
	Quizzes	5	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: data show, power point

Course Learning outcomes (Objectives):
1) Understand properties of real substances, such as steam and ideal gases [I, II,VI]
2) Learn how to use tabular data and equations of state [II, VI]
3) Understand and use the process diagrams. [I, II, III]
4) Understand closed systems and control volumes. [I, II, III, VI]
5) Understand the first law and its basic applications. [I, III, V]
6) Understand the second law and its basic applications. [I, II, III, V, VI]

Contribution of the course to Criterion 3: Credit hours for:
- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies,
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design,
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
V: an understanding of the responsibility of engineers to practice professionally and

ethically at all times. **VI:** an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.

Teaching staff:			
	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Loay B. Aldabbagh		
E-mail:	to assigned later		
Office location:	Mechatronics Department - right building - 2nd floor - room 4		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Electronic principles		**Course Number:** ELCP 204
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: Understanding the general characteristics of diode and its types. Understand the process of rectification to establish a dc level from a sinusoidal ac input. Be able to predict the output response of a clipper and clamper diode configuration. Become familiar with the analysis of and the range of applications for Zener diodes.
Become familiar with the basic construction and operation of the Bipolar Junction Transistor and determine the dc levels for the variety of important BJT configurations.
Become acquainted with the design process for BJT amplifiers. Learn to use the equivalent model to find the important ac parameters for an amplifier.
Study the construction and operating characteristics of Field Effect (FET), and its types Junction Field Effect Transistor(JFET), Metal-Oxide-Semiconductor FET (MOSFET), and Metal-Semiconductor FET (MESFET) transistors and their transfer characteristics from the drain characteristics of a JFET, MOSFET, and MESFET transistor. Understanding how to use the Universal JFET Bias Curve to analyze the various FET configurations. Become acquainted with the small-signal ac model for a JFET and MOSFET. Be able to perform a small-signal ac analysis of a variety of JFET and MOSFET configurations.
Understand what a differential amplifier does Learn the basics of an operational amplifier, Develop an understanding of what a common mode of operation is Describe double-ended input operation
Learn about operation amplifier applications constant gain, summing, and buffering amplifiers
Understand how an active filter works, Describe different types of controlled sources

Course web page: Google Classroom

Course Pre requisites: Electrical circuit analysis ECAN100
Corequisites: None

Textbook(s):
1. R. L. Boylestad, Electronic Devices and Circuit Theory,10th Edition, Prentice Hall, 2009.

Reference(s):
- Thomas L. Floyd , Electronic Devices , 7th Addition, Pearson Prentice Hall, 2005.

Course Outline (Topics covered and Class schedule):

Week 1	Introduction (Semiconductor Diodes, pn junction diode, Diode Applications, Rectifier circuits, clipper, clamper)
Week 2	Zener diode and its application (voltage regulator)
Week 3	Introduction to Bipolar junction transistors (BJT) and it is configurations

Week 4	DC analysis of BJT equivalent circuits(Introduction, operating point, Fixed-bias Configuration, Emitter-bias Configuration, Voltage-divider Bias Configuration, Collector Feedback Configuration, Emitter-follower Configuration (common collector).
Week 5	AC analysis of BJT equivalent circuits part 1,introduction, equivalent model, re-model Fixed bias configuration, re-model Voltage-divider bias configuration
Week 6	AC analysis of BJT equivalent circuits part 2 (re-model CE Emitter-Bias configuration, 1) Un-bypassed situation. 2) bypassed configuration. re-model of Emitter-Follower Configuration, re model of common Base configuration , Re-model Collector Feedback C
Week 7	Effect of RL And RS, Design example of the C.E amplifier circuit
Week 8	Multi stages transistor , Cascaded Systems
Week 9	Transistor as switch
Week 10	Field-Effect Transistor FET (Introduction and types)
Week 11	Metal–Oxide–Semiconductor Field-Effect Transistor types of MOSFETs and Basic Construction and Basic Operation and Characteristics of:- 1. Depletion-type MOSFET (DMOSFET). 2. Enhancement-type MOSFET (EMOSFET).
Week 12	Field-Effect Transistor Biasing part 1 • Introduction. • Fixed-Bias Configuration. • Self-Bias Configuration. • Voltage-Divider Biasing. • Common-Gate Configuration.
Week 13	Field-Effect Transistor Biasing part 2 • Depletion-Type MOSFETs. • Enhancement-Type MOSFETs. • Combination Networks. • Design.
Week 14	Introduction to the operational amplifier, Practical OP-AMP Circuits, Applications of operational amplifier part1 (Inverting Amplifier, Non-inverting Amplifier, Unity Follower, Integrator, Differentiator
Week 15	Applications of operational amplifier part2 (Comparator, Voltage Subtraction, Voltage Summing, Multiple-Stage Gains, Constant-gain Multiplier...)

Laboratory schedule: Thursday 8:30-12:30

	Method	**No**	**Percentage %**

Assignment & Grading	Midterm exam	25	
	Homework + project (if any)	5	
	Quizzes	5	
	Lab work	15	
	Final exam	40	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Lab, in-class projector, data show, computer

Course Learning outcomes (Objectives):
1) To provide students with a solid foundation in the fundamentals of Diodes, Transistors, and Amplifier Circuits.(I,II,III)
2) To provide students with solid foundation in the semiconductors,Transistors and operation Amplifier Circuits . (I,VI,VII)
3) To equip them with the necessary skills to practically implement application-oriented and need-based electronic circuits. (I,II,III,VI)

Contribution of the course to Criterion 3: Credit hours for:
- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Zeyad M.Yousif		1- Marwah Ezzulddin Merza Al-abasy, 2- Zahraa Tarik A. 3- mohammed sameer mohammed

University of Mosul
College of Engineering

E-mail:	zmyousif@uomosul.edu.iq		1. mialabasy@uomosul.edu.iq 2. zahraata.eng@uomosul.edu.iq 3. mohammed.alsoufi@uomosul.edu.iq
Office location:	Mechatronics Department - right building - 2nd floor - room 5		
Office Hours:			

University of Mosul
College of Engineering

Course Name: English Language Pre - Intermediate		**Course Number:**
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 1	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**
Course Description: In this course, it is aimed at developing students' general English skills through the skills of reading, writing, listening, and speaking. Each unit is organized to enhance students' basic knowledge of vocabulary and grammar through reading texts. The students will learn how to form simple sentences and use them in real life situations. By the end of the course, students will be able to produce basic sentences and communicate in simple real-life situations.		
Course web page: Google Classroom		
Course Pre-requisites: None **Corequisites:** None		
1. New Headway -Pre-Intermediate/ Student's Book 2. New Headway -Pre-Intermediate/ Workbook		
Reference(s): • Archived lectures by specialist teacher for every paper or video material		

Week	Hours	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	1	Chapter one **Getting to know you**	Blackboard + Data Show screen	Oral and written exams
2	1	Chapter two **Whatever makes you happy**	Blackboard + Data Show screen	Oral and written exams
3	1	Tutorial	Blackboard + Data Show screen	Oral and written exams
4	1	Chapter three **What's in the news?**	Blackboard + Data Show screen	Oral and written exams
5	1	Chapter four **Eat, drink**	Blackboard + Data Show screen	Oral and written exams

6	1	Chapter five **Looking forward**	Blackboard + Data Show screen	Oral and written exams
7	1	Academic writing	Blackboard + Data Show screen	Oral and written exams
8	1	Mid exam	Blackboard + Data Show screen	Oral and written exams
9	1	Academic writing	Blackboard + Data Show screen	Oral and written exams
10	1	Tutorial	Blackboard + Data Show screen	Oral and written exams
11	1	Chapter six **The way I see it**	Blackboard + Data Show screen	Oral and written exams
12	1	Tutorial	Blackboard + Data Show screen	Oral and written exams
13	1	Chapter seven **Living history**	Blackboard + Data Show screen	Oral and written exams
14	1	Exam 2	Blackboard + Data Show screen	Oral and written exams
15	1	General Review	Blackboard + Data Show screen	Oral and written exams

Laboratory schedule: None

	Method	**No**	**Percentage %**
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class Blackboard, data show, computer.

Course Learning outcomes (Objectives):

Student who finish this course should:
A1- Students can learn how to understand and translate articles written in English into their native language [IV,V,VI,VII]
A2 - The ability to listen to and understand the articles in English. [IV,V,VI,VII]
A3 - The ability to translate into his mother tongue. [IV ,VII]
A4- Allow students to conduct research and write research reports in English. [V,VI,VII]
A5- Learn about the English language and its role in transferring and understanding different types of science and technology. [IV,V,VI,VII]
A6 - The ability to refrain from quoting a text. [V,VI,VII]

Contribution of the course to Criterion 3:

- can have a successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies.
- engage in professional service such as participation in professional societies, and to always consider and support professional ethics.
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity, and leadership.

Relationship of the course to the Program outcomes:

IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
V: an understanding of the responsibility of engineers to always practice professionally and ethically.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	Assistant teacher	Lab teaching
Name:	Raghad Raied Mahmood		
E-mail:	Raghad.mahmood@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 2		
Office Hours:	Sunday, 10:30 - 12:30 AM		

University of Mosul
College of Engineering

Course Name: Engineering Economics		**Course Number: ENGC226**
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: In addition to teaching the student through investment and operational costs and fixed and variable costs. And how to calculate extinction and inflation and study the market.
The lectures include introducing engineering economics, project evaluation, and how to use engineering to reduce cost and achieve quality.

Course web page: Google Classroom

Course Pre requisites: Fluid Mechanics, FLME251
Corequisites: None

Textbook(s):
1. Anthony Esposito, Fluid Power with Applications, 7th ed., 2014.

Reference(s):
- Festo Didactics , various level textbooks, and workbooks

Course Outline (Topics covered and Class schedule):

Week 1	Engineering Economics (Definitions, Concepts)
Week 2	Interest and Economic relationships
Week 3	Inflation
Week 4	feasibility Study
Week 5	Cash flow , capital time value
Week 6	Depreciation , (SOYDD)
Week 7	Depreciation , (DBD)
Week 8	Comparison between alternatives , present value Concept
Week 9	Comparison between alternatives ,Equivalent annual cost
Week 10	Replacement
Week 11	Economic Appraisal
Week 12	Payback period
Week 13	internal rate of return

Week 14	Breakeven Point
Week 15	sensitivity analysis

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, power point, animations.

Course Learning outcomes (Objectives):

1. One of the most important factors for the success of the application of value engineering is linking the cost value to the actual needs of users and how to translate this into designs to avoid unnecessary cost and work to eliminate it, which raises the value of engineering projects.**[I,II]**
2. Taking a model for an engineering project to study the effect of the design on costs by providing quantities of raw materials and the percentage of waste if the waste is taken into account by the designer and the impact of this on the cost of the project.**[III,IV]**
3. Practicing the inductive approach during the stage of the theoretical study with the aim of presenting the value management approach, its concepts, definitions and concepts of costs and their relationship to the various stages of the project. **[V,VI,VII]**
4. Moving from the stage of the applied study to the analytical method in order to link the stage of applying the value management approach to the design stage and its impact on cost. **[V,VI,VII]**

Contribution of the course to Criterion 3:

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.

II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.

III: an ability to outline and conduct experiments as well as analyze and interpret data.

IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.

V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.

University of Mosul
College of Engineering

VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields. **VII:** an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	Assistant teacher	Lab teaching
Name:	Rakan Farouk Qassem		
E-mail:			
Office location:			
Office Hours:			

University of Mosul
College of Engineering

Course Name: Engineering Mathematics II		**Course Number:** ENGE230
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: This course gives the students the ability to solve and investigate the differential equations using different methods, most types of ordinary differential equations will be covered (1st order and second order , linear and non- linear). In doing so, the students will gain an advantage for the next courses in that some signal processing and control system problems that will be easier to solve. Also, the Laplace transform method is used to solve the differential equations, and more information about this transform can be gained and investigated.

Course web page: Google Classroom

Course Pre requisites: Engineering Mathematics I
Corequisites: None

Textbook(s):
1. E. Kreyszig, et al, "1. Advanced Engineering Mathematics," 10th ed., 2011.

Reference(s):
- D.G. Zill, "1. Advanced Engineering Mathematics," 6th ed., 2018.
- Mathematica Help

Course Outline (Topics covered and Class schedule):

Week 1	Definition and Classification of differential equation (ordinary and partial, order, degree, Linear and non-linear, homogeneous and non-homogeneous).
Week 2	Solutions of 1st order linear ordinary differential equations, homogeneous and non-homogeneous. General and particular solutions.
Week 3	Solutions of 1st order nonlinear ordinary differential equations, homogeneous and non-homogeneous, using the method of Separation of Variables and and Exact and modified exact equations method.
Week 4	Solutions of 1st order nonlinear ordinary differential equations, homogeneous and non-homogeneous, using various methods of substitution.
Week 5	Various fields of applications of 1st order ordinary differential equations.
Week 6	Solution of 2nd order, homogeneous, linear ordinary differential equations with constant coefficients.
Week 7	Solution of 2nd order, nonhomogeneous, linear ordinary differential equations with constant coefficients by the method of Undetermined coefficients.
Week 8	Solution of 2nd order, nonhomogeneous, linear ordinary differential equations with constant coefficients by the method of Variable of parameters.
Week 9	Possible solutions of boundary value problems. also, introduce the stability criteria of solution (its physical meaning in engineering systems). The dependence of stability and system behavior on the characteristic roots.

Week 10	Various fields of applications of second order ordinary differential equations with solutions.
Week 11	Laplace transform: definition, versatility and application, Laplace Inverse Transform, using tables and partial fractions. Application of Laplace transform definition on various Geometric functions.
Week 12	Laplace Transform of derivatives, solution of linear ordinary differential equations using Laplace Transforms, 1st-shifting theorem (Translation in S- domain).
Week 13	Unit step function and its Laplace Transform. 2nd shifting theorem (Translation in t-domain), Laplace Transforms of derivatives.
Week 14	Laplace transforms of integrals (t-function integral and S-function integral), Convolution Theorem.
Week 15	Practices of applying Laplace inverse transform on various special functions.

Laboratory schedule: Monday 8:30-10:30 AM

	Method	**No**	**Percentage %**
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, computer, power point, animations

Course Learning outcomes (Objectives):
1. Student is able to recognize the underling rule of differential equations in real world problems, **[I, II, VI]**
2. Student is able to classify the differential equations mathematically, and the types of physical problems (IVP, BVP). **[I, II, VI]**
3. Student is able to solve 1st order, homogeneous and non-homogeneous, linear and nonlinear, ordinary differential equations, **[I, II]**
4. Student is able to solve 2nd order, homogeneous and non-homogeneous, linear ordinary differential equations, **[I, II]**
5. Student is able to make Laplace transforms of various kinds of functions, **[I, II]**
6. Student is able to use Laplace transforms to solve any order , homogeneous and non-homogeneous, linear ordinary differential equations. **[I, II]**

Contribution of the course to Criterion 3: Credit hours for:
- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies

- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Hassan Al-Siraj	Zahraa Reyad	
E-mail:	saeedh81@uomosul.edu.iq	zahraa.reyad@uomosul.edu.iq	
Office location:	Mechatronics Engg. Dept - Right building - 2nd floor - room 2	Mechatronics Department - right building - 2nd floor - room 7	
Office Hours:	Moday, 10:00 - 11:00 AM	Moday, 10:00 - 11:00 AM	

University of Mosul
College of Engineering

Course Name: Fluid Mechanics		**Course Number:** FLME251
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: This class provides students with an introduction to principal concepts and fluid properties in addition to the methods of fluid mechanics. Topics covered in the part of the fluid statics include pressure; pressure measurements; pressure distribution and center of pressure; and hydrostatics force. Topics covered in the part on fluid dynamics include open systems and control volume analysis; flow classification; mass conservation; Bernoulli Equation and momentum conservation for moving fluids; viscous fluid flows, and flow through pipes. Students will work to formulate the models necessary to study, analyze, and design fluid systems through the application of these concepts, and to develop the problem-solving skills essential to good engineering practice of fluid mechanics in practical applications.

Course web page: Google Classroom

Course Pre requisites: Thermodynamic and Heat Transfer THHT203
Corequisites: None

Textbook(s):
1. B.R. Munson, D.F. Young and T.H. Okiishi, Fundamentals of Fluid Mechanics, seventh edition, John Wiley & Sons, Inc., 2013

Reference(s):
- Frank M. White, Fluid Mechanics, seventh edition, McGraw-Hill, 2011

Course Outline (Topics covered and Class schedule):

Week 1	Introduction; Fluid mechanics applications in science and mechatronics engineering; Matter; Solid and Fluid (liquid and Gas).
Week 2	Shear and normal stress, pressure; Definition of Fluid static and dynamic; Approaches to study fluid mechanics; Analytical method, Experiments, and Computation (Computation Fluid Dynamic, CFD); Definition of; Hydrodynamics, Hydraulics, Gas dynamics and Ae
Week 3	Fluid Properties; Mass Density, Specific Volume, Specific Weight, Specific Gravity; Idea Gas Law, Dynamic and Kinematic Viscosity, shear stress and velocity gradient, Newtonian and Non-Newtonian Fluids; Compressibility, Process (Isothermal and Isentropic)
Week 4	Fluid Static (Hydrostatics); Pressure definition; Pressure at a Point; Pressure Force on a Fluid Element, Equilibrium force of a Fluid Element; Body and Viscous force; Pressure variation in a Fluid at Rest for Incompressible and compressible Fluid.
Week 5	Standard Atmosphere; Variation of Temperature; Pressure and Density of air with the Elevation; Absolute Pressure; Gage Pressure and Vacuum Pressure,
Week 6	Pressure Measurements; Barometer (Mercury and Aneroid Barometer), Piezometer Tube, U-Tube Manometer, Differential U-tube manometer, Inclined-tube manometer, Bourdon gage, Pressure transducers.
Week 7	Pressure distribution on flat surface surface; Hydrostatic Force on an Inclined Plane Surface of Arbitrary shape; resultant force and location of center of pressure, centroid and parallel axis theorem

Week 8	Hydrostatic Force on Submerged Curve Surface.
Week 9	Mid. Course Exam
Week 10	Fluid Dynamics; Physical Quantities of Flow; Velocity, Pressure, Density, Temperature and Acceleration. Lagrangian and Eulerian Systems; Control volume method.
Week 11	Classification of Fluid Flow; Uniform and Non-uniform Flow, Steady and Unsteady Flow, One, two and three dimensional flows, Viscous and Inviscid Flow, Internal and External Flow, Laminar and Turbulent Flow (boundary layer), Compressible and Incompressible
Week 12	Elementary Equation of Motion; Differential and Control Volume Approach. Continuity Equation (Conservation of Mass) derivation, Volume and Mass Flow Rate, Momentum Flux, Applications on Conservation of Mass.
Week 13	Bernoulli Equation; limitations and the assumptions, Pressure head, Velocity head, Elevation head, Piezometric head, Total head, Hydraulic and Energy Grade lines. Application of the Bernoulli equation; Pitot Tube, Pitot-Static Tube (stagnation point), Fr
Week 14	The Linear Momentum Equation (conservation of linear momentum) derivation, Newton's second law, Body and surface forces, The three components force. Application of the Linear Momentum Equation; steady-incompressible case, Flow on a pipe nozzle, Force due
Week 15	Final course Exam.

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	30	
	Homework + project (if any)	5	
	Quizzes	5	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in class data show, computer, power point

Course Learning outcomes (Objectives):
1) Understand the Fundamental fluid properties and their significance in Engineering and methods of fluid pressure measurement and calculation of forces on different surfaces. [I, II, III, IV, VI, VII].
2) Know about the working of different types of devices used for the measurement of fluid flow [I, II, III, IV, VII].

3) Understand flow through orifices [I, II, III, IV, VI].
4) Understand the different types of pipe flow and the conditions for governing them [I, II, III, IV, VI].
5) Understand the concepts of boundary layer flows [I, II].

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Dr. Laith Mohammed Jasim		
E-mail:	jasiml68@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 5		
Office Hours:			

University of Mosul
College of Engineering
Mechatronics Engineering Department

Course Name: Digital Logic			
Department: Mechatronics Engineering Department		**Class:** 2 **Semester:** 2	**Program Code: DILO225**
Credits: 3 (2 +2)	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**	
Course Description: Foundation in design and analysis of Numerical Systems and the operation of digital gates. Design and implementation of combinational and sequential logic circuits. Concepts of Boolean algebra, Karnaugh maps, flip-flops, registers, and counters along with various logic families and comparison of their behavior and characteristics			
Course Pre requisites: Electronics Prenciples.			
Textbook(s): Digital Logic and Computer Design by M Morris Mano			
• **Reference(s):** Digital Logic Design by Pu-Jen Cheng, Digital Logic Design by Nasser M. Sabah			

Weeks	**Materials and Syllabus Details**
Week 1	Numerical System o Binary System o Octal System o Hexadecimal System
Week 2	Numerical System Converting between Systems (Binary, Octal, Hexadecimal, Decimal) o Mathematical Operations o Binary System Problems
Week 3	Logic Gates o Gates with their symbols and truth tables o Logical Operations o Timing Diagram for logic gates o Logic gates as switches
Week 4	Logic Circuit Design o Logic circuit designing steps o Implementation of Logic circuits using truth tables o Implementation of logic circuits using equations o Converting logic circuit to logic equations
Week 5	Boolean Algebra and Identities o Basic Identification of Boolean algebra o Duals of Expressions o Demorgan's Theories o Truth tables for Demorgan
Week 6	Boolean Algebra and Identities Algebraic Manipulation o Simplifying Functions o Fewer Gates o Duality Properties

	o Complement of Functions
Week 7	Strategies of Minimizations o Terminology and Definitions o Guidelines of Simplifying Functions
Week 8	K-Map Simplifying SOP Procedures □ Three Variable K-Map □ Four Variable K-Map □ Five Variable K-Map o Karnaugh Map POS Minimization □ Three Variable K-Map □ Four Variable K-Map □ Five Variable K-Map o Getting between SOP and POS o Don't Care Conditions
Week 9	Multiplexer o Definitions o Constructions o 2-1-multiplexer o 4-1-multiplexer 8-1-multiplexer o 16-1-multiplexer o 32-1-multiplexer o Realizing Logic Functions Efficiently o Larger Multiplexer o Cascading Multiplexer Circuits
Weak 10	De-Multiplexer o Definitions o Applications o 1-4-demultiplexer o 1-8-demultiplexer o 1-16-demultiplexer o Timing Diagram o 1-m-demultiplexer o De-multiplexer as Decoder o Characteristics table of De-multiplexer
Week 11	Decoder o Characteristics of Decoder o Construction of Decoder o Types of Decoders o 2-4-decoder o 3-8-decoder o 4-16 –decoder o Applications of Decoder o Expansions of Decoder
Week 12	Encoder o Definitions o Types

	o Applications o Code Convertor o Binary to Gray Code Convertor
Week 13	Adders and Subtractors Circuits o Half Adder o Full Adder o Binary Adder o Binary Subtractor o Binary Adder Subtractor
Week 14	Sequential Logic Circuits o Latches and Some Definitions o Synchronous and Asynchronous Sequential Circuits o SR-Latches o SR-Latches as Memories o D-Latches
Week 15	Sequential Logic Circuits o JK-latches o T-Laches Counters

	Method			No	Percentage %
Assignment & Grading	**Midterm exam**			25	25%
	Homework + project (if any)			5	5%
	Quizzes			5	5%
	Lab work			15	15%
	Final exam	**Theoretical Part:** 40	**Practical Lab Part:** 10	50	50%

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Data show, white board, and Labs (Mustimeters Digital logic boards)

Course Learning outcomes (Objectives):

1) Adequate knowledge in digital system design concepts,.(**I, II, III, VI**).

2) Ability to design and implement digital circuits under realistic constraints and conditions,.(**I, II, III, IV, VI**).

3) Ability to debug, verify, simulate, synthesize digital circuits,.(**I, II, III, VI, VII**).

4) Ability to devise, select, and use modern techniques and tools needed for digital system design,(**I, II, III, VII**).

Contribution of the course to Criterion 3: Credit hours for:

- Can have successful professional career in mechatronics engineering and related fields or work as Researcher or pursue additional degrees through graduate studies

- Apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- Have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Dr. Muhamad Azhar Abdilatef		
E-mail:	Muhamad.azhar@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 6		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Electomechanical system		**Course Number:** ELES253
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**
Course Description: this course deals with any device convert electrical energy to mechanical energy .it consist of many subject like : single phase (Ac) motor , servo motor, stepper motor, solinoid , brushless dc motor, permanent magnet dc motor ,		
Course web page: Google Classroom		
Course Pre requisites: electrical machine **Corequisites:** electrical machine ELMA 202		
Textbook(s): 1. Electrical Machines by S. K. Sahdev 2018 2. PRINCIPLES OF ELECTRIC MACHINES AND POWER ELECTRONICS , THIRD EDITION .by P. C. SEN 2013		
Reference(s): ● ELECTRICAL MACHINES with MATLAB® ,S e c o n d E d i t i o n by TURAN GÖNEN ,2012		

Course Outline (Topics covered and Class schedule):

Week 1	introduction to electromechanical energy conversion theory , principle, limmitation , application
Week 2	solenoid , types , construction
Week 3	solenoid , principle operation , application
Week 4	dc paramagnet magnet motor , construction , operation , speed control
Week 5	brushless dc motor , construction , operation , speed control
Week 6	servo motor construction , operation , speed control,
Week 7	servo motor control circuit
Week 8	stepper motor construction , operation , speed control,
Week 9	stepper motor control circuit
Week 10	mid term exam

Week 11	single phase induction motor , construction , type
Week 12	torque equation ,losses , efficiency , equivalent circuit of single phase induction motor
Week 13	single phase induction motor starting methode seperate type , shaded pole
Week 14	single phase induction motor , capacitor run capacitor start
Week 15	universal motor construction , operation , speed control,

Laboratory schedule: sunday 12:30-2:30

	Method	No	Percentage %
Assignment & Grading	Midterm exam	25	
	Homework + project (if any)	5	
	Quizzes	5	
	Lab work	25	
	Final exam	40	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Lab, in-class projector, data show, computer

Course Learning outcomes (Objectives):
1) learning about electrical machine type [I,II,III,V,VII]
2) know the principle of electromechanical energy conversion theory[I,II,III,V,VII]
3) connect the practical with theoretical sides[I,II,III,V,VII]

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- engage in professional service such as participation in professional societies, and to always consider and support professional ethics
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.

University of Mosul
College of Engineering

II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society. V: an understanding of the responsibility of engineers to practice professionally and ethically at all times. VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	Assistant teacher	Lab teaching
Name:	dr .MyasarSalim Younus		shahad waleed/Marwan ahmed
E-mail:	myasaralattar@uomosul.edu.iq		
Office location:	2nd floor , 1st room		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Signals and systems		**Course Number:** SISY254
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: Presents the fundamentals of signal and system analysis, representation, operation, and modern digital processing focusing on representations of discrete-time and continuous-time signals (singularity functions, complex exponentials and geometrics, sampling and quantization) and representations of linear, time-invariant systems (difference and differential equations, block diagrams, system functions, convolution, correlation and modulation) signal processing and presenting correlation and digital signal processing applications.

Course web page: Google Classroom

Course Pre requisites: None
Corequisites: None

Textbook(s):
1. Simon Haykin and Barry Van Veen, "Signals and systems", Wiley 2005
2. Oppenheim, Willsky, & Young, "Signals and Systems", Prentice-Hall, 1996

Reference(s):
- Benoit Boulet, "Fundamentals of signals and systems", Charles River Media 2006

Course Outline (Topics covered and Class schedule):

Week 1	Introduction, basic definition to signals and their main types with examples (continuous and discrete-time signals)
Week 2	Introduction to systems and their types and application examples
Week 3	Classification of signals: (continuous - discrete), (analog – digital), (periodic – aperiodic), and (causal – noncausal)
Week 4	Classification of signals: (even – odd), (power – energy), (deterministic – random) and (finite - infinite length)
Week 5	Signal operation: shifting, scaling (time and value), inversion (time and value) and combined operation.
Week 6	Signal useful function: unit step (continuous and discrete), ramp, unit impulse (with properties), triangular and complex exponential (continuous and discrete)
Week 7	Signal expression and representation: graphical form, functional form and equation form & Signals construction.
Week 8	Sampling theorem: Nyquist low and aliasing problem with solution
Week 9	Quantization and coding
Week 10	Discrete time signal representation types: graphical, functional, tabular and sequential (vector) Elementary discrete time signal with classification and manipulation

Week 11	Description and classification of system with interconnection & block representation)
Week 12	Introduction to linear time invariant system (LTIS) and System properties (linearity, time invariant, causality, stability and memory)
Week 13	Convolution operation and methods: graphical, table look-up, vector by matrix, add overlap and analytical method with image (matrix) convolution
Week 14	Deconvolution method: iterative, polynomial and graphical method Correlation types & application: quantitative, cross-correlation and auto-correlation
Week 15	Modulation: reason, classification and types (amplitude, frequency, phase and spread spectrum) Modern digital signal processing advantages, disadvantages and applications

Laboratory schedule: none

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: In class data show, computer, power point, images and videos

Course Learning outcomes (Objectives):
Student who finish this course should:

1) Classify signals according to a variety of criteria including continuous, discrete, periodic, aperiodic, even, odd, power, and energy. **[I]**
2) Perfom different operation on signals including shifting and scaling used in different application. **[I, III, IV]**
3) Unnderstand the basics of sampling therorem, quantization, coding and their application in real world applications. **[I, III, IV]**
4) Know and indentify the types of discrete time signals, as well as perform signal manpulation, including amplitude scaling, amplitude shfting, sum of two signals, and product of two signals. **[I, II]**
5) Define, state and identify system properties of linearity, time (in)variance, causality, memory and stability. **[I]**
6) Perform the basic operations and characterization on Linear Time In-variant systems including convolution, de-convolution, and correlation. **[I, III]**
7) Describe the concept and techniques for performing signal modulation and analyse the performance of Amplitude Modulation (AM), Phase Modulation (PM), and Frequency Modulation (FM). **[I, III, IV]**

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
III: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
IV: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Dr. Omar Saadallah Hamid		
E-mail:			
Office location:	Mechatronics Department - right building - 2nd floor		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Advance Heat Transfer		**Course Number:** AHTR263
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: Introduction to heat transfer and its relationship to thermodynamics (first and second law of thermodynamics), One-dimensional, steady-state conduction with and without heat generation, Thermal resistance and extended surfaces (Fins), Two-dimensional, steady-state conduction (Separation of variables, Shape factors, and Finite difference methods), Introduction to convection (laminar and turbulent boundary layer equation, dimensionless parameters, Reynolds analogy), Radiation, physics of thermal radiation, black body heat exchange, Classification of heat exchangers in Mechatronics systems, Design of heat exchangers.

Course web page: Google Classroom

Course Pre requisites: Thermodynamics and heat transfer, THHT204
Corequisites: None

Textbook(s):
1. Bergman, lavine, Incropera and dewitt - Fundamentals of Heat and Mass Transfer, John Wiley & Sons, Inc., 7th Edition 2011.

Reference(s):
- None

Course Outline (Topics covered and Class schedule):

Week 1	Introduction to heat transfer
Week 2	Introduction to heat transfer
Week 3	Introduction to conduction
Week 4	Introduction to conduction
Week 5	One–dimensional, steady state conduction
Week 6	One–dimensional, steady state conduction
Week 7	Two-dimensional, steady state conduction
Week 8	Two-dimensional, steady state conduction
Week 9	Two-dimensional, steady state conduction
Week 10	Introduction to convection
Week 11	Introduction to convection

Week 12	Introduction to convection
Week 13	Classification of heat exchangers
Week 14	Classification of heat exchangers
Week 15	Review

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	25	
	Homework + project (if any)	10	
	Quizzes	5	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class projector, data show

Course Learning outcomes (Objectives):
1) apply principles of math, science and engineering in solving heat transfer problems;[I, II]
2) identify, formulate, and solve engineering problems associated with fins;[I, II, III, VI]
3) identify ethical issues associated with engineering solutions to the selection of a particular fins for a given application;[I, II, V, VI]
4) demonstrate effective solution procedures to communicate solutions to engineering problems;[I, II, III, VI]
5) identify ethical issues associated with engineering solutions to the selection of a particular insulation for a given application [I, II, III, VI]

Contribution of the course to Criterion 3: Credit hours for:
- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies,
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design,
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to

produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Loay B. Aldabbagh		
E-mail:	to be specified later		
Office location:	Mechatronics Department - right building - 2nd floor - room 4		
Office Hours:			

University of Mosul
College of Engineering

Course Name: English Language Intermediate		**Course Number:**
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**
Course Description: In this course, it is aimed at developing students' general English skills through the skills of reading, writing, listening, and speaking. Each unit is organized to enhance students' basic knowledge of vocabulary and grammar through reading texts. The students will learn how to form simple sentences and use them in real life situations. By the end of the course, students will be able to produce basic sentences and communicate in simple real-life situations.		
Course web page: Google Classroom		
Course Pre-requisites: None **Corequisites:** None		
1. New Headway -Intermediate/ Student's Book 2. New Headway -Intermediate/ Workbook		
Reference(s): • Archived lectures by specialist teacher for every paper or video material		

Week	Hours	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2	Chapter one A world of difference	Blackboard + Data Show screen	Oral and written exams
2	2	Academic writing	Blackboard + Data Show screen	Oral and written exams
3	2	Tutorial	Blackboard + Data Show screen	Oral and written exams
4	2	Chapter two The working week	Blackboard + Data Show screen	Oral and written exams
5	2	Chapter three Good times, bad times	Blackboard + Data Show screen	Oral and written exams

6	2	Mid exam	Blackboard + Data Show screen	Oral and written exams
7	2	Academic writing	Blackboard + Data Show screen	Oral and written exams
8	2	Chapter Four Getting it right	Blackboard + Data Show screen	Oral and written exams
9	2	Academic writing	Blackboard + Data Show screen	Oral and written exams
10	2	Tutorial	Blackboard + Data Show screen	Oral and written exams
11	2	Chapter Five Our changing world	Blackboard + Data Show screen	Oral and written exams
12	2	Tutorial	Blackboard + Data Show screen	Oral and written exams
13	2	Chapter six What matters to me	Blackboard + Data Show screen	Oral and written exams
14	2	Exam 2	Blackboard + Data Show screen	Oral and written exams
15	2	General Review	Blackboard + Data Show screen	Oral and written exams

Laboratory schedule: None

	Method	**No**	**Percentage %**
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class Blackboard, data show, computer.

Course Learning outcomes (Objectives):

Student who finish this course should:
A1- Students can learn how to understand and translate articles written in English into their native language [IV,V,VI,VII]
A2 - The ability to listen to and understand the articles in English. [IV,V,VI,VII]
A3 - The ability to translate into his mother tongue. [IV ,VII]
A4- Allow students to conduct research and write research reports in English. [V,VI,VII]
A5- Learn about the English language and its role in transferring and understanding different types of science and technology. [IV,V,VI,VII]
A6 - The ability to refrain from quoting a text. [V,VI,VII]

Contribution of the course to Criterion 3:

- can have a successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies.
- engage in professional service such as participation in professional societies, and to always consider and support professional ethics.
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity, and leadership.

Relationship of the course to the Program outcomes:

IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
V: an understanding of the responsibility of engineers to always practice professionally and ethically.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	Assistant teacher	Lab teaching
Name:	Raghad Raied Mahmood		
E-mail:	Raghad.mahmood@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 3		
Office Hours:	Sunday, 10:30 - 12:30 AM		

University of Mosul
College of Engineering

Course Name: Numerical Analysis		**Course Number:** ENGE320
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: This course is an introduction to numerical analysis. The primary objective of the course is to develop a basic understanding of numerical algorithms and skills to implement algorithms to solve mathematical problems on the computer. This course analyzed the basic techniques for the efficient numerical solution of problems in science and engineering. Topics errors, spanned root finding, regression, interpolation, approximation of functions, numerical differentiation, numerical integration, direct and iterative methods in linear algebra, and numerical solution of differential equations (initial and boundary value problem).

Course web page: Google Classroom

Course Pre requisites: Calculus I (ENGC121) and Calculus II (ENGC122)
Corequisites: None

Textbook(s):
1. Steven C. Chapra and Raymond P. Canale, Numerical Methods for Engineering: with Software and Programming Application, Fourth edition, 2003.

Reference(s):
- Steven T. Karris, Numerical Analysis Using Matlab and Excel, Third Edition, 2007

Course Outline (Topics covered and Class schedule):

Week 1	Concepts and role for the numerical method in engineering, approximations and errors, the definition of Round-off error and truncation error, absolute and relative true/approximation error..
Week 2	Numerical solution of Nonlinear algebraic equations (Root of equations): Bracketing methods (Bisection, and False-position method).
Week 3	Open methods (Newton-Raphson and secant method).
Week 4	Numerical solution of linear algebraic equations (system): The difference between the direct and indirect methods, singular and ill/well-conditioned system, partial and complete pivoting, convergence criteria, Jacobi iteration method.
Week 5	The gauss-Seidel iterative method, Gauss-Seidel iterative with the relaxation factor method, Tri-diagonal system and its solution.
Week 6	Curve Fitting: Classification of Curve Fitting (Regression and Interpolation), the concepts of regression, and Least Square Criterion, Linear Regression.
Week 7	Nonlinear Regression, popular nonlinear regression models (Exponential, Power, Growth, and Polynomial model), the linearization of the first three nonlinear models, Polynomial regression.
Week 8	Introduction to Interpolation: Cubic Spline Interpolation (Cheney and Kincaid Formula)

Week 9	Numerical Integration: Trapezoidal Rule (equal and non-equal segment width), Simpson's1/3 rule (equal and non-equal segment width).
Week 10	Numerical Differentiation: Tayler series and truncation error, the approximation of the first derivative (FDA, BDA and CDA), the approximation of the second derivative (FDA, BDA and CDA).
Week 11	Numerical Solution of Ordinary Differential Equation (ODE): Classification of Differential Equation (Initial Value Problem "IVP" and Boundary Value Problem "BVP"), the numerical methods for solving the IVP (Euler's)
Week 12	Fourth-Order Runge-Kutta method for solving the IVP, Numerical solution for the system of ODEs with the two methods above.
Week 13	The numerical methods for solving the BVP: The shooting method adaptation together with the two above methods used to solve the IVP.
Week 14	Introduction to another methods (finite difference, finite volume, finite element method)
Week 15	Final Exam.

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	30	
	Homework + project (if any)	5	
	Quizzes	5	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class projector, data show, computer

Course Learning outcomes (Objectives):
1-Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration. [I, III, IV, VII].
2-The solution of linear and nonlinear equations [I, VII].
3- The solution of differential equations [I, III].
4-Analyse and evaluate the accuracy of common numerical methods [I, III, IV, VII].

Contribution of the course to Criterion 3: Credit hours for:
- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Dr. Laith Mohammed Jasim		
E-mail:	jasiml68@uomosu.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 5		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Mechanisms and Vibration		**Course Number:** MEVI300
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: Study mechanisms and their parts relative motion. Calculation of velocities, accelerations, forces, and efficiency of power transmission. The second part of the course will devoted to the study of the principles of mechanical vibration; related terminologies, degree of freedom, simple harmonic motion, un-damped and damped vibration, and free and forced vibration. Also, various system behaviors is explained.

Course web page: Google Classroom

Course Pre requisites: Engineering mechanics II (dynamics), EMDY201
Corequisites: None

Textbook(s):
1. R.S. Khurmi and J. K. Gupta, "Theory of Machine," 14th ed.; S. Chand & Co. Ltd., New Delhi, 2005.
2. SS Rattan, "Theory of Machines," 4th ed, 2014.
3. 3. S. Rao, “Mechanical Vibrations”, 6th Ed, 2018.

Reference(s):
- John J. Uicker, Jr., "Theory of Machines and Mechanisms," 5th ed, 2017.
- Haym Benaroya, "Mechanical Vibration, Analysis, Uncertainties, and Control," 2018.
- J. Hannah and R.C. Stephens, "Mechanics of Machines: Elementary theory and examples," 1978.

Course Outline (Topics covered and Class schedule):

Week 1	Mechanisms-1: Types, Characteristics, and applications
Week 2	Mechanisms-2: Types, Characteristics, and applications
Week 3	Velocity analysis: Instantaneous method center.
Week 4	Velocity analysis: Relative velocity method.
Week 5	Acceleration analysis: Calculation of linear and angular accelerations for points on mechanisms.
Week 6	Acceleration analysis: Introductory Examples
Week 7	Acceleration analysis: detailed Examples, calculation of efficiency and power transmission.
Week 8	Introduction to vibration
Week 9	SDF – Free undamped motion: Theory and derivation of system equation
Week 10	SDF – Free undamped motion: Solution of equation, examples.

Week 11	SDF – Free damped motion: Theory and derivation of system equation.
Week 12	SDF – Free damped motion: Solution of equation, examples.
Week 13	SDF – Forced motion: introductory lecture to the topic.
Week 14	MDF – systems: introductory lecture to the topic.
Week 15	MDF – systems: introductory lecture to the topic.

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, power point, animations

Course Learning outcomes (Objectives):
The students who successfully fulfill the course requirements will:
1) Gain knowledge about different mechanisms, and understand the rigid body motion of planar mechanisms, **[I, II, VI]**
2) Gain an ability to apply the kinematics and kinetic analysis to planar mechanisms. **[I]**
3) Gain and ability to specify the degree of freedom of a system. **[I, II, VI]**
4) the student can recognize the vibrational motion and its kind. **[I, II, VI]**
5) the student can formulate, solve, and interpret the behavoir of single degree of freedom system. **[I, II]**

Contribution of the course to Criterion 3: Credit hours for:
- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.

II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society. **VI:** an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.			
Teaching staff:			
	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Hassan Al-Siraj	Saad Zaghlul Saeed Al-Khayyat	
E-mail:	saeedh81@uomosul.edu.iq	saeeds70@uomosul.edu.iq	
Office location:	Mechatronics Department - right building - 2nd floor - room 2	Department Head room	
Office Hours:	by assignment	by assignment	

University of Mosul
College of Engineering

Course Name: Mechanical Eng. Lab.		**Course Number:** MLAB301
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 1	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: This practical course includes basic experiences in various topics in mechanical engineering that have applications in the field of mechatronics engineering. This course included experiments in applied mechanics, mechanical systems, materials, heat transfer, and fluid mechanics.

Course web page: Google Classroom

Course Pre requisites: Engineering Mechanics II (Dynamics) (EMDY201)
Corequisites: None

Textbook(s):
1. كتاب تجارب في الهيدروليك

Reference(s):
- Technical Documents for Laboratory Equipment

Course Outline (Topics covered and Class schedule):

Week 1	Friction on Inclined Plane
Week 2	Torsion of Bar
Week 3	Hook's Law
Week 4	Reaction of Beams
Week 5	Impact Test
Week 6	Fatigue Test
Week 7	One Dimensional Heat Conduction
Week 8	Transient Heat Transfer
Week 9	Force Convection from a Cylinder in a Cross Flow
Week 10	Centrifugal Pump Performance
Week 11	Verification of Bernoulli Equation

Week 12	Venturi Meter Apparatus
Week 13	Impact of a Jet
Week 14	Losses in Piping Systems
Week 15	Final Exam

Laboratory schedule: Sunday 8:30-10:30 AM

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	0	
	Quizzes	0	
	Lab work	15	
	Final exam	50	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Lab.

Course Learning outcomes (Objectives):
1) Students will be able to properly compose a technical report. [III, V, VII].
2) Students will be able to conduct experiments in the areas of the Mechanical Engineering. [I, III, V, VI, VII].

Contribution of the course to Criterion 3: Credit hours for:
- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	Assistant teacher	Lab teaching

University of Mosul
College of Engineering

Name:	Dr. Laith Mohammed Jasim		
E-mail:	jasiml68@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 5		
Office Hours:			

Lecturer: Dr. Omar W. Maaroof
omarmaaroof@uomosul.edu.iq
2020-2021

Mechatronics Engineering department
University of Mosul
Office: Mechatronics Department 2nd floor room 6

Modeling and Simulation (MODS302)

Course type: Required

Prerequisites: Signals & Systems (SISY254)

Class hours: 1+2 **Credits: 2**

Course Description: This course is intended to introduce students to the modeling and simulation techniques of mechatronics systems. The selection and driving of mathematical modeling methods in the mechatronics systems are discussed in detail. Components of mechatronics systems such as mechanical, electrical, and electromechanical components are presented in various examples. The presented modeling techniques are used throughout the example systems to represent them in mathematical expression to be used in system analysis, design, control, and optimization. The course is associated with laboratory experiments to simulate the modeled systems with the help of the MATLAB program.

Course outline

Week1	**Introduction to Modeling and Simulation**
Week2	**Principles of Modeling and Simulation,**
Week3	**Modeling and Simulation of Mixed Systems**
Week4	**Block Diagram Modeling**
Week5	**SISO: State-Space System Models**
Week6	**State-Space representations (Examples)**
Week7	**Theoretical Foundations: Modeling of Dynamic Systems**
Week8	**Block Diagram Modeling (Modified Analogy Approach)**
Week9	**Block Diagram Modeling (Modified Analogy Approach)**
Week10	**Modeling Electrical systems**
Week11	**Modeling Mechanical systems (Translational systems)**
Week12	**Modeling Mechanical systems (Rotational systems)**
Week13	**Modeling Electro-Mechanical Systems (DC Motor)**
Week14	**Modeling Fluid system**
Week15	**Modeling Fluid system (incompressible fluid)**

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislation.

Grading:

Activities	Percentages
Quiz	**10%**
Homework	**10%**
Mid-term exam	**15%**
Lab works	**15%**
Final exam	**40%**
Final Lab Exam	**10%**

Teaching Techniques: in-class data show, Slides, and writing board.

Textbook

- **Mechatronic Systems: Modeling and Simulation** with HDL by George Pelz. 2003
- **Mechatronic Systems Design** by Devdas Shetty and Richard A. Kolk, 2011
- **Automatic Control Systems** by Golnaraghi and Kao 2010

Reference book

- Karnopp, Dean C., Donald L. Margolis, and Ronald C. Rosenberg. *System dynamics: modeling, simulation, and control of mechatronic systems*. John Wiley & Sons, 2012.
- Lectures will be based on several resources including books and MATLAB help.

Class Code on google classroom: jpqsll4

Course Learning Outcomes (Objectives):
Students who finish this course should:
1. Analyze different various mechanical, electrical, and electromechanical systems using different methods. (Outcome I and VI)
2. Analyze different systems using newton's second law, Kirchhoff's law, first law or thermodynamics laws, etc. (Outcome I and VII)
3. Able to define the analogous model. (Outcome V and VII)
4. Use simulation techniques to solve, test and design various systems. (Outcome II, III, VI, and VII)

Contribution of the course to Criterion 3 (Program Educational Objectives):
● Can have a successful professional career in mechatronics engineering and related fields or work as a researcher or pursue additional degrees through graduate studies
● Apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
● Engage in professional service such as participation in professional societies, and to always consider and support professional ethics
● Have a constant desire for professional development through lifelong learning activities, Self-confidence, creativity, and leadership

Relationship of the course to the Graduate Outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

University of Mosul
College of Engineering

Course Name: Measurement and Instrumentations		**Course Number:** MEIN303
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: This course covers fundamentals of measurement and discuss the basic component of measurement system (sensors, signal conditioning, processing, transmission and Input Output Device) and how to use these information's to design measurement system. This course gives the student the skills to build practical measurement systems.

Course web page: Google Classroom

Course Pre requisites: Electronic Principles ELCP204
Corequisites: None

Textbook(s):
1. "Measurement and Instrumentation Principles" Third edition, by Alan S. Morris, 2001
2. "Introduction to Instrumentation Measurement", Second Edition by Robert B. Northrop, 2011.

Reference(s):
- "The Measurement Instrumentation and Sensors Hand Book" by John G. Webster

Course Outline (Topics covered and Class schedule):

Week 1	Units and Dimensions, type of instruments
Week 2	Characteristics of instrument or transducers, Static and dynamic characterstics
Week 3	Errors in measurement systems, Sources of measurement noise, Techniques for reducing measurement noise
Week 4	Sensors and Transducers, Sensor Categories, Position and displacement Transducer
Week 5	Resistance, inductance and capacitance measurement
Week 6	Bridge circuits
Week 7	Current measurement, frequency and phase measurement
Week 8	Strain gauges, Force Sensors.
Week 9	Midterm exam
Week 10	Torque sensors and design problem on strain gauges.
Week 11	Rotational motion transducers, Rotational displacement and velocity, Absolute angular displacement and Velocity, Gyroscope

Week 12	Capacitive, resistive and magnetic sensors, Hall effect sensor
Week 13	Piezoelectric transducers, Ultrasonic transducers range and level measurement
Week 14	Level measurement and Pressure measurement
Week 15	Generalized Measurements system, real world measurement systems

Laboratory schedule: Tuesday 10:00 12:00 AM

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	5	
	Quizzes	5	
	Lab work	15	
	Final exam	50	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Data show, Lab, and computer

Course Learning outcomes (Objectives):
The students who finsih this course will be able:

1- To work with different components of modern measurement systems (I, II, VI,)
2- To understand the instrumentations concepts as parts of control system field. (I, II, III)
3- To perform different experments using differents types of sensors. (I, II, III, VI)
4- To design and build a complete measurement system (I, II, VI, VII)
5- To deal with real world problems and give proper solution (I, II, VI, VII)

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.

VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields. **VII:** an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Saad Ahmed Al Kazzaz	Bilal Rabah yahya	
E-mail:	kazzazs60@uomosul.edu.iq	bilal.altamer@uomosul.edu.iq	
Office location:	Mechatronic Department - right building 2nd floor - Room 3	Mechatronics Department - right building Ground floor- Measurement Lab	
Office Hours:	Tuesday, 10:00 - 12:00 AM	Tuesday, 10:00 - 12:00 AM	

University of Mosul
College of Engineering

Course Name: Microprocessors and Assembly Language		**Course Number:** MICA304
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: Historical review of microprocessors microcomputers. Basic concepts and definitions of microprocessors. Internal architecture of microprocessors. The assembly language instruction statements parts. The assembly language instructions. Developing assembly language programs and project.

Course web page: Google Classroom

Course Pre requisites: DIGITAL LOGIC DILO252
Corequisites: ELECTONIC PRINCIPLES ELCP204

Textbook(s):
1. Walter A. Triebel, Avtar Singh, "The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware, and Applications", Fourth Edition, Pearson Education Ltd, 2014.

Reference(s):
- W. Triebel, A. Singh, "The 8088 and 8086 Microprocessors", Fourth Edition, Pearson Education Ltd, 2018.

Course Outline (Topics covered and Class schedule):

Week 1	Introduction to the microprocessors and microcomputers
Week 2	System numbers.
Week 3	The Microarchitectures of 8086 microprocessors.
Week 4	The 8086 microprocessors software model.
Week 5	The Register and Immediate addressing mode
Week 6	The Memory addressing mode
Week 7	Data transfer instructions.
Week 8	Assembly Arithmetic instructions
Week 9	Assembly logic instructions
Week 10	Control instructions
Week 11	Shift and rotate statements and instructions
Week 12	Formulation and creation of assembly Loops.

Week 13	The Subroutines in 8088/8086 assembly Language.
Week 14	The Strings in 8088/8086 assembly Language.
Week 15	Discussion of the 8088/8086 assembly Language student projects.

Laboratory schedule: Tuesday 10:30-02:30 AM,

	Method	No	Percentage %
Assignment & Grading	Midterm exam	80	
	Homework + project (if any)	95	
	Quizzes	90	
	Lab work	80	
	Final exam	90	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Microprocessors Lab, Data show, Laptops for Instructor.

Course Learning outcomes (Objectives):
he students who successfully fulfill the course requirements will:

1) Understand the systems concept of all types of microprocessors and microcontrollers. **I, II, V, VI.**
2) Gain knowledge about microprocessors internal architectures, and design. **I, II, III, V, VI**
3) Gain an ability to develop programs in assembly level. **I, II, III, V, VI, VII**

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.

University of Mosul
College of Engineering

VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields. **VII:** an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	Assistant teacher	Lab teaching
Name:	Assistant Prof. Dr. Rafid Ahmed Khalil Alamori		Dr. Aws Hasim+ Ahmed Alwazan
E-mail:	rafidahmedkhalil@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 3		
Office Hours:	Sunday, 9:30:00 - 11:30 AM		Sunday, 9:30:00 - 11:30 AM

University of Mosul
College of Engineering

Course Name: Signal Processing		**Course Number:** SPRO361
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): E**

Course Description: The goals of this course are to provide students with an understanding of discrete-time signals and the analytical tools to transform, analyze, and design digital signal processing systems, including various types of filters.

Course web page: Google Classroom

Course Pre requisites: Signal& Systems, SISY254
Corequisites: None

Textbook(s):
1. 3. "Discrete-Time Signal Processing," Alan V.Oppenheim, Ronald W. Schafer and John R. Buck second edition 1999, ISBN 0-13-754920-2

Reference(s):
- "Signal Processing First," James H. McClellan, Ronald W. Schafer, Mark A.Yoder, Pearson/ Prentice Hall, c20032003 ISBN 0130909998.
- "Digital Signal Processing: Principles, Algorithms, and Applications," John G. Proakis, Dimitris K Manolakis, 1995.

Course Outline (Topics covered and Class schedule):

Week 1	Introduction to Digital signal processing 1. ADC blocks 2. The Sampling Theorem 3. Example
Week 2	D. Signals Representation 1. Graphical representation 2. Functional representation 3. Tabular representation 4. Sequential (Vector) representation Common D. Signals 1. Unit step signal 2. Impulse signal 3. Ramp signal 4. Exponential signal 5. The
Week 3	Discrete time signals manipulation 1. Shifting 2. Reversal 3. Time Scaling 4. Addition 5. Amplitude scaling 6. Multiplication 7. Unit delay element & Unit advance

Week 4	DISCRETE-TIME SYSTEMS 1. discrete-time systems as blocks 2. discrete-time systems types
Week 5	Properties of DISCRETE-TIME SYSTEM 1. System Causality 2. System stability 3. Linear Systems 4. Time invariant system 5. LTI Systems
Week 6	Convolution 1. Convolution utilization 2. Convolution conditions 3. Methods of Convolution 4. Graphical Method Convolution
Week 7	Convolution(cont.) 1. Methods of Convolution 2. Slide Rule Method Deconvolution 1. Methods of Deconvolution 2. Iterative Method 3. The Graphical Method
Week 8	Term Exam
Week 9	Linear Constant-Coefficient Difference Equations 1. Solution of First-order LCCDE 2. Solution of Nth -order LCCDE
Week 10	Z-Transform, properties, examples on classical discrete-time signals, ROC and inverse Z-Transform
Week 11	Discrete-time LTI system analysis using the Z- variable. System function and its relationship to other forms of time- and frequency-domain representations.
Week 12	Digital Filters: IIR and FIR filters, stability and linear- phase properties of FIR filters against fast roll-off and low order properties of IIR filters.
Week 13	Design of IIR filters: numerical methods, IIR digital filters via bilinear transformation of classical analogue filters (Butterworth, Chebyshev, and elliptic), and impulse invariant method.
Week 14	Design of FIR filters: windowing and frequency sampling method. Realizations of IIR and FIR filters.

Week 15	Final Exam

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	5	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Lab, in-class projector, data show, computer,

Course Learning outcomes (Objectives):

1. Deal with basic digital processing techniques for the mechatronic system.[I,II,V]
2. Learn Z- and Discrete Fourier transforms and their application. [II,III,V]
3. Design FIR and IIR digital filters to meet arbitrary specifications. [I,II,VI]
4. Design and implement digital signal processing algorithms for various applications. [III,VI,VII]

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	Assistant teacher	Lab teaching
Name:	Aws Anaz		

University of Mosul
College of Engineering

E-mail:	aws.anaz @uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 2		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Image Processing		**Course Number:** IMPR362
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2020 – 2021**	**Course type: (Required / Elective): E**

Course Description: The course is intended to introduce students to the fundmental of image processing and its application, the student also intodused to the topics of image enhancment and image restoration and image segmentation, image compression and classification, the student also knowing about the how connects this topic with robotic system.

Course web page: Google Classroom

Course Pre requisites: Digital signals processing
Corequisites: None

Textbook(s):
1. Rafael c Conzales &Richard E wood, digital image processing, 4th ed., 2010.

Reference(s):
- various level textbooks, and workbooks

Course Outline (Topics covered and Class schedule):

Week 1	Introduction to digital image processing
Week 2	Digital imaging fundamentals1
Week 3	Digital imaging fundamentals2
Week 4	Image enhancement 1
Week 5	Image enhancement 2
Week 6	Image enhancement Histogram processing
Week 7	Image enhancement spatial filters1
Week 8	Image enhancement spatial filter2
Week 9	Image enhancement frequency filter1
Week 10	Image enhancement frequency filter2
Week 11	Image segmantation

Week 12	Image segmantation
Week 13	**IMAGE compression 1**
Week 14	**IMAGE compression2**
Week 15	Final exam

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, power point, animations.

Course Learning outcomes (Objectives):
Student who finish this course should:
1) the important rule of studying the image processing and its application in the robotic system.(**I)**
2)Knowing different type of image filtering of spaicial and frequency filters. **(III)**
3) The student learned what image segmentation and image classifiacation. (**VI)**
4) the student learned the image compression. (**VII**)

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- engage in professional service such as participation in professional societies, and to always consider and support professional ethics
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

University of Mosul
College of Engineering

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics. **III:** an ability to outline and conduct experiments as well as analyze and interpret data. **VI:** an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields. **VII:** an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Ayman dhafer abdul nafs		
E-mail:	ayman@uomosul.edu.iq		
Office location:	Building of gollege of dentistry		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Design of Machine Elements I		Course Number: DMEL350
Department: Mechatronics Engineering Department	Program Name: Mechatronics Engineering	Program Code:
Credits: 3	Year & Semester: 2020 – 2021	Course type: (Required / Elective): R

Course Description: This course is considered as a basic introductory to the design of machine elements starting from the basic stress analysis, combined stress analysis and applying the graphical method for finding the stress at any direction of the point of interest using Mohr's circle. Also, shaft design is given extensively to the students throughout this course.

Course web page: Google Classroom

Course Pre requisites: Engineering Mechanics – Dynamics, EMDY201
Corequisites: None

Textbook(s):
Machine Elements in Mechanical Design, Robert L. Mott, 6th Ed. 2008

Reference(s):
Shigley's Mechanical Engineering Design, Budynas and Nisbett, 8th, 2006.

Course Outline (Topics covered and Class schedule):

Week 1	The Nature of Mechanical Design
Week 2	Materials in Mechanical Design
Week 3	Stress and deformation Analysis 1
Week 4	Stress and deformation Analysis 2
Week 5	Combined Stresses and Mohr's Circle
Week 6	Design of Different Types of Loadings 1
Week 7	Design of Different Types of Loadings 2
Week 8	Columns
Week 9	Midterm Exam
Week 10	Shaft Design 1
Week 11	Shaft Design 2
Week 12	Belt Drives

Week 13	Chain Drives
Week 14	Keys and Couplings
Week 15	Final Exam

Laboratory schedule: None

Assignment & Grading	Method	No	Percentage %
	Midterm exam	1	20
	Homework + project (if any)	2	10
	Monthly exam + Quizzes	3	10
	Lab work	0	0
	Final exam	4	60

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, animations, simulation, power point, demonstraion devices and models.

Course Learning outcomes (Objectives):
At the end of the course, student must be able to

1. Understand basic concepts of machine design and analysis. [I], [II], [III]
2. Gain a basic idea about the available engineering analysis packages. [I], [II], [IV], [VI],
3. Get a basic method for analysis of any mechanical device. [IV],
4. Lean and gain engineering morals and ethics. [V], [VII]

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.

III: an ability to outline and conduct experiments as well as analyze and interpret data.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	Assistant teacher	Lab teaching
Name:	Ahmad Wadollah S. Al-Sabawi		
E-mail:	ahmadalsabawi@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 4		
Office Hours:	by assignment		

University of Mosul
College of Engineering

Course Name: power electronic and drives		**Course Number:** PELD351
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: this course introduces an information's of power electronics switches and their characteristics ,also it present a power electronics converters like ac to dc (rectifiers) dc to dc (chopper) ac to ac (ac voltage converter) and their operation principle , waves ,efficiency , totals harmonics distortion

Course web page: Google Classroom

Course Pre requisites: electronic principle
Corequisites: not

Textbook(s):
1. 1- POWER ELECTRONICS HANDBOOK , by MUHAMMAD H. RASHID 2001
2. Power Electronics Design Handbook by Nihal Kularatna 1998

Reference(s):
- 3-POWER ELECTRONICS HANDBOOK DEVICES, CIRCUITS, AND APPLICATIONS ,Third Edition by MUHAMMAD H. RASHID 2001

Course Outline (Topics covered and Class schedule):

Week 1	introduction to equations needed in power electronics circuit and wave analysis
Week 2	solved problem for ac and dc ciruit analysis
Week 3	power electronics switches diodes type operation principles and characteristics
Week 4	power electronics switches transistors type operation principles and characteristics
Week 5	power electronics switches thyristors type operation principles and characteristics
Week 6	solved problem
Week 7	thyristors triggering and commutations
Week 8	single phase uncontrolled rectifiers half wave
Week 9	single phase controlled rectifiers half wave
Week 10	single phase controlled and un controlled rectifiers full wave
Week 11	mid term exam
Week 12	single phase ac to ac half wave controlled circuit

Week 13	single phase ac to ac full wave controlled circuit
Week 14	Class A chopper
Week 15	Class B chopper

Laboratory schedule: 10:30-12:30

	Method	No	Percentage %
Assignment & Grading	Midterm exam	25	
	Homework + project (if any)	5	
	Quizzes	5	
	Lab work	25	
	Final exam	40	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: class projector, data show, computer

Course Learning outcomes (Objectives):
1- power electronics switches types [I,II,]
2- power electronics switches characteristics[I,II,IV}
3-single phase un conrolled rectifiers [I,III,IV,V,VI,VII]
4-single phase controlled rectifiers[I,III,IV,V,VI,VII]
5-single phase controlled ac voltage converter[I,III,IV,V,VI,VII]
6- class A & B chopper[I,III,IV,V,VI,VII]

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- engage in professional service such as participation in professional societies, and to always consider and support professional ethics
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

- **Relationship of the course to the Program outcomes:**

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of

audiences.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Myasar Salim younus		shahad waleed
E-mail:	myasaralattar@uomosul.edu.iq		
Office location:	2nd floor , room 1		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Control Systems		**Course Number:** MTE302
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:** MTE
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: The course provides the students the essential knowledge related to control system. Also the course aims at giving the student adequate skills in mathematical modelling, block diagram reduction, time domain analysis (transient and steady state) and control system stability.

Course web page: Google Classroom

Course Pre requisites:
Signal and Systems (MTE)
Corequisites: None

Textbook(s):
1-Automatic Control System, Farid Golnarag and Benjamin C. Kuo

Reference(s):

In the library, there are many control systems books that can be used as reference books.

Course Outline (Topics covered and Class schedule):

Week 1	Introduction to control system.
Week 2	Mathematical model of physical system, mechanical system I.
Week 3	Mathematical model of physical system, electrical system II.
Week 4	Block diagram, Block diagram reduction.
Week 5	Closed loop system subjected to disturbance, multivariable system
Week 6	Signal flow graph representation, mason gain formula
Week 7	Modeling in state space
Week 8	Transient response analysis, First order system
Week 9	Transient response analysis, Second order system, Damping ratio and natural frequency
Week 10	Definition of transient response, specifications, impulse response and dominant poles
Week 11	Steady- state error in unity feedback.
Week 12	Routh stability criterion

Week 13	Introduction To Frequency Response
Week 14	Root Locus Analysis
Week 15	Construction Method Of Bode Plot And Asymptotic.

Laboratory schedule: 2 Lab hours

	Method	No	Percentage %
Assignment & Grading	Midterm exam including Lab exam	30	
	Homework + project (if any)	5	
	Quizzes	5	
	Lab work	10	
	Final exam	50	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, power point, animations.

Course Learning outcomes (Objectives):

Student who finish this course should:

1) Define and explain feedback and feed-forward control architecture and discuss the importance of performance, robustness and stability in control design [I III VII]

2) Interpret and apply block diagram representations of control systems and design PID controllers based on empirical tuning rules [I II III VI]

3) Compute stability of linear systems using the Routh array test and use this to generate control design constraints [I III IV]

4) Use Evans root locus techniques in control design for real world systems [I III IV]

5) Compute gain and phase margins from Bode diagrams .[I III IV]

6) Design Lead-Lag compensators based on frequency data for an open-loop linear system.[I III IV]

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies,
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design,
- engage in professional service such as participation in professional societies, and to always consider and

support professional ethics,

- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Firas Ahmed Al-Durze		
E-mail:	dr.firasaldurze@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 2		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Microcontroller Systems Design		**Course Number:** MCSD353
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: Historical review of microcontrollers. Basic concepts and definitions of microcontrollers. Internal architecture of microcontrollers. Introductions to PIC 16F84A microcontrollers. The assembly language instruction statements parts. The assembly language instructions. Developing assembly language programs and project.

Course web page: Google Classroom

Course Pre requisites: MICROPROCESSORS AND ASSEMBLY LANGUAGE MICA304.
Corequisites: DIGITAL LOGIC DILO252.

Textbook(s):
1. Martin P. Bates,"Introduction to Microelectronic Systems: The PIC 16F84 Microcontroller",Butter worth-Heinemann, 2011.
2. The Microchip Corporation Data Sheet of PIC 16F84A Microcontroller.

Reference(s):
- Martin P. Bates, "PIC Microcontrollers: An Introduction to Microelectronics, Elsevier Science & Technology, 2011.

Course Outline (Topics covered and Class schedule):

Week 1	Introduction to the microcontrollers and the difference between microprocessor and microcontroller.
Week 2	The RISC and CISC architectures.
Week 3	The Internal Architecture of the PIC microcontrollers
Week 4	The memory organisation of microcontrollers.
Week 5	The Data memory of PIC Microcontrollers.
Week 6	The program memory of PIC Microcontrollers.
Week 7	The PIC microcontroller assembly statement and instruction set.
Week 8	The PIC microcontroller Bit oriented instructions.
Week 9	The PIC microcontroller Byte oriented instructions.
Week 10	The PIC microcontroller arithmetic and Logic instructions.
Week 11	The PIC microcontroller control instructions.

Week 12	The PIC microcontroller shift and rotate instructions.
Week 13	The PIC microcontroller loop instructions.
Week 14	The PIC microcontroller Subroutines.
Week 15	Student Project Discussion

Laboratory schedule: Monday 10:30-2:30.

	Method	No	Percentage %
Assignment & Grading	Midterm exam	80	
	Homework + project (if any)	90	
	Quizzes	90	
	Lab work	90	
	Final exam	90	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Lab Hours, computers, and Data show.

Course Learning outcomes (Objectives):
The students who successfully fulfill the course requirements will:

1) Have deep understanding of microcontroller systems and types. **I, II, III, V, VI**
2) Gain knowledge about microcontrollers internal architectures and design. **I, II, V, VI**
3) Gain an ability to develop assembly language projects. **I, II, III, V, VI, VII**

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.

V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Dr. Rafid Ahmed Khalil Alamori		Dr.Mohamad Yasen
E-mail:	rafidahmedkhalil@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 3.		Mechatronics Department - right building - 2nd floor - room 3.
Office Hours:	Sunday, 9:30:00 - 11:30 AM		Sunday, 9:30:00 - 11:30 AM

University of Mosul
College of Engineering

Course Name: Theory of Machines		**Course Number:** THMH354
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: Study of relative motion between the various parts of a machine. Calculation of forces which act on the machines' parts. Designing the various parts of a machine.

Course web page: Google Classroom

Course Pre requisites: Engineering Mechanics II (Dynamics), EMDY201
Corequisites: None

Textbook(s):
1. R.S. Khurmi and J. K. Gupta, "1. Theory of Machines," 14th ed.; S. Chand & Co. Ltd., New Delhi, 2005.

Reference(s):
- SS Rattan, "Theory of Machines," 4th ed, 2014.

Course Outline (Topics covered and Class schedule):

Week 1	Turning Moment Diagram and Flywheel - 1
Week 2	Turning Moment Diagram and Flywheel - 2
Week 3	Rotational Balancing
Week 4	Frictional clutches: single and multiple plat
Week 5	Frictional clutches: Cone type
Week 6	Belt drives: Flat belt
Week 7	Belt drives: V-type
Week 8	Toothed gears: Definitions, classifications, and terminologies
Week 9	Toothed gears: pressure angle, gear law, sliding velocity between two teeth, path of contact, arc of contact, contact ration for involute gears.
Week 10	Toothed gears: Standard systems, interference between two involute gears.
Week 11	Gear train: Definition, law of speed ratio, reverted gear train, compound gear train.
Week 12	Gear train: Epicyclic gear train system.
Week 13	Gyroscope

Week 14	Cams
Week 15	Introduction to Mechanisms Synthesis

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, animations, power point

Course Learning outcomes (Objectives):
1) Student is able to understand the theory of Turning Moment diagram of intenrnal combustion engines and the versatility of the flywheel. **[I, II]**
2) Student is able to understand the operation principles and design of the Frictional clutches. **[I, II]**
3) Student is able to understand the operation principles and design of Belt drives. **[I, II]**
4) Student is able to understand the various designs of toothed gears, their various classifications, related terminologies, and calculate them. student is able to understand the operation principle and design considerations (e.g. analyze the interference between two toothed gears). **[I, II, VI]**
5) Student is able to classify gear trains and their various use. Also, student is able to analyze and calculate related kinematics of gear trains. **[I, II]**
6) understand the operation principles of various other machine parts like Gyroscope and Cams. **[I, II, VI]**

Contribution of the course to Criterion 3: Credit hours for:
- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.

University of Mosul
College of Engineering

Teaching staff:			
	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Hassan Al-Siraj	Saad Zaghlul Saeed Al-Khayyat	
E-mail:	saeedh81@uomosul.edu.iq	saeeds70@uomosul.edu.iq	
Office location:	Mechatronics Department - right building - 2nd floor - room 2	Head of the Department room	
Office Hours:	by assignment	by assignment	

University of Mosul
College of Engineering

Course Name: Hydraulic and Pneumatic Systems		**Course Number:** HPNS355
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: The course is intended to introduce students to the hydraulic and pneumatic systems; their principles of operation. The components in the power generation, control, and drive section are discussed in details. Component functions, construction, and usage. The control section using fluid power, electric power, and PLC is used throughout the example circuits. The course ended with various industrial circuits examples.

Course web page: Google Classroom

Course Pre requisites: Fluid Mechanics, FLME251
Corequisites: None

Textbook(s):
1. Anthony Esposito, Fluid Power with Applications, 7th ed., 2014.

Reference(s):
- Festo Didactics , various level textbooks, and workbooks

Course Outline (Topics covered and Class schedule):

Week 1	Introduction to fluid power systems, DCV designation
Week 2	Working media fluid flow, DCV Classification
Week 3	Working media power generation unit and components. DCV usage, selection, and performance
Week 4	Non-return Valves
Week 5	flow control valves-1
Week 6	flow control valves-2
Week 7	pressure control valves-1
Week 8	pressure control valves-2
Week 9	other types of valves
Week 10	electric and PLC – control
Week 11	Actuators - 1
Week 12	Actuators - 2

Week 13	Actuators - 3
Week 14	preliminary design considerations
Week 15	Identification code of fluid power circuit components

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, power point, animations.

Course Learning outcomes (Objectives):
Student who finish this course should:
1) Recognize various types of fluid power circuits, their components, and the function of each component. **[I, II, VII]**
2) Distinguish the preparation section components and the function of each component in a circuit. **[I, II, VII]**
3) Recognize various types of valves: directional, non-return, flow, pressure, and other combination control valves. Also identify the function of each of these valves in a circuit. **[I, II, , VI, VII]**
4) Select the proper actuator for a fluid power circuit including special duty actuators. **[I, II, VII]**
5) Recognize various basic industrial and workshop fluid power circuits, and their special duty. **[I, II, ,IV, VI, VII]**
6) Read and symbolize various fluid power circuit and their components. **[II, ,IV, VI, VII]**

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- engage in professional service such as participation in professional societies, and to always consider and support professional ethics
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics. **II:** an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society. **IV:** an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences. **VI:** an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields. **VII:** an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Hassan Al-Siraj		
E-mail:	saeedh81@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 2		
Office Hours:			

Lecturer: Dr. Omar W. Maaroof
omarmaaroof@uomosul.edu.iq
2020-2021

Mechatronics Engineering department
University of Mosul
Office: Mechatronics Department 2nd floor room 6

Solid Modeling (SMOD363)
Time: Wednesday 8:30 – 11:30
Class hours: 3, Credi: 3
Selected Elective course, No prerequisites

COURSE OBJECTIVES

To gain experience with the basic tools of the solid modeling program. Students will use one of the commercial programs used by engineers, students, and designers which is called SolidWorks. They will design, implement, and analyze a sample of engineering solid models for applications in solid modeling, design, and CAD/CAM. To get knowledge of how to produce and deal with sketches, Parts, and Assemblies of mechanical parts.

Week	Course outline
W1	**Introduction:** Solid Modeling, some available Software / Installation
W2	**Creating Sketch Entities:** Centerlines, Sketch Command, Line Command, Exit Sketch.
W3	**Creating Sketch Entities:** Circle Command, Center Point Circle.
W4	**Sketch Relations:** Using Geometric Relations, Horizontal Relation, Geometric Relation Symbols.
W5	**Sketch Relations:** Preventing Relations with [Ctrl] Key, View Sketch Relations, constraints, Examples.
W6	**Boss and Cut Features – Extrudes, Revolves, Sweeps, Lofts:** Creating Basic Swept Features, Extruded Boss/Base (Blind), Merge Result Option, Examples.
W7	**Boss and Cut Features – Extrudes, Revolves, Sweeps, Lofts:** Extruded Cut, Extruded Cut (Through All), Examples.
W8	**Dimensions:** Applying and Editing Smart Dimensions, Dimension, Smart Dimension.
W9	**Dimensions:** Dimension Standard, Dimension (Modify), Examples.
W10	**Feature Conditions – Start and End:** Controlling Feature Start and End Conditions, Extruded Boss/Base (Blind), Examples.
W11	**Feature Conditions – Start and End:** Examples.
W12	**Components-Parts:** Physical properties, Mechanical analysis.
W13	**Components-Assemblies:** mates (constraints).
W14	**CAD/CAM:** Manufacturing, Rapid prototyping, 3D Printing, CNC & G-Code
W15	**Case Study:** Examples of mechanical parts design and manufacturing

Class Code on google classroom: Natansj

Lecturer: Dr. Omar W. Maaroof
omarmaaroof@uomosul.edu.iq
2020-2021

Mechatronics Engineering department
University of Mosul
Office: Mechatronics Department 2nd floor room 6

Grading:

Activities	Percentages
Quiz	**10%**
Homework	**10%**
Mid-term exam	**20%**
Project proposal, Presentation, final model	**10%**
Final exam	**50%**

Textbook:

- Amit Bhatt, Mark Wiley. SolidWorks 2022 Step-By-Step Guide-CADFolks (2021)

Reference book:

- **INTRODUCING SOLIDWORKS (SOLIDWORKS help)**
- Planchard, David. SOLIDWORKS 2021 Tutorial: A Step-by-Step Project Based Approach Utilizing 3D Modeling. SDC Publications, 2020.

COURSE LEARNING OUTCOMES

1. Students will be familiar with important solid modeling representations and techniques to create 3-D solid models, and geometric modeling [II, VI, and VII]
2. Giving them insight into the capabilities and limitations of solid modeling systems [VI]
3. Gained engineering program experience and skills [III and VI]
4. An understanding of theoretical and practical concerns as they design, implement, and analyze samples in Solid Modeling and CAD/CAM within the designing team [II, III, and VII]
5. Students will get the experience of self-learning techniques for the other solid modeling commercial programs. [I and VI]

Contribution of the course to Criterion 3 (Program Educational Objectives):

● Can have a successful professional career in mechatronics engineering and related fields or work as a researcher or pursue additional degrees through graduate studies

● Apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design

● Engage in professional service such as participation in professional societies, and to always consider and support professional ethics

● Have a constant desire for professional development through lifelong learning activities, Self-confidence, creativity, and leadership

Relationship of the course to the Graduate Outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.

II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.

III: an ability to outline and conduct experiments as well as analyze and interpret data.

IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.

V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.

VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.

VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

University of Mosul
College of Engineering
Mechatronics Engineering Department

Course Name: Communications Engineering			
Department: Mechatronics Engineering Department		**Class: 3** **Semester:** 1	**Program Code: COEN365**
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): E**	
Course Description: Foundation AND Prencipiles of Comunications and Networing with their relations to mechatronics engineering fields			
Course Pre requisites: NONE			
Textbook(s): Behrouz A. Forouzan: Data Communication and Networking, 4th edition			
Reference(s): B. Sklar, Digital Communications: Fundamentals and Applications, 2nd Ed., Prentice Hall, 2001. L. W. COUCH II, Digital and Analog Communication Systems, 6th Edition, Prentice Hall.			

Weeks	**Materials and Syllabus Details**
Week 1	Communication Systems
Week 2	Signals and Its Categories
Week 3	Analog Communications
Week 4	Analog modulation: Amplitude modulation frequency modulation, phase modulation
Week 5	Digital Signaling and Circuits
Week 6	Analog to digital conversion, quantizing, encoding.
Week 7	Digital Modulation
Week 8	Fiber Optics
Week 9	Principles of Networking, Networks Categories
Weak 10	Protocols, Standards, Standards Organisations, Internet Standards
Week 11	Network Models
Week 12	Network Layers
Week 13	Ethernet
Week 14	Wireless Networks
Week 15	Applications of Networking and Communication in Mechatronics

	Method	**No**	**Percentage %**
Assignment & Grading	**Midterm exam**	25	25%
	Homework + project (if any)	10	10%
	Quizzes	5	5%
	Final exam	60	60%

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Laptop, Data show, White board, Multimeters Digital logic boards

Course Learning outcomes (Objectives):

1) Adequate knowledge in Communication system concepts ,.(**I, II, IV, V**).
2) Ability to design and implement netwoks under realistic constraints and conditions ,.(**I, II, IV, V, VII**).
3) Ability to understand the details of digital and analog signals ,.(**II, IV, V, VII**) .
4) Ability to devise, select, and use modern techniques and tools needed for communication system,.(**IV, V, VI, VII VII**).

Contribution of the course to Criterion 3: Credit hours for:

- Can have successful professional career in mechatronics engineering and related fields or work as Researcher or pursue additional degrees through graduate studies
- Apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- Engage in professional service such as participation in professional societies, and to always consider and support professional ethics

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Dr. Muhamad Azhar Abdilatef		
E-mail:	Muhamad.azhar@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 6		
Office Hours:			

University of Mosul
College of Engineering

Course Name: public safety		**Course Number:** ENGE429
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): E**

وصف المقرر:التعرف على اساسيات السلامة العامة في كافة ميادين العمل للافراد العاملين في المؤسسات والشركات والمعامل وكيفية حماية البشر من الاضرار الناجمة عن مخاطر بيئه العمل وكذلك الحفاظ على مقومات العنصر المادى وهى المنشأت وما تحتويه وكذلك توفير كافة الاشتراطات التى تكفل توفير بيئه امنه وتحقق الوقاية من المخاطر وبث الامان فى قلوب العاملين اثناء عملهم وتعاملهم مع الادوات لتوفير الثقة لدى العاملين والعملاء فى المنشأت مما يؤدي الى خفض التكلفة الانتاجية وزياده الانتاج وتقليل الفاقد فى المواد الخام من خلال التخطيط الفنى السليم لاسس الوقاية والسلامة العامة.

Course web page: Google Classroom

Course Pre requisites: None
Corequisites: None

Textbook(s):

العمل بيئة وتأمين المهنية والصحة السلامة
إعداد د .مجدي عبد الله شرارة - نشر من قبل مؤسسة فريدريش إيبرت (مكتب مصر) / حقوق الطبع© 2016 محفوظة لمؤسسة فريدريش إيبرت

Reference(s):

- Phil Hughes MBE_MSc_FIOSH_RSP, Liz Hughes BA(Hons)_MSc - Easy Guide to Health and Safety-Butterworth-Heinemann (2008)

Course Outline (Topics covered and Class schedule):

Week 1	مقدمة، مفهوم واهداف السلامة العامة
Week 2	تاريخ السلامة العامة
Week 3	الاطار القانوني وحماية العاملين واصحاب المؤسسات والشركات
Week 4	حوادث العمل، الاسباب وطرق العلاج
Week 5	انواع المخاطر التي يتعرض لها العاملون، الاسباب والوقاية(المخاطر الميكانيكية، الكهربائية والفيزيائية)
Week 6	انواع المخاطر التي يتعرض لها العاملون، الاسباب والوقاية(الكيميائية، الضوضاء والاهتزازات)
Week 7	طرق قياس المخاطر لطبيعية
Week 8	امتحان منتصف المقرر
Week 9	الوقاية من المخاطر البيولوجية
Week 10	الوقاية من المخاطر السلبية
Week 11	مهمات السلامة للوقاية الشخصية

Week 12	الاسعافات الاولية
Week 13	الحرارة - مصادرها وطرق انتقالها
Week 14	انواع الحرائق و مواد الاطفاء
Week 15	امتحان نهائي

Laboratory schedule: none

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: In class data show, computer, power point, images and videos

Course Learning outcomes (Objectives):
Student who finish this course should:

1. التوعية بأهمية السلامة والصحة المهنية وتحسين الوعي لدى العاملين والإدارة بأهمية الالتزام بالممارسات السليمة والإجراءات الوقائية. [I,II]
2. الحد من الحوادث والإصابات والأضرار الناجمة عن الأخطاء البشرية والتقنية والتكنولوجية.[IV,V]
3. تطوير وتنفيذ إجراءات السلامة والصحة المهنية لضمان توفير بيئة عمل آمنة وصحية للعاملينج [VI]
4. سن القوانين والتشريعات اللازمة للحفاظ على سلامة الأشخاص والبيئة. [III]
5. تحديد وتقييم المخاطر وتحليلها وتطبيق الإجراءات الوقائية والتحكم في المخاطر للحد من التعرض للمخاطر. [V,VI]
6. التوعية في اهمية الاسعافات الاولية وكيفية اسعاف المصابين. [VII]

Contribution of the course to Criterion 3: Credit hours for:

- من خلال هذه المادة يمكن تجنب حدوث الحوادث او الحد من حصولها
- الدراية الكافية بجميع المخاطر التي يمكن يتعرض لها اي شخص
- يمكنه معرفة معدات الوقاية الشخصية الخاصة بالعمل

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.

IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	Assistant teacher	Lab teaching
Name:	م.م احمد خالد اسماعيل		
E-mail:	ahmedkhalid@uomosul.edu.iq		
Office location:	Dental college		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Robotics		**Course Number:ROTI400**
Department: Mechatronics Engineering Department	**Program Name:**Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: Methods of transformations being used in the analysis of position, velocity and acceleration using the advanced methods of matrix algebra for serial robots. Path planning and trajectory generation. Control methods for position and force. Laboratory experiments were prepared.

Course web page: Google Classroom

Course Pre requisites: Theory of Machines THMH354
Corequisites: None

Textbook(s):

1. 1. Introduction to robotics mechanics and control, John J. Craig, SI. Units. Third ed., 2005.
2. Robotics - Modelling, Planning and Control, Bruno Siciliano • Lorenzo Sciavicco • Luigi Villani • Giuseppe Oriolo , 2009.

Reference(s):

- Kunz, T. and Stilman, M. (2011). Turning paths into trajectories using parabolic blends. GT-GOLEM-2011-006. Georgia Institute of Technology.
- Q.-S. Lin, Y.-F. Yao, and J.-X. Wang, “Simulation and application of neural network PID auto-tuning controller in servo-system” , IEEE 2nd International Workshop on Database Technology and Applications, 2010, pp.1-4.

Course Outline (Topics covered and Class schedule):

Week 1	Introduction to robotics: Types of joints used in robots Mechanisms, Descriptions (position, orientations, and frames).
Week 2	Link properties: Link-connection description, Derivation of link transformations.
Week 3	MANIPULATOR KINEMATICS.
Week 4	EXAMPLE: KINEMATICS OF INDUSTRIAL ROBOT.
Week 5	Joint's angle: Inverse kinematics of serial robots.
Week 6	LINEAR AND ROTATIONAL VELOCITY OF RIGID BODIES
Week 7	Velocity propagation from link to link.
Week 8	JACOBIANS: SINGULARITIES

Week 9	Forces: Static force in manipulators.
Week 10	Dynamics : NEWTON'S EQUATION, EULER'S EQUATION, Iterative Newton-Euler dynamic formulation.
Week 11	Dynamics : AN EXAMPLE OF CLOSED-FORM DYNAMIC EQUATIONS, THE STRUCTURE OF A MANIPULATOR'S DYNAMIC EQUATIONS
Week 12	Trajectory generation: Cubic polynomials.
Week 13	Trajectory generation: Linear segment with parabolic bade (LSPB).
Week 14	Linear Control of manipulator: FEEDBACK AND CLOSED-LOOP CONTROL, SECOND-ORDER LINEAR SYSTEMS.
Week 15	Linear Control of manipulator: CONTROL-LAW PARTITIONING, TRAJECTORY-FOLLOWING CONTROL

Laboratory schedule:Wednesday 10:30 AM-12:30 PM

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	5	
	Quizzes	10	
	Lab work	15	
	Final exam	50	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: In class Data Show, Power point , and videos

Course Learning outcomes (Objectives):
1-Student is able to understand the transformation of position, velocity and acceleration. **[I, II, VII]**
2) Student is able to calculate the forewords and inverse kinematics. **[I, II, III, VII]**
3) Student is able to understand the velocity propagation from link to another towords the tip. **[I, II, III, VII]**
4) Student is able to obtain the dynamic equations of any robot arm. **[I, II, VI, VII]**
5) Understand the generation of trajectory for robot arm.[**I, II, VII**]
6) Student is able to design a controller for trajectory tracking. [**I, II, ,IV, VI, VII]**

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies

Relationship of the course to the Program outcomes:

University of Mosul
College of Engineering

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Saad Zaghlul Saeed		Omar W. Maaroof
E-mail:	saeeds70@uomosul.edu.iq		omarmaaroof@uomosul.edu.iq
Office location:	Right building- 2nd floor - Room 1		Right building- 2nd floor - Room 6
Office Hours:			

University of Mosul
College of Engineering

Course Name: Design of Machine Elements II		Course Number: DMEL401
Department: Mechatronics Engineering Department	Program Name: Mechatronics Engineering	Program Code:
Credits: 3	Year & Semester: 2021 – 2022	Course type: (Required / Elective): R
Course Description: This course is considered as a complementary course for the proceeding course entitled design of machine elements I, DMEL350. At the end of the course students will have a basic knowledge about the most important component of any mechanical device such as shafts, bearings, fasteners, bolts, …. Etc.		
Course web page: Google Classroom		
Course Pre requisites: Design of Machine Elements I, DMEL350 Corequisites: None		
Textbook(s): Machine Elements in Mechanical Design, Robert L. Mott, 6th Ed. 2008		
Reference(s): Shigley's Mechanical Engineering Design, Budynas and Nisbett, 8th, 2006.		
Course Outline (Topics covered and Class schedule):		

Week 1	Kinematics of Gears
Week 2	Spur Gear Design
Week 3	Rolling Contact Bearings 1
Week 4	Rolling Contact Bearings 2
Week 5	Plain Surface Bearings
Week 6	Springs
Week 7	Clutches and Brakes
Week 8	Midterm Exam
Week 9	Fasteners
Week 10	Machine Frames, Bolted Connections and Welded Joints 1
Week 11	Machine Frames, Bolted Connections and Welded Joints 2
Week 12	Electric Motors and Controls
Week 13	Linear Motion Elements 1

Week 14	Linear Motion Elements 2
Week 15	Final Exam

Laboratory schedule: None

Assignment & Grading	Method	No	Percentage %
	Midterm exam	1	20
	Homework + project (if any)	2	5
	Monthly exam + Quizzes	3	15
	Lab work	0	0
	Final exam	4	60

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, animations, simulation, power point, demonstraion devices and models.

Course Learning outcomes (Objectives):
At the end of the course, student must be able to

1. Understand basic concepts of machine design and analysis. [I], [II], [III]
2. Gain a basic idea about the available engineering analysis packages. [I], [II], [IV], [VI],
3. Get a basic method for analysis of any mechanical device. [IV],
4. Lean and gain engineering morals and ethics. [V], [VII]

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.

V: an understanding of the responsibility of engineers to practice professionally and ethically at all times. VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields. VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	Assistant teacher	Lab teaching
Name:	Ahmad Wadollah S. Al-Sabawi		
E-mail:	ahmadalsabawi@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 4		
Office Hours:	by assignment		

University of Mosul
College of Engineering

Course Name: Modern Control Systems		**Course Number: MOCS 402**
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:** MTE
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: This course provides the students with the needed background for analyzing, implementing digital control system, and Knowledge about principles and techniques of A/D and D/A conversions and basics of Z transform. This course provides the students with the needed Knowledge in stability analysis of digital control systems.

Course web page: Google Classroom

Course Pre requisites:
Control Systems (MTE 302)
Corequisites: None

Textbook(s):
1-Digital Control Engineering Analysis and Design, M. Sami Fadali, Second Edition.

Reference(s):
In the library, there are many control systems books that can be used as reference books.

Course Outline (Topics covered and Class schedule):

Week 1	Introduction to digital control.
Week 2	Discrete time system representation.
Week 3	Mathematical modeling of sampling process.
Week 4	Data reconstruction.
Week 5	Modeling discrete-time systems by pulse transfer function.
Week 6	Revisiting Z-transform.
Week 7	Mapping of s-plane to z-plane.
Week 8	Pulse transfer function I.
Week 9	Pulse transfer function II.
Week 10	Sampled signal flow graph.
Week 11	Stability analysis of discrete time systems.
Week 12	Jury stability test. Stability analysis using bi-linear transformation
Week 13	Time response of discrete systems.

Week 14	Transient and steady state responses
Week 15	Root locus method for discrete system.

Laboratory schedule: 2 Lab hours

	Method	No	Percentage %
Assignment & Grading	Midterm exam including Lab exam	30	
	Homework + project (if any)	5	
	Quizzes	5	
	Lab work	10	
	Final exam	50	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, power point, animations.

Course Learning outcomes (Objectives):

Understanding the various issues related to digital control systems such as

1) Students understand the basic sampling theory and converter [I III IV]
2) Students understand Z-transform and its properties [I III IV]
3) Students can analyze signals in both time domain and Z domain [I III IV]
4) Students understand transfer function, block diagram, and signal flow graphs [I III IV]
5) Students understand the state variable technique [I III IV]
6) Students understand the basic knowledge necessary for system stability [I III IV]
7) Students learn the theory of digital PID controller [I III IV]
8) Students can design the discrete-date control systems [I III VII]

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies,
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design,
- engage in professional service such as participation in professional societies, and to always consider and support professional ethics,
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.

III: an ability to outline and conduct experiments as well as analyze and interpret data.

IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences. VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:			
	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Firas Ahmed Al-Durze		
E-mail:	dr.firasaldurze@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 2		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Special Topics in Mechatronics		**Course Number:** STME461
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: Special Topics mean advanced and hot topics in mechatronics. The students present report monthly of one of chosen topics and discusses it in a seminar during the semester.

Course web page: Google Classroom

Course Pre requisites: None
Corequisites: None

Textbook(s):
1. W. Bolton,"Mechatronics", 6th Edition,Pearson Education Limited, 2016.

Reference(s):
- Well known Scientific Website about the Topics.

Course Outline (Topics covered and Class schedule):

Week 1	Nanotechnology systems and applications
Week 2	Embedded systems design and applications
Week 3	Electric Cars
Week 4	Wind energy systems design and applications
Week 5	Solar energy systems design and applications
Week 6	SCADA Systems
Week 7	Autotronics Engineering
Week 8	Intelligent systems design and applications
Week 9	Internet of Things (IOT)
Week 10	Cooling Electronics equipments
Week 11	reconfigurable robot
Week 12	Gas power Plants
Week 13	Writing Technical and Scientific Reports

Week 14	Cooling system in airplane
Week 15	Final Report discussion

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	90	
	Homework + project (if any)	95	
	Quizzes	100	
	Lab work	95	
	Final exam	100	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Computer and Data show.

Course Learning outcomes (Objectives):
The students who successfully fulfill the course requirements will:

1) Have the ability read and write articles and scientific researches, **I, II, III, V, VI, VII**
2) Have experience about major field in mechatronics. **I, II, V, VI**
3) Have an ability to acquire the information and presented it. **I, II, III, V, VI**

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- engage in professional service such as participation in professional societies, and to always consider and support professional ethics

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics

engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	Assistant teacher	Lab teaching
Name:	Dr. Rafid Ahmed Khalil Alamori,		
E-mail:	rafidahmedkhalil@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 3,		
Office Hours:	Sunday, 9:30:00 - 11:30 AM		

University of Mosul
College of Engineering

Course Name: Automation		**Course Number:** MTE___
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:** MTE
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: This course will cover a concept of Automation and Production Tools fields for the production systems that are used to manufacture products and the parts assembled into those products. The production system is the collection of people, equipment, and procedures, organized to accomplish the manufacturing operations of a company (or other organization).

Course web page: Google Classroom

Course Pre requisites:
Mechatronics Measurements
Electric circuits & network analysis 1, MTE103,
Digital Logic Design, MTE216
Corequisites: None

Textbook(s):
1. M. Groover, "Automation, Production Systems, and Computer Integrated Manufacturing" 3rd edition.

Reference(s):
1. In the library, there are many Automations books that can be used as reference books

Course Outline (Topics covered and Class schedule):

Week 1	Introduction, The major advantages of using automation, Automation Lab. Example, Industrial Automation vs. Industrial Information Technology,
Week 2	Role of automation in industry, Automation Advantages, Industrial Product Life Cycle, Economy of Scale and Economy of Scope, Production Systems Types, Types of Automation Systems
Week 3	Architecture of Industrial Automation Systems, The Functional Elements of Industrial Automation, Sensing and Actuation Elements.
Week 4	Industrial Sensors and Instrument Systems. Industrial Actuator Systems, Industrial Control Systems, The Architecture of Elements: The Automation Pyramid
Week 5	Measurement Systems, Static Characteristics, Sensitivity, sensitivity drift, Linearity, Hysteresis, Resolution, Accuracy, Precision,
Week 6	Dynamic Characteristics, Step response performance, Frequency Response Performance, Random Characteristics,
Week 7	Mid-Term Exam
Week 8	Introduction to Sequence/Logic Control and Programmable Logic Controllers, Industrial Example of Discrete Sensors and Actuators, Programmable Logic Controllers (PLC),

Week 9	Comparing Logic and Sequence Control with Analog Control, PLC Evolution , PLC >> Application Areas, PLCs Architecture, Communications processors, Expansion units, Input/output Units, Programmers
Week 10	The Software Environment and Programming of PLCs, Structure of a PLC Program, The cyclic execution of PLC Programs,
Week 11	The Relay Ladder Logic (RLL) Diagram, Example: Forward Reverse Control
Week 12	The Function Chart (IEC), The Statement List (STL), Typical Operands of PLC Programs, Internal Variable Operands or Flags,
Week 13	Timers(On delay, Off delay, Fixed pulse width timer, Retentive Timer, Non-Retentive Timer), Counter, User defined Data, Addressing, Operation Set.
Week 14	Formal Modelling of Sequence Control Specifications and Structured RLL Programming, motivation example Industrial stamping process,
Week 15	Steps in Sequence Control Design, Design of RLL Program, state transition logic, state logic, output logic,

Laboratory schedule: 2 Lab hours

	Method	No	Percentage %
Assignment & Grading	Midterm exam including Lab exam	25	
	Homework + project (if any)	10	
	Quizzes + Monthly exam(if any)	5	
	Lab work	10	
	Final exam(including Lab exam)	50	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, power point, animations.

Course Learning outcomes (Objectives):
The students after successfully complete the course are able to:
1- Have deep understanding of Automation systems and its types. [II, III, VII, V]
2- Gain an ability to develop a PLC program using various Programming methods. [II, VII, IV, VI]
3- Design a complete Mechatronic System [I, II, III, VI]

Contribution of the course to Criterion 3: Credit hours for:
- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies,
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design,

- engage in professional service such as participation in professional societies, and to always consider and support professional ethics,
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:

I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.

II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.

III: an ability to outline and conduct experiments as well as analyze and interpret data.

IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.

V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.

VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.

VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Dr. Ali A. Abdulla Alkurukchi		
E-mail:	ali.alkurukchi @uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 2		
Office Hours:			

University of Mosul
College of Engineering

Course Name: English Language Upper Intermediate		**Course Number:**
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**
Course Description: In this course, it is aimed at developing students' general English skills through the skills of reading, writing, listening, and speaking. Each unit is organized to enhance students' knowledge of vocabulary and grammar through reading texts. The students will learn how to form sentences and use them in real life situations. By the end of the course, students will be able to produce complete sentences and communicate appropriately in real-life situations.		
Course web page: Google Classroom		
Course Pre-requisites: English Language Intermediate Course **Corequisites:** None		
1. New Headway -Upper Intermediate/ Student's Book 2. New Headway -Upper Intermediate/ Workbook		
Reference(s): • Archived lectures by specialist teacher for every paper or video material		

Week	Hours	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	2	Chapter one Home and away	Blackboard + Data Show screen	Oral and written exams
2	2	Academic writing	Blackboard + Data Show screen	Oral and written exams
3	2	Tutorial	Blackboard + Data Show screen	Oral and written exams
4	2	Chapter two Been there, got the T-shirt	Blackboard + Data Show screen	Oral and written exams
5	2	Chapter three News and views	Blackboard + Data Show screen	Oral and written exams

6	2	Mid exam	Blackboard + Data Show screen	Oral and written exams
7	2	Academic writing	Blackboard + Data Show screen	Oral and written exams
8	2	Chapter Four The naked truth	Blackboard + Data Show screen	Oral and written exams
9	2	Academic writing	Blackboard + Data Show screen	Oral and written exams
10	2	Tutorial	Blackboard + Data Show screen	Oral and written exams
11	2	Chapter Five Looking ahead	Blackboard + Data Show screen	Oral and written exams
12	2	Tutorial	Blackboard + Data Show screen	Oral and written exams
13	2	Chapter six Hitting the big time	Blackboard + Data Show screen	Oral and written exams
14	2	Exam 2	Blackboard + Data Show screen	Oral and written exams
15	2	General Review	Blackboard + Data Show screen	Oral and written exams

Laboratory schedule: None

	Method	**No**	**Percentage %**
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work	0	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class Blackboard, data show, computer, speakers.

Course Learning outcomes (Objectives):

Student who finish this course should:
A1- Students can learn how to understand and translate articles written in English into their native language [IV,V,VI,VII]
A2 - The ability to listen to and understand the articles in English. [IV,V,VI,VII]
A3 - The ability to translate into his/her mother tongue. [IV ,VII]
A4- Allow students to conduct research and write research reports in English. [V,VI,VII]
A5- Learn about the English language and its role in transferring and understanding different types of science and technology. [IV,V,VI,VII]
A6 - The ability to refrain from quoting a text. [V,VI,VII]

Contribution of the course to Criterion 3:

- can have a successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies.
- engage in professional service such as participation in professional societies, and to always consider and support professional ethics.
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity, and leadership.

Relationship of the course to the Program outcomes:

IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
V: an understanding of the responsibility of engineers to always practice professionally and ethically.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Dr. Mohammed Yaseen Al-Nuaimi		
E-mail:	mohammed.yaseen@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 3		
Office Hours:	Sunday, 10:30 - 12:30 AM		

University of Mosul
College of Engineering

Course Name: Engineering Management		**Course Number:** NGC425
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**

Credits: 4	**Year & Semester: 2020-2021**	**Course type: (Required)**

Course Description: The course aims to equip students with knowledge and skills to manage technical and economic aspects of industrial projects and operations. It covers topics such as technical and economic feasibility studies, plant performance appraisal, administrative and production organization, operation research techniques, linear programming and optimization methods, industrial costs and controllable cost techniques, and time measurement studies. Students will learn to evaluate production processes and identify opportunities for improvement to enhance efficiency, reduce costs, and optimize performance.

Course web page: Google Classroom

Course Pre requisites:
Corequisites: None

Textbook(s):

1. د. عادل عبد المالك " الهندسة الصناعية "– دار الكتب للطباعة والنشر - جامعة البصرة - الطبعة الأولى 2000
2. د. خليل العاني ، د. إسماعيل إبراهيم القزاز ، د. عادل عبد المالك آوريال " إدارة الجودة الشاملة ومتطلبات الأيزو 2000:9001 " الطبعة الأولى 2001 ، مطبعة الأشقر- بغداد.
3. Hamdy A. Taha " Operations Research : an introduction" 6th edition (1997), Prentice-Hall.
4. Prem Kumar Gupta and D.S. Hira " Operations Research : an introduction" 2nd edition (1989) S. Chand & Company LTD, NewDelhi.
5. Charles E. Ebeling "An Introduction to Reliability and Maintainability Engineering " (1997) , McGraw-Hill.

Reference(s):

1. د. مازن بكر عادل وأخرون " بحوث العمليات للإدارة الهندسية " جامعة الموصل 1986
2. Phillips,D.T.;Ravindran,A.;Solberg ,J." Operations Research : Principles and Practice " (1976) John Wiley

Course Outline (Topics covered and Class schedule):

Week 1	Concepts and objectives of Engineering Management
Week 2	Technical and economic studies for project feasibility.
Week 3	Plant performance appraisal.
Week 4	Administrative and production organization of industrial enterprises
Week 5	Using operation research in production.
Week 6	Linear programming and Graphical method.
Week 7	Algebraic method and Simplex method
Week 8	Allocation of resources.

Week 9	Quality Control and production inspection method.
Week 10	Industrial costs and controllable cost techniques.
Week 11	Time measurement studies for production operations.
Week 12	Method Time studies for production operations.
Week 13	Construction of technological paths.
Week 14	Productivity, measurement method, and techniques.
Week 15	Method of Inventory Control.

Laboratory schedule: Tuesday 10:30 am - 12:30 pm

	Method	**No**	**Percentage %**
Assignment & Grading	Midsemester exam	20	
	Homework + project (if any)	10	
	Quizzes	10	
	Lab work		
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: In class Data Show, Power point , and videos

Course Learning outcomes (Objectives):

1) To provide students with a solid grounding in the fundamental principles and practices of engineering, so that they can understand and manage engineering projects effectively. [**I**]
2) To provide students with a solid understanding of finance, accounting, marketing, and other business-related topics. [**I, III**]
3) To encourage students to consider their work's moral and social implications and to prioritize responsible and sustainable engineering practices. [**I, V**]
4) To aid students in cultivating their ability to solve problems and think critically, while also motivating them to engage in creative thinking and create original solutions for engineering obstacles. [**III, V, VI, VII**]
5) To help students develop the leadership, communication, and management skills necessary to lead teams of engineers and technical professionals. [**IV,V, VI, VII**]

Contribution of the course to Criterion 3: Credit hours for:

- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Mohammed Falah Mohammed		
E-mail:	mohammedfalahali@gmail.com		
Office location:			
Office Hours:			

University of Mosul
College of Engineering

Course Name: Mechatronics System Design		**Course Number:** MTSD450
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description: This course covers the procedure for designing a Mechatronics system (Input Device, sensors, signal conditioning, processing, control system and) and how to use these information to design mechaternics system. This course gives the student the skills to build a practical Mechatronics systems.

Course web page: Google Classroom

Course Pre requisites: Control System
Corequisites: None

Textbook(s):
1. Mechatronics System Design", Second Edition, SI by Devdas Shetty and Richard A. Kolk, 2010.

Reference(s):
- 1- "Mechatronic Systems Design Methods, Models, Concepts", First eddition By Klaus Janschek,2012
- 2- "Control of Mechatronic Systems: Model-Driven Design and Implementation Guidelines", First edition, by Patrick O. J. Kaltjob, 2020

Course Outline (Topics covered and Class schedule):

Week 1	Mechatronics Design Process
Week 2	Transfer Functions, Block Diagrams and Manipulations
Week 3	Modeling and Simulation
Week 4	Block Diagram Modeling—Direct Method
Week 5	Block Diagram Modeling—Analogy Approach
Week 6	Block Diagram Modeling—Modified Analogy Approach
Week 7	Block Diagram Modeling of Electrical Systems
Week 8	Block Diagram Modeling Mechanical systems
Week 9	Block Diagram Modeling Electromechanical system
Week 10	Sensors and transducers Modeling
Week 11	Modeling of Actuating systems

Week 12	System control Modeling
Week 13	Study Case I
Week 14	Study Case II
Week 15	Evaluation

Laboratory schedule: Thursday 8:30-10:30 AM

	Method	No	Percentage %
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	5	
	Quizzes	5	
	Lab work	15	
	Final exam	50	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Student will attend lab. Ten experiments will be done, and student will write a report for each experiment, hand solution of exercise. in-class projector for theory,

Course Learning outcomes (Objectives):
The students after successfully complete the course are able to:
1- Learn how to work with different components of mechatronics systems. (I,II,III,VI)
2- Discuss the concepts modeling as parts of control system field. (I,II,III)
3- Design and Model Parts or Whole Mechatronic System (I,II,III,VI,VII)

Contribution of the course to Criterion 3: Credit hours for:
- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies
- engage in professional service such as participation in professional societies, and to always consider and support professional ethics

Relationship of the course to the Program outcomes: I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits

University of Mosul
College of Engineering

Teaching staff:			
	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Saad Ahmed Salih Al Kazzaz		
E-mail:	kazzazs60@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 3		
Office Hours:			

University of Mosul
College of Engineering

Course Name: PC Interface and Data Acquisition		**Course Number:** MTE___
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:** MTE
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): E**

Course Description: This course will cover a concept of PC Interface and Data Acquisition which include: the fundamental of signal handling, ADC, DAC, MPU addressing and decoding, parallel, serial, and game port

Course web page: Google Classroom

Course Pre requisites:
Microprocessor and digital system
Digital Logic Design, MTE216
Corequisites: None

Textbook(s):
Kevin James, "PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control"

Reference(s):
1. In the library, there are many Automations books that can be used as reference books

Course Outline (Topics covered and Class schedule):

Week 1	Introduction to Data Acquisition on the PC
Week 2	Analog Signal Transmission, Wire and cable options, Noise and Ground, Zero and Span cct(Inverting Summer, Instrument Amplifier),
Week 3	Signal Condationing, Isolation Amplifier, Transformer-coupled Amplifiers, Optically Coupled Amplifiers
Week 4	Analog to Digital and Digital to Analog Conversion: Sample and Hold circuits, Analog, multiplexers/demultiplexers
Week 5	Analog to digital Converters, Digital to analog Converters, Examples of sensors with signal conditioned output
Week 6	Microprocessor Addressing System: Memory Mapped Addressing, I/O Addressing.
Week 7	Address decoder Design, Assembly Language for I/O
Week 8	Mid-Term Exam
Week 9	Programmable Peripheral Interface(PPI), Advantage, Addressing
Week 10	PPI Examples
Week 11	Computer Parallel Port: Architecture

Week 12	Computer Parallel Port: programming and examples
Week 13	Computer Serial Port: Architecture
Week 14	Computer serial Port: programming and examples
Week 15	Computer Game Port: Architecture, programming, and examples

Laboratory schedule: 2 Lab hours

	Method	No	Percentage %
Assignment & Grading	Midterm exam including Lab exam	25	
	Homework + project (if any)	10	
	Quizzes + Monthly exam(if any)	5	
	Lab work	10	
	Final exam(including Lab exam)	50	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class data show, power point, animations.

Course Learning outcomes (Objectives):
The students after successfully complete the course are able to:
1- Have deep understanding of PC Interface systems and types. [II, III, VII, V]
2- Gain an ability to develop pc interfaces SW using various Programming language. [II, VII, IV, VI]
3- Design and Model Parts or Whole Mechatronic System [I, II, III, VI]

Contribution of the course to Criterion 3: Credit hours for:
- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies,
- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design,
- engage in professional service such as participation in professional societies, and to always consider and support professional ethics,
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.

III: an ability to outline and conduct experiments as well as analyze and interpret data.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Dr. Ali A. Abdulla Alkurukchi		
E-mail:	ali.alkurukchi @uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 2		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Artificial Intelligent		**Course Number:** ARIN453
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 2	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): R**

Course Description:

1. Introduction to Intelligence.
2. Introduction to Artificial Neural Networks, Neuron Model.
3. Feedforward Neural Networks, Derivation of Error Backpropagation (EBP) Training Algorithm, Improving the Convergence Properties of EBP, Second Order Training Schemes.
4. Radial Basis Function Neural Networks, Unsupervised Learning.
5. Fuzzy Logic, Membership Functions.
6. Standard Fuzzy Systems (SFS), Adaptive Neuro-Fuzzy Inference Systems (ANFIS)
7. Introduction to Genetic Computing, Encoding and Decoding, Operators: Mutation, Crossover, Offspring generation.
8. Particle Swarm Optimization
9. Applications of Particle Swarm Optimization
10. AI applications in Mechatronics.
11. Project work.

Course web page: Google Classroom

Course Pre requisites: None
Corequisites: None

Textbook(s):

1. The course will rely primarily on handouts and papers.

Reference(s):

- "Fundamentals of Computational Intelligence: Neural Networks, Fuzzy Systems, and Evolutionary Computation" (IEEE Press Series on Computational Intelligence) 1st Edition by James Keller, Derong Liu, and David Fogel.

Course Outline (Topics covered and Class schedule):

Week 1	Introduction to Intelligence.
Week 2	Introduction to Artificial Neural Networks, Neuron Model.
Week 3	Feedforward Neural Networks, Derivation of Error Backpropagation (EBP) Training Algorithm, Improving the Convergence Properties of EBP, Second Order Training Schemes.
Week 4	Monthly Exam
Week 5	Radial Basis Function Neural Networks, Unsupervised Learning.
Week 6	Fuzzy Logic, Membership Functions.

Week 7	Midterm Exam
Week 8	Standard Fuzzy Systems (SFS), Adaptive Neuro-Fuzzy Inference Systems (ANFIS)
Week 9	Monthly Exam
Week 10	Introduction to Genetic Computing, Encoding and Decoding, Operators: Mutation, Crossover, Offspring generation.
Week 11	Second Term Exam
Week 12	Particle Swarm Optimization
Week 13	Applications of Particle Swarm Optimization
Week 14	AI applications in Mechatronics.
Week 15	Project work. and final exam

Laboratory schedule: None

	Method	**No**	**Percentage %**
Assignment & Grading	Midterm exam	20	
	Homework + project (if any)	5	
	Quizzes	5	
	Lab work	5	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: in-class projector, data show, computer

Course Learning outcomes (Objectives):
1) To let the students be aware of radically different tools from the conventional ones.[I,II,IV]
2) to describe when/how and why we need intelligence, [I,III,VI]
3) how we implement it. [I,II,VII,IV]

Contribution of the course to Criterion 3: Credit hours for:
- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies

- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
IV: an ability to communicate effectively using oral, written, and graphic forms with different levels of audiences.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Aws Anaz		
E-mail:	aws.anaz@uomosul.edu.iq		
Office location:	Mechatronics Department - right building - 2nd floor - room 2		
Office Hours:			

University of Mosul
College of Engineering

Course Name: Intelligent control		**Course Number:** ICON464
Department: Mechatronics Engineering Department	**Program Name:** Mechatronics Engineering	**Program Code:**
Credits: 3	**Year & Semester: 2020-2021**	**Course type: (Required / Elective): E**

Course Description: Industrial systems are complex and have nonlinear behaviors, therefore, new methodologies are required to design and develop intelligent controllers. Intelligent control systems are becoming very important for both academia and industry. Control methodologies are required to improve the performance of control complex and nonlinear systems. These controllers are based on fuzzy logic, neural network and evolutionary computation

Course web page: Google Classroom

Course Pre requisites: Control System CONS352
Corequisites: Control System CONS352

Textbook(s):
1. Zilouchian, Ali, and Mo Jamshidi, eds. Intelligent control systems using soft computing methodologies. CRC press, 2001.

Reference(s):
- Liu, Jinkun. Intelligent control design and Matlab simulation. Singapore: Springer, 2018.

Course Outline (Topics covered and Class schedule):

Week 1	1. An introduction to classical and intelligent control systems.
Week 2	2. Intelligent systems and applied artificial intelligence.
Week 3	3. Intelligent control concepts.
Week 4	4. Artificial neural networks: fundamentals and architectures
Week 5	5. Artificial neural networks: applications.
Week 6	6. Introduction to fuzzy logic.
Week 7	7. Fuzzy control and stability.
Week 8	8. Control applications of fuzzy logic.
Week 9	9. Neuro-fuzzy controllers: theory and design.
Week 10	10. Neuro-fuzzy controllers: applications.

Week 11	11. Probabilistic and evolutionary algorithms.
Week 12	12. Optimization of intelligent systems using GA.
Week 13	13. Intelligent control systems: research paper analysis
Week 14	14. Intelligent control systems: design methods.
Week 15	15. Final exam and Projects discussion.

Laboratory schedule: None

	Method	No	Percentage %
Assignment & Grading	Midterm exam	15	
	Homework + project (if any)	5	
	Quizzes	10	
	Lab work	5	
	Final exam	60	

Note: Attendance to lectures and submitting assignments is obligatory according to the Ministry of Higher Education and Scientific Research of Iraq legislations.

Teaching Techniques: Lectures, discussion groups, tutorials, problem solving, projects, debates, etc.

Course Learning outcomes (Objectives):
On completing the course, students will be able to have to following skills:
1. Knowledge and understanding:
A1. Know the advantages and drawbacks of intelligent controllers and when to apply them [I,II,V]
A2. Understand how to derive, develop, and apply intelligent controllers[II,III,V]
2. Intellectual skills:
B1 Comprehend advanced mathematical models and intelligent systems[III,V,VII]
B2. Design intelligent systems for various applications[V,VI,VII]
3. Professional and practical skills:
C1. Simulate and analyze responses to advanced controller concepts[I,VI, VII]
C2. Apply intelligent controllers to physical systems[III,VI,VII]
4. General and transferrable skills:
D1. Apply intelligent decision making techniques to engineering systems. [I, II,VI]
D2. Optimize system performance. [III, V,VI]

Contribution of the course to Criterion 3: Credit hours for:
- can have successful professional career in mechatronics engineering and related fields or work as researcher or pursue additional degrees through graduate studies

- apply design methodology in relation to mechatronics engineering, by incorporating the use of design standards, realistic constraints, and consideration of the economic, environmental, and social impact of the design
- have a constant desire for professional development through life-long learning activities, self-confidence, creativity and leadership

Relationship of the course to the Program outcomes:
I: an ability to identify, evaluate and solve engineering problems utilizing the acquired principal knowledge of engineering, science, and mathematics.
II: an ability to design an integrated system and its various components and processes to produce solutions that fulfill the need of society.
III: an ability to outline and conduct experiments as well as analyze and interpret data.
V: an understanding of the responsibility of engineers to practice professionally and ethically at all times.
VI: an ability to acquire new engineering knowledge and skills in the mechatronics engineering fields.
VII: an ability to function on multi-disciplinary teams to analyze, solve problems, and deadline commits.

Teaching staff:

	Course Instructor	**Assistant teacher**	**Lab teaching**
Name:	Aws Anaz		
E-mail:	aws.anaz@uomosul.edu.iq		
Office location:	right building - 2nd floor - room 2		
Office Hours:			