University of Misan
College of Engineering
Department of Electrical Engineering
Academic program description
2024 - 2025

Ministry of Higher Education and Scientific Research

University of Misan

College of Engineering

Department of Electrical Engineering

Academic Program Description

For the academic year

2023 – 2024

Bologna Process

Republic of Iraq - Ministry of Higher Education and Scientific Research university of Misan

Bachelor's degree in Electrical Engineering (First cycle)

Four years (Eight semesters) - 240 ECTS credits - 1 ECTS = 25 hr Program Curriculum (2023 - 2024)

Level	Semester	No.	Module Code	Module Name in English	Language	SSWL (hr/w) CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)		Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
UGI	One	1	EL111	fundamental of electrical	English	4		2		1			4	109	66	175	7.00	C	
		2	EE112	Mathematic	English	4				1			3	78	72	150	6.00	B	
		3	EE113	Basic	English	3				1			3	63	62	125	5.00	C	
		4	UM114	Computer	English	2		2					4	64	61	125	5.00	B	
		5	EE123	Chemistry	English	2				١			3	33	42	75	3.00	B	
		6	UM116	Academic	English	2							3	33	17	50	2.00	S	
		7	ENG123	Workshop Technology	English			٢					3	33	17	50	٢.٠٠	S	
					Total	١٧	0	6	0	٤	0		23	413	337	750	30.00	27	

Level	Semester	No.	Module Code	Module Name in English	Language	SSWL (hr/w) CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)		Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
UGI	Two	1	EL121	fundamental of electrical engineering	English	4		2		1			٤	109	٦٦	١٧٥	٧.00	C	
		2	EE122	Mathematic	English	4				1			3	78	72	150	6.00	B	
		3	EE123	ELECTRONIC I	English	٣				١			3	٦٣	٦٢	١٢٥	٥.٠٠	C	
		4	EL124	computer Programming II	English	2		2					4	64	٣٦	١٠٠	٤.00	C	
		5	EE125	Mechanical Engineering	English	٢							٣	٣٣	١٧	٥٠	٢.٠٠	B	
		6	EE115	Engineering Drawing	English	1		2					3	48	52	100	4.00	B	
		7	UM126	Democracy and Human Rights	Arabic	2							3	33	١٧	٥٠	2.00	S	
					Total	١٨	0	6	0	3			23	428	322	750	30.00	27	

Level	Semester	No.	Module Code	Module Name in English	Language	SSWL (hr/w) CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)		Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
	Three	1	EL211	Electrical Circuit I	English	٣				1			3	٦٣	62	125	5.00	C	
		2	EL212	Electrical Machine I	English	٣				1			3	63	62	125	5.00	C	
		3	ENG201	Mathematical iii	English	٣				1			3	63	٣٧	١٠٠	٤.00	B	
		4	EL213	Electronic	English	2		2					4	٦٣	٦٢	١٢٥	٥.00	C	
		5	EL214	Electromagnitic fields I	English	3							3	٤٨	27	75	3.00	B	
		6	EL215	computer Programming III	English	2		2					4	64	٣٦	١٠٠	٤.00	C	
		7	EL216	Digital	English	2		٢					٤	٦٤	٣٦	١٠٠	٤.٠٠	C	
					Total	18	0	٦	0	٣	0		24	428	322	750	30.00	27	

Level	Semester	No.	Module Code	Module Name in English	Language	SSWL (hr/w) CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)		Exam	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
	Four	1	EL221	Electrical Circuit II	English	3				1			3	63	87	150	5.00	C	
		2	EL222	Electrical Machine II	English	٣		2		1			4	94	56	150	6.00	C	
		3	ENG202	Mathematical III	English	3				1			3	63	37	100	4.00	B	
		4	EL223	Electronics II	English	2		2					4	79	46	125	5.00	C	

		5	EL224	Electromagnitic fields	English	3				1			3	63	37	100	4.00	B
		6	EL215	Computer Programming IV	English	2		2					4	64	61	125	5.00	C
		7	EL226	Digital Technical II	English	2							3	79	46	125	3.00	C
				Baath crimes		2							3	33	17	50	2	
					Total	20	0	6	0	ε	0		21	441	309	750	30.00	30

Level	Semester	No.	Module Code	Module Name in English	Language	SSWL (hr/w)							Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
						CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)								
		1	EL311	Electrical Machines I	English	3		2		1			4	94	56	150	6.00	C	
		2	EL312	Electrical Power I	English	3				1			3	63	62	125	5.00	C	
UGIII	Five	3	EL313	Communicatio n I	English	3				1			3	63	62	125	5.00	C	
		4	EL314	Engineering Analysis I	English	3				1			3	63	62	125	5.00	B	
		5	EL315	Electronic s I	English	2		2		1			4	79	46	125	5.00	C	
		6	EL316	Contr ol I	English	2				1			3	48	52	100	4.00	C	
					Total	16	0	4	0	6	0		20	410	340	750	30.00	26	

Level	Semester	No.	Module Code	Module Name in English	Language	SSWL (hr/w)							Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
						CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)								
		1	EL321	Electrical Machines II	English	3		2		1			4	94	56	150	6.00	C	
		2	EL322	Electrical Power II	English	3				1			3	63	62	125	5.00	C	
		3	EL323	Communication II	English	3		2		1			4	94	56	150	6.00	C	
UGIII	Six	4	EL324	Numerical Anallsis II	English	3				1			3	63	62	125	5.00	B	
		5	EL325	Electronics II	English	3				1	1		3	63	37	100	4.00	C	
		6	EL326	Contro l II	English	3				1	1		3	63	37	100	4.00	C	
					Total	18	0	4	0	6	2		20	440	310	750	30.00	28	

Level	Semester	No.	Module Code	Module Name in English	Language	SSWL (hr/w)							Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
						CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)								
		1	EL411	Power System	English	3				1			3	63	62	125	5.00	C	
		2	EL412	Power	English	3		2		1			4	94	56	150	6.00	C	
		3	EL413	Information	English	3				1	1		4	63	62	125	5.00	C	
	Seven	4	EL414	Engineering Control	English	3		2		1	1		3	94	56	150	6.00	C	
		5	EL415	Electiv(Antenna and Wave propogatin)	English	3				1	1		3	63	37	100	4.00	E	
		6	EE416	Engineering Project	English	1			2		1		3	48	52	100	4.00	C	
					Total	16	0	4	2	5	4		20	425	325	750	30.0	27	

Level	Semester	No.	Module Code	Module Name in English	Language	SSWL (hr/w)							Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
						CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)								
		1	EL421	Power System Analysis	English	3				1			3	63	62	125	5.00	C	
		2	EL422	Special	English	3		2		1	1		3	94	56	150	6.00	C	
		3	EL423	Digital	English	3		2		1	1		4	94	56	150	6.00	C	
UGIV	Eight	4	EL424	Advanced	English	3				1	1		4	63	62	125	5.00	C	
		5	EL425	Elective (Renewable Energy)	English	3				1	1		3	63	37	100	4.00	E	
		6	EE426	Engineering	English	1			2		1		3	48	52	100	4.00	C	
					Total	16	0	4	2	5	5		20	425	325	750	30.0	27	

Total	132	0	38	4	39	13		162	3357	2643	6000	240.0		Must be 240 ECTS			

Structured SWL (hr/w) type	**CL**	Class Lecture	**B**	Basic learning activities			**SWL:**	Student Workload	
	Lab	Laboratory	**C**	Core learning activity		Structured SWL			
	Pr	Practical Training	**S**	Suport or related learning activity		Unstructured SWL			
	Tut	Tutorial	**E**	Elective learning activity					

first stage Bologna process

Course Description

Course Description

The DC Circuits course is intended for undergraduate students pursuing studies in electrical engineering or related disciplines. This course provides a comprehensive introduction to the fundamental principles and concepts of direct current (DC) circuits. It lays the foundation for understanding electrical circuits and serves as a prerequisite for more advanced courses in electronics and circuit analysis. Understanding Basic Electrical Concepts: Students will develop a solid understanding of electrical quantities such as voltage, current, resistance, power, and energy, and learn how these concepts relate to DC circuits. DC Circuit Analysis: Students will learn techniques for analyzing and solving DC circuits using Ohm's law, Kirchhoff's laws, and various circuit analysis methods. They will gain proficiency in calculating voltages, currents, and power dissipation in series, parallel, and combination circuits. Applying Circuit Laws: Students will apply basic circuit laws and theorems, including Ohm's law, Kirchhoff's voltage and current laws, Thevenin's theorem, and Norton's theorem to simplify and solve complex DC circuits.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Maysan	University Department/Center
Fundamentals of Electrical Engineering I/EL111	Course Name / Course Code
Bologna	Academic System
Multisim	Programs Included
Actual attendance	Learning Method
First / 2024-2025	Semester / Year
200 hours / semester	Number of Study Hours
9/1/2023	Preparation Date of Description

Course objectives

1. Develop problem solving skills and understanding of circuit theory through application of techniques..
2. Understanding voltage, current and power of a given circuit.
3. Dealing with the basic concept of electrical circuit.
4. Understanding Kirchhoff's Current and Voltage Laws.
5. Perform network and node analysis.
6. Apply Thevenin-Norton Theorem, Superposition and Maximum Power Transfer to Find Different Electrical Quantities.

7. Understanding the magnetic circuit with some important applications.

Learning outcomes
1. Describe electrical quantities such as charge, current, voltage, power, and energy, and list the various terms associated with electrical circuits. 2. Definition of Ohm's Law, determination of the resistance of a material, and the effect of temperature on resistance. 3. Explanation of Kirchhoff's laws used in the analysis of series and parallel circuits. 4. Application of the analysis method to series and parallel circuits. 5. Explanation of network analysis in DC circuit with and without current source. 6. Explanation of complex analysis in DC circuit with and without voltage source. 7. Introduce the superposition theorem to find a solution for a network with two or more sources. 8. Understand Thevenin's Theorem to provide an equivalence circuit for any given terminal of the circuit. 9. Understand Norton's theorem to provide an equivalence circuit for any given terminal of the circuit. 10. Use Thevenin's Theorem and Norton's Theorem to find the maximum power transfer to the load. 11. Explain the substation theory, inverter theory and Millman's theory. 12. Describe the magnetic circuit and explain the important laws of magnetism with some applications.

Teaching and learning methods
The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by considering the types of

simple experiments that involve some sampling activities that interest students. By presenting theoretical explanations with the help of the whiteboard and “data show” to illustrate the approach (examples and exercises), using textbooks, and using e-learning and digital tools for digital teaching.

Evaluation methods
For evaluation purposes, it is used. 1. Quick and surprise tests method 2. Determine some homework 3. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Basic concepts: system of units, charge, current, voltage, power, energy, circuit elements
Week 2	Resistance of conductors and temperature effects, temperature coefficient of resistance
Week 3	Basic laws: Ohm law, series resistance, Kirchhoff's voltage law and voltage divider.
Week 4	Basic laws:, parallel resistance Kirchhoff's current law and current divider.
Week 5	Basic laws, series – parallel network, ladder network, Star-delta connection..
Week 6	Methods of analysis: Mesh Analysis
Week 7	Methods of analysis: Mesh Analysis, Nodal Analysis
Week 8	Methods of analysis: Nodal Analysis
Week 9	Circuit theorems: superposition theorem, source transformation
Week 10	Circuit theorems: Thevenin,s theorem
Week 11	Circuit theorem: Norton's theorem
Week 12	Circuit theorem: Maximum power transfer theorem, substitution theorem, reciprocal theorem and Millman's theorem
Week 13	Magnetic circuits: magnetic fields, flux density, permeability, reluctance,
Week 14	Magnetic circuits: ohms law for magnetic circuits, magnetizing force, hysteresis, ampere circuital law.

Week 15	Magnetics circuits: the flux and determine NI in the series and parallel magnetic circuits and air gaps
Week 16	Preparatory week before the final exam

References
Charles k. Alexander, and Matthew NO Sadiku, "Fundamentals of Electrical Circuits"
• Boylestad, "Introductory Circuit Analysis"

Course laboratories	
Electrical Engineering Fundamentals Lab	
Weeks	Experiments
Week 1	Introduction: types of resistance and how to read its values, measurement instrument (Ammeter, voltmeter, ohmmeter) and how to connect them in the electric circuit
Week 2	Series, parallel, series – parallel connection
Week 3	Kirchhoff voltage law & Kirchhoff current low
Week 4	Superposition theorem
Week 5	Thevemin's Theorem
Week 6	Norton's Theorem
Week 7	Maximum Power Transfer

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course Description

Course Description
Engineering drawing is the technical language among engineers, therefore,AimsthisA The decisionto Make students master the basics of this unique language. The course includes application Those basics through the programAutoCAD with its interface, 2D and 3D tools, options, electronic library, exporting and importing drawing files and printing them. The production Two-dimensional drawings and diagrams for the design and manufacture of general engineering systems and special electrical applications is the primary purpose of this course. The course also includes Basics of 3D Isometric and Oblique Drawing and 3D Drawing inAutoCAD. The student will be able to draw and work with different types of design plans and working drawings, by learning the rules for creating and reading writings and measurements on drawings.YIncludesThe decisionAlso an introduction to working with AutoCAD Electric and use of its advanced electronic library.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Engineering drawing /EE115	Course Name / Course Code
Bologna	Academic System
AutoCAD	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
100hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
1. Introducing students to the basics of drawing. 2. Introducing the basics and principles of technical drawings.. 3. Enhancing communication in engineering drawings and product design. 4. Developing students' skills in drawing inspiration from geometric shapes.	

5. Develop knowledge of manual and computer engineering drawings.
6. Create, edit and print a variety of technical drawings using the system.CAD.

Learning outcomes
1. Understand and read engineering drawings clearly.. 2. Communicate effectively in a modern technical environment.. 3. Enhance imagination for geometric shapes. 4. Create and present high quality engineering drawings in a well-crafted manner.. 5. Presenting correct letters, shapes and dimensions in a specific style and standard.. 6. Produce detailed electrical engineering drawings using software.AutoCAD

Teaching and learning methods
The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons.From exceptto I amDAFor evilHATo look atY With helpAndAFor lispoRahAWhiteandAnd "Da"So What?"To clarifyAFor the curriculum (AExampleandWhat?RYen) AndYou will useorABooksAFor methodologyAndYou will useorATo learnAFor electricityandI amAndNoToolsAFor digital For trainingRYesAFor my number.

Evaluation methods
The student's work will be assessed according to the unit assignments. Drawings will be corrected in the drawing room weekly. Homework will be assessed in the next lecture. During both assessments, the student will provide oral and written feedback in order to improve his/her skills. A final exam will be given at the end of the semester.

Course structure	
weeks	**Material covered**
Week 1	Introduction, Graphic Instruments and Their Use, Lettering
Week 2	Engineering operations.
Week 3	Graphic Geometry
Week 4	Multi View Ortho Graphic Projection in First and Third Angle Projection
Week 5	Multi View Ortho Graphic Projection in First and Third Angle Projection

Week 6	Multi View Ortho Graphic Projection in First and Third Angle Projection
Week 7	Mid-term + Dimensions
Week 8	Third View
Week 9	Isometric Drawing and Sketching
Week 10	Isometric Drawing and Sketching
Week 11	Isometric Drawing and Sketching
Week 12	Oblique Drawing
Week 13	Oblique Drawing
Week 14	Section of Isometric Drawing Sectional View
Week 15	Section of Isometric Drawing Sectional View
Week 16	Preparatory week before the final exam

References
• Abdul-Rasul AL Khafaf, "Engineering Drawing", Baghdad, 1990
• K. Venkata Reddy, "Textbook of Engineering Drawing" Second Edition, BS Publications, 2008

Course laboratories	
AutoCAD Lab	
Weeks	Experiments
Week 1	The use of CAD in engineering drawing. Description of menu Bar and toolbars. Drawing Ellipse, Rectangle.
Week 2	Drawing line, poly line, Ray, Circle, point, Arc, etc.
Week 3	CAD Electrical, Mechanical/Special features.
Week 4	The use of various layers.
Week 5	Drawing electrical symbols on simple architectural plans.
Week 6	3-D Drawing, render.
Week 7	Orthogonal projections and sectional views.

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted

50	Maximum number could be accepted

Course Description

Course Description
This is amazingThe materialDedicated to engineering students studying in the Department of Electrical Engineering, Faculty of Engineering, University ofMaysanThis course aims to improve the student's ability to read and understand books and lectures given in English within the field of electrical engineering. This is achieved through two stages. At the beginning of this course, the student will be given an intensive review of English tenses and grammar with many examples. In the second stage, many articles rich in engineering vocabulary are presented and explained to the students. In both stages, the student's progress will be assessed through many tests, assignments and examinations.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
English language /UM116	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
50hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
1. Enable the learner to communicate effectively and appropriately in real-life situations:	

2. Use English effectively for study purposes across the curriculum;
3. Develop and integrate the use of the four language skills: reading, listening, speaking and writing;

Learning outcomes
Upon completion of the course, students will be able to:: 1. Students will enhance their awareness of the correct use of English grammar in all language skills.. 2. Students will improve their ability to speak English.. 3. Students will review the grammatical forms of English and the use of these forms in specific communicative contexts, which include: classroom activities, homework, reading texts, and writing.. 4. Students will improve their reading fluency skills.. 5. Students will read university texts and expand their vocabulary.. 6. Students will achieve these outcomes by developing the following skills: focused reading, work and examination skills; discussion of longer essays; and summary writing including the drafting process.

Teaching and learning methods
1. Encourage students to learn by explaining the importance of English in their studies and career future.. 2. Stimulate the spirit of competition among students. 3. Use engaging visual examples to draw students' attention to details.. 4. Increase exercise on weak points.. 5. Maintaining a ray of hope for vulnerable individuals through the constant opportunity to overcome failure.

Evaluation methods
For evaluation purposes, it is used. 4. Quick and surprise tests method 5. Determine some homework 6. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Basic English essentials
Week 2	Vocabulary enrichment and dictionary use
Week 3	English grammar

Week 4	English grammar
Week 5	English grammar
Week 6	Reading comprehension
Week 7	Mid-term exam
Week 8	Writing paragraph
Week 9	Writing paragraph
Week 10	Reading and writing.
Week 11	Basic conversation practice
Week 12	Basic conversation practice
Week 13	Reading practice
Week 14	Presentation
Week 15	Presentation
Week 16	Preparatory week before the final exam

References
• Oxford English for Electrical and Mechanical Engineering Student's Book • basic English language skills Oxbridge academy Headway Student's Book • https://www.ted.com/talks • https://www.perfect-english-grammar.com/the-method.html • https://www.merriam-webster.com/

Course laboratories	
No Prerequisites	
Weeks	Experiments
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	

Week 6	
Week 7	

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course Description

Course Description
The unit provides a comprehensive introduction to the programming language.CThe first two weeks will cover basic syntax and grammar rules and introduce students to practical programming techniques. The remaining lectures will focus on more advanced concepts, such as data input and output, functions, scope rules and storage classes, arrays and strings, arithmetic and logical operations, command line arguments, and library development and use. Daily programming assignments and weekly lab exercises are required. Knowledge of theCHighly sought after for summer internships, full-time positions in software development and embedded systems.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Computer Programming I/UM114	Course Name / Course Code
Bologna	Academic System
C++	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
125 hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
1. Comprehensive treatment of problem-solving skills independent of	

any particular language.
2. Procedural/Algorithmic Program Development. We do not believe that a long and thin course such as this can also support object-oriented concepts, and our commitment is to strong fundamental learning. We expect the Level 2 curriculum to introduce the principles of object-oriented programming.
3. An awareness of the role of programming in the broader software engineering context, along with more general attitudes and study skills appropriate to computing science.
4. To recognise the complexity of this subject, the requirements for progression to Level 2 have been set higher than the standard pass requirements. In this way, good performance is rewarded, even if we do not view the candidate as having the skills to progress.

Learning outcomes

Students will learn:

1. The basics, fundamental ideas and concepts needed to succeed in any programming language..
2. How to write a computer program and learn how to make the computer understand it.
3. Explaining pseudocode and its role in programming.
4. Explain basic computer data structures such as arrays, lists, stacks, and queues..
5. Explore how to make real-world programming easier, from libraries to frameworks, to SDKs and APIs.

Teaching and learning methods

The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by looking at the types of simple experiments that involve some sampling activities that interest students.From exceptto I amDAFor evilHATo look atY With helpAndAFor lispoRahAWhiteandAnd "Da"So What?"To clarifyAFor the curriculum (AExampleandWhat?RYen) AndYou will useorABooksAFor methodologyAndYou will useorATo learnAFor electricityandI amAndNoToolsAFor digital For trainingRYesAFor my number.

Evaluation methods
For evaluation purposes, it is used. 7. Quick and surprise tests method 8. Determine some homework 9. Midterm exams 10. Report writing

Course structure	
weeks	**Material covered**
Week 1	Introduction, The Rules of Programming Languages.
Week 2	Working with Data, Creating and Naming Variables
Week 3	Using Variables and Operators
Week 4	Choosing and Using Data Types, Applying Data Types
Week 5	Creating Constants, Exploring Language Differences
Week 6	Managing Program Flow
Week 7	Mid-term + Making Choices and Conditions
Week 8	Quiz 1
Week 9	Creating Complex Conditions and Creating Loops
Week 10	Creating Functions, Returning Values and Using Parameters
Week 11	Using Recursion, Creating and Using Composite Data Types
Week 12	Arrays and Collections
Week 13	Introducing Object-oriented Programming
Week 14	Quiz 2
Week 15	Making Things Modular
Week 16	Preparatory week before the final exam

References
• Braunschweig, D. and Busbee, K. L. (2018). Programming Fundamentals – A Modular Structured Approach, 2nd Edition.

Course laboratories	
Computer Lab	
Weeks	Experiments
Week 1	C++ Examples
Week 2	C++ Examples
Week 3	C# Examples
Week 4	Java Examples
Week 5	JavaScript Examples
Week 6	Python Examples
Week 7	Python Examples

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course Description

Course Description
YGrant thisA The decisionStudents will learn the fundamentals of linear equations and matrices; functions, limits, and continuity; vector geometry; differentiation; applications of differentiation; integration; and applications of integration, including an introduction to first-order differential equations. After successful completion of this course.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Mathematics I/EE112	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
150 hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
Mathematics 1 aims to provide a comprehensive introduction to the mathematical concepts and techniques essential to the study of electrical engineering. During this course, students will develop a strong mathematical foundation that will support their understanding of advanced electrical engineering topics in later semesters. The main objectives of the course are: 1. Introduce students to the basic concepts of mathematics and coding. 2. Develop proficiency in algebraic manipulations and solving	

equations.
3. Introduce students to the concepts of sets, intervals, and inequalities.
4. Provide an understanding of analytical geometry.
5. Provide an understanding of trigonometric functions and their applications.
6. Introducing students to the basic concepts of differentiation and the laws of differentiation on different mathematical functions.
7. Introduce students to the basic concepts of linear algebra.

Learning outcomes

Students will be able to:

1. Understand the basic concepts related to this.The decision
2. Learn the concept of mathematical functions and related mathematical operations.
3. Understand how to represent mathematical functions and equations graphically.
4. Understanding trigonometric functions and their applications.
5. Learn the concept of differentiation and the laws of differentiation on different mathematical functions.
6. Understand how differentiation applies to various engineering applications in general and applications related to electrical engineering in particular.

Teaching and learning methods

The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by looking at the types of simple experiments that involve some sampling activities that interest students.From exceptto I amDAFor evilHATo look atY With helpAndAFor lispoRahAWhiteandAnd "Da"So What?"To clarifyAFor the curriculum (AExampleandWhat?RYen) AndYou will useorABooksAFor methodologyAndYou will useorATo learnAFor electricityandI amAndNoToolsAFor digital For trainingRYesAFor my number.

Evaluation methods

For evaluation purposes, it is used.

11. Quick and surprise tests method

12.Determine some homework
Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Introduction to calculus, Equations and solution methods, Elements and Sets, Real Numbers and The Real Line, Interval, Union and Intersections of Intervals, and Inequalities.
Week 2	Analytical Geometry: Distance between points, Slope and equation of Line, Point Slope Equation, The Distance from Point to a Line, and Angles between two Lines.
Week 3	Assignment + Quiz + Functions: Definition, Domain and Range of Functions, Absolute Value Function, The Greatest Integer Function, and Composition of Functions.
Week 4	Graph of Functions: Symmetry Test for Graphs, Shifting, Shrinking and Stretching.
Week 5	Assignment + Trigonometric Functions: Definition and Identities of Trigonometric Functions, Graph of Trigonometric Functions.
Week 6	Quiz + Derivatives: Definition, Derivatives by the Limits, Laws of Derivatives, and Second and Higher Order Derivatives
Week 7	Implicit Differentiation and the Quotient rule for Derivatives.
Week 8	The Chain Rule, Derivative of Parametric Equations, and Derivative of Trigonometric Functions.
Week 9	Assignment + Quiz + Applications of Derivatives, Analysis of Functions: Increase and Decrease, Concavity and Inflection Points, Horizontal and Vertical Asymptotes, and Oblique Asymptotes
Week 10	Mid Term + Matrices: Introduction to Matrices: Definition and notation of matrices, matrix elements, dimensions of a matrix, special types of matrices (square, rectangular, row vector, column vector)
Week 11	Matrices: equality of matrices, Matrix Operations: Addition and subtraction of matrices, scalar multiplication, matrix multiplication, Matrix determinant, Matrix Inverses, Matrix transpose.
Week 12	Assignment + Matrices: Systems of Linear Equations and Cramer's rule.
Week 13	Quiz + Limits and Continuity: Introduction, Definition, and Properties of the Limits.
Week 14	Right-hand limits and left-hand limits, Limit Involving Infinity, Continuous Function, and Algebraic properties of continuous functions.
Week 15	Review and solve related problems.
Week 16	Preparatory week before the final exam

References

- GEORGE B. THOMAS, JR. “Calculus”, 14th edition, Cenveo® Publisher Services, 2018.
- Anthony Croft, Robert Davison, Martin Hargreaves, and James Flint “Engineering Mathematics, A Foundation for Electronic, Electrical, Communications and Systems, Engineers”, Pearson Education, 2017.

Course laboratories
No Prerequisites

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course Description

Course Description
It is doneExplains many basic topics such as the atom, models, the wave nature of light, and Heisenberg's uncertainty principle. Explains the electrical, mechanical, and magnetic properties of materials.. Semiconductor materials and their applications are explained. Different structures and applications of different diodes are then discussed. Explain the atomic structure of bipolar transistor(BJT)And its applications. Explanation of the atomic structure of the field effect transistor(FET)Metal-oxide semiconductor field effect transistor(MOSFET).Various applications of field effect transistor are explained.(FET)Field effect transistor MOSFET. Main objectivesFor the decisionIt is to develop an understanding of energy levels and atomic structure along with electrical and magnetic properties of metals. Also, the understanding of properties of semiconductors and their applications are discussed. After that, different types of diodes structure and their applications are developed. Finally, transistors are introduced.BJTandFETandMOSFETWith its applications.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Basic physics / EE113	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
125hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives

1. To introduce the basic concepts of physics that provide the basis for further study of materials, structures, mechanics and electronics at the level necessary to begin an engineering degree programme.
2. Strengthen the common knowledge base and begin developing the appropriate learning methodology for the engineering degree program.
3. Demonstrate your understanding of the basics of physics.
4. Apply basic concepts in the analysis of mechanical, electrical and thermal problems.

Learning outcomes

1. Introduction - Physical parameters; Dimensions and units; Scalar and vector quantities; Measurements; Conservation of energy
2. Statics - (including forces and moments)
3. material structure
4. Thermal properties and heat transfer
5. Electrical properties

Teaching and learning methods

The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by considering the types of simple experiments that involve some sampling activities that interest students. By presenting theoretical explanations with the help of the whiteboard and “data show” to illustrate the approach (examples and exercises), using textbooks, and using e-learning and digital tools for digital teaching.

Evaluation methods
For evaluation purposes, it is used. 13. Quick and surprise tests method 14. Determine some homework Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Semiconductor introduction
Week 2	Energy band
Week 3	SI and Ge properties'
Week 4	Crystal structure of SI and Ge
Week 5	Mobility in Semiconductor
Week 6	Doping in Semiconductor
Week 7	Types of Semiconductor
Week 8	Drift and diffusions' current in semiconductor
Week 9	PN junction characteristics
Week 10	diode
Week 11	Load line analysis for diode
Week 12	Diode models
Week 13	Type of diode
Week 14	Series and parallel diode configuration
Week 15	Gates of diode
Week 16	Preparatory week before the final exam

References
1. Electronic devices and circuitsR.L.Boylstad(PearsonIndia)
2. Electronic Principles- APMalvino (Tata McGrawHill)
3. Principles of Electronics- V. K. Mehta and Rohit Mehta (S. Chand Publication)

Course laboratories	
Weeks	Experiments

Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course Description

Course Description
Analysis of single phase AC circuits: reactance and impedance, conductivity - impedance andAdmission, Phase Diagram, Series-Parallel and Series/Parallel Circuits, Power Calculation in AC Circuits, Power Factor and Power Factor Correction. Complex number and its applications to AC circuits: Equivalent impedance: Series - Parallel - Series/Parallel - Delta and Star connections Introduction to network theories, Kirchhoff's lawsKVL - KCLMaxwell's circular currents (network analysis), nodal analysis, superposition theory,

Thevenin's theorem, Norton's theorem, maximum power transfer theory, Millman's theorem, substitution theory, reciprocity theory, power calculation (combined power)
Resonance: Quality factor - Selectivity - Half power - Frequency and bandwidth, Parallel resonance: Quality factor - Selectivity - Half power - Frequency and bandwidth, Series/Parallel resonant circuits.
Magnetic circuit: Magnetic field, Direction of magnetic field, Properties of magnetic field lines, Magnetic field due to electricity, Magnetic field in a coil, Force in a current carrying conductor through a magnetic field, Left hand rule, Magnitude of force, Electromagnetic induction, Faraday's law, Right hand rule, Magnitude of induced electromagnetic force, Magnitude of electromagnetic force in a coil, Magnetic field strengthmmfMagnetic constants, reluctance, magnetic leakage and fringing, magnetic factors, magnetic circuit:Consecutive-ParallelismConsecutive/ Parallelism, Kirchhoff's laws for magnetic circuit, Hysteresis and factors on its loop, Hysteresis loss and Eddy current loss, Minimum size condition of permanent magnet, Load line of permanent magnet, Force between two magnetic poles, Magnetic attraction between two iron surfaces

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Basics of Electrical EngineeringII/EL121	Course Name / Course Code
Bologna	Academic System
multisim	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
200hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives

1. Develop problem solving skills and understand the shape of an AC wave..
2. Understanding the meaning of voltage or current changing with time.
3. Dealing with sine and vector current.
4. Introducing the concept of impedance and circuit admittance.
5. Understanding Kirchhoff's Current and Voltage Laws.
6. Perform network and node analysis.
7. Apply Thevenin-Norton Theorem, Superposition and Maximum

Power Transfer to Find Different Electrical Quantities.
8. Understanding three phase voltage generation.

Learning outcomes

1. Description of the characteristics and definitions of alternating sinusoidal voltage.
2. Presentation of the general form of voltage and sinusoidal current.
3. Explain the phase relationship.
4. Understanding the terms: average value and effective value(RMS).
5. Explain the response of the elementsRandLandCFor voltage and sine current.
6. Determine average power and power factor
7. AC circuit solutionThe sequenceAnd parallelThe sequence-Parallel.
8. Network analysis explanation in AC circuit with and without power source.
9. Explanation of complex analysis in an AC circuit with and without a current source
10. Star-Delta and Delta-Star Conversion
11. Introduce source transformation and superposition theory to find a solution for a network with two or more sources.. .
12. Understand Thevenin's Theorem to provide an equivalence circuit for any given terminal of the circuit.. .
13. Understand Norton's theorem to provide an equivalence circuit for any given terminal of the circuit..
14. Use Thevenin's Theorem and Norton's Theorem to find the maximum power transfer to the load..
15. Explanation of substation theory, inverter theory and Millman's theory.
16. Determine AC power, triangle power and total power.PandQandS.
17. Understanding Power Factor Correction
18. Introducing the concept of series and parallel resonant circuit.
19. Three phase circuits presentation

Teaching and learning methods

The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by looking at the types of simple experiments that involve some sampling activities that interest students.From exceptto I amDAFor evilHATo look atY With helpAndAFor lispoRahAWhiteandAnd "Da"So What?"To clarifyAFor the curriculum (AExampleandWhat?RYen) AndYou will

useorABooksAFor methodologyAndYou will useorATo learnAFor electricityandI amAndNoToolsAFor digital For trainingRYesAFor my number.

Evaluation methods
For evaluation purposes, it is used. 1. Quick and surprise tests method 2. Determine some homework 3. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Basic concepts of AC circuit: definition, general format for sinusoidal voltage or current, phase relations,
Week 2	Average value, effective value, response of basic R, L, and C elements to a sinusoidal voltage or current.
Week 3	Series AC circuits, Kirchhoff's voltage law and voltage divider.
Week 4	Parallel resistance Kirchhoff's current law and current divider. Equivalent circuits
Week 5	Series – parallel network, ladder network, Star-delta connection.
Week 6	Methods of analysis: Mesh Analysis
Week 7	Mid-term Methods of analysis: Nodal Analysis,
Week 8	Circuit theorems: superposition theorem, source transformation
Week 9	Circuit theorems: Thevenin,s theorem
Week 10	Circuit theorem: Norton's theorem
Week 11	Circuit theorem: Maximum power transfer theorem, substitution theorem, reciprocal theorem and Millman's theorem
Week 12	Three phase system
Week 13	Power in balanced three phase system
Week 14	unbalanced three phase system
Week 15	Three phase power measurement
Week 16	Preparatory week before the final exam

References
Charles k. Alexander, and Matthew NO Sadiku, •

"Fundamentals of Electrical Circuits"
Boylestad, "Introductory Circuit Analysis" •

Course laboratories	
Foundations Lab	
Weeks	Experiments
Week 1	Introduction: oscilloscope instrument and use it to display alternating waveform and measurement of frequency, voltage, and phase shift.
Week 2	Response of pure R, L, and C elements to sinusoidal voltage
Week 3	Frequency response of series RC circuit
Week 4	Frequency response of parallel Rl circuit
Week 5	Phase measurement by Lissajous pattern

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course Description

Course Description
In this course will be studiedElectrical conductivity in electrolytes: The ability of electrolytes to conduct electricity based on the movement of charged particles in solution due to the presence of ions. Electrolyte conductivity measurements,Measurement of the electrical conductivity of electrolytes by passing an electric current through them, using two electrodes placed in the solution. Degree of dissociation of electrolytes in solution: A measure of the degree to which an electrolyte solute dissociates into ions in solution, expressed as a percentage. Number of ions transported: The fraction of the total current carried by a given ion in a solution containing multiple ions, used to calculate ion transport rates and predict the behavior of a solution. Oxidation and reduction: Processes in which an atom or molecule loses or gains electrons, respectively. Critical in energy conversion, biological processes, and industrial processes such as corrosion and metallurgy

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Chemistry /EE123	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
75hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
To introduce and develop the basic concepts of physical chemistry, especially those of importance in chemical engineering processes. 1. Energy conservation in closed, open and interacting systems. 2. Understanding the phase behavior of materials and how to use the phase rule. 3. Understand the concepts of chemical potential, ideal and non-ideal conditions, and activity coefficients.. 4. Calculate changes in enthalpy, entropy, Gibbs free energy, and equilibrium constants for chemical reactions.. 5. Understand the basic principles of electrochemistry.. 6. Understand the basic principles of physical chemistry of interfaces.	

Learning outcomes
1- Understanding the conductivity and behavior of electrolytes 2- Description of strong and weak ions and their conductivity behavior 3- Calculate conductivity, resistance and cell constant of electrolyte solutions 4- Understanding the principles of conductivity measurement using conductivity sensors. 5- Description of conductivity sensor types and their applications 6- Use conductivity measurements to determine the concentration of electrolyte solutions.. 7- Determine and calculate the degree of dissociation for a given solution 8- Understand the effect of concentration, temperature, and pressure on the dissociation of electrolyte solutions.. 9- Determine the transition number and relate it to the movement of ions in electrolyte solutions. 10- Description of methods for measuring the transition number. 11- Understand the concepts of oxidation and reduction and their relationship to electron transfer. 12- Identifying oxidizing and reducing agents in chemical reactions 13- Apply the concepts of oxidation and reduction to balance oxidation-reduction equations and predict spontaneous oxidation-reduction reactions.

Teaching and learning methods
The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by looking at the types of simple experiments that involve some sampling activities that interest students.From exceptto I amDAFor evilHATo look atY With helpAndAFor lispoRahAWhiteandAnd "Da"So What?"To clarifyAFor the curriculum (AExampleandWhat?RYen) AndYou will useorABooksAFor methodologyAndYou will useorATo learnAFor electricityandI amAndNoToolsAFor digital For trainingRYesAFor my number.

Evaluation methods
For evaluation purposes, it is used. 4. Quick and surprise tests method 5. Determine some homework 6. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Introduction in Electrochemistry, Additionally, electrochemistry plays a vital role in the synthesis of materials
Week 2	Overall, electrochemistry is a fascinating field of study that has a wide range of applications and continues to be an active area of research and development.
Week 3	Electric conductance in electrolytes measures how well electrolytes conduct electricity. Factors affecting it include concentration, temperature and ionic mobility.
Week 4	The measurement of conductivity of electrolytes involves the use of a conductometer to measure the flow of electric current through the solution.
Week 5	Conductivity measurements can be used to determine parameters such as molar conductance, equivalent conductance and ion concentration.
Week 6	The degree of dissociation of electrolytes in a solution is a measure of the extent to which they break down into ions.
Week 7	can be determined experimentally by measuring the conductivity of a solution of known concentration and comparing it to the conductivity of a similar solution of a non-electrolyte.
Week 8	The degree of dissociation is affected by factors such as temperature, concentration, and the nature of the electrolyte.
Week 9	It is an important parameter in determining the properties and behavior of electrolyte solutions.
Week 10	Transference number of ions is a measure of the mobility of a particular ion in an electrolytic solution. It represents the fraction of the total electrical current carried by that ion.
Week 11	The transference number can be experimentally determined by measuring the current carried by a single type of ion in a solution of known concentration and comparing it to the total current carried by all ions in that solution.
Week 12	The transference number is dependent on factors such as the nature and concentration of the electrolyte, as well as the temperature and pressure. It is used in various fields.
Week 13	Oxidation and reduction reactions involve the transfer of electrons from one substance to another.
Week 14	Oxidation is the loss of electrons, while reduction is the gain of electrons. These reactions commonly involve the transfer of oxygen atoms or hydrogen atoms, hence the term "redox" (reduction-oxidation).
Week 15	Oxidation and reduction reactions are fundamental in many chemical and biological processes. Examples include combustion, photosynthesis,

Week 16	Preparatory week before the final exam

References
• The degree of Dissociation of Electrolytes in Solution: P. Atkins and J. de Paula, "Physical Chemistry," 11th ed. Oxford University Press, (2017), Electronic Principles-APMalvino (Tata McGrawHill) • Physical Chemistry by Peter Atkins and Julio De Paula, Chapter 11, Oxford University Press, 2017,

Course laboratories	
No Prerequisites	
Weeks	Experiments
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course Description

Course Description
In this course will be studied Rest, Force System, Unit System, Parallelogram Law, Force + Components, Resultant of Plane Forces, Components of Force in Space, Moment of Force, Moment of Coupling, Equilibrium, Free Body Diagram, Planar System, Analysis of Beams, Friction, Nature of Friction, Theory of Friction, Coefficient of Friction, Center of Gravity and Center of Gravity, Center of Gravity of Area, Center of Gravity Determined by Integration, Moment of Inertia, Parallel Axes Theory, Moment of InertiaSecond semester for the area by integration, radius of gyration, moment of inertia of the complex area. Dynamics: Particle motion, Rectilinear motion, Curvilinear motion, Rectangular components of curvilinear motion, Perpendicular and tangential components of acceleration, Force dynamics, Mass and acceleration, Particle dynamics, Newton's second law. Thermodynamics: Introduction, Efficiency and its specifications, Work and heat in ideal gases and steam, First law of thermodynamics, Experimental law in steam and gases, LawSecond semester of thermodynamics practical law in steam and gases. Strength of materials: Hooke's law, tensile and compressive stress, thin-walled cylinders and spheres, composite stress (Moore's circle), shear and vertical stress, stress in beams (primary principle). *Workshop skills The workshop training program is designed to meet the following: Objectives To teach site safety rules and regulations in an industrial environment Proper use of work tools, equipment and machinery Introduce basic workshop practices, production, labor and time requirements for workshop operations. Students are introduced to training programs in six workshops: welding, forming, turning and milling, carpentry and casting. The student is required to spend 4 hours of training

in each workshop

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Engineering mechanics and workshops /EE125	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
125hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives

1. Application of the principles of mechanics to practical engineering problems.
2. Identify an appropriate structural system to study a particular problem and isolate it from its environment..
3. Teaching site safety rules and regulations in an industrial environment and the proper use of work tools, equipment and machinery.
4. Provides basic workshop practices, production, labor and time requirements for workshop operations..
5. Develop a simple mathematical model for engineering problems and perform static analysis..
6. Perform kinetic and dynamic analyses of particles and particle systems.

Learning outcomes

This course is essential in all branches of engineering as it provides students with the general fundamentals of engineering science. By completing this course, students will be able to:-

1- Understanding how the world works, both natural and man-made..
2- Understanding physical principles, such as forces, motion, and equilibrium, which are of critical importance to any engineer..
3- Gain a good knowledge of site safety rules in an industrial environment and increase knowledge about the use of work tools, devices and machines.
4- Provide a general guide to troubleshooting..
5- Show how to analyze power systems..
6- Introducing the concept of free body diagram and equilibrium

equation.
7- Provide specific applications for friction force analysis..
8- Study and classification of the motion of particles and solids.
9- Know the basics of thermodynamics.
10- Know the basics of strength of materials

Teaching and learning methods
1. Encourage students to learn by explaining the importance of mechanical engineering to their studies and future careers.. 2. Stimulating the spirit of competition among students. 3. Use engaging visual examples to draw students' attention to details.. 4. Increase exercise on weak points.. 5. Maintaining a ray of hope for vulnerable individuals through the constant opportunity to overcome failure.

Evaluation methods
For evaluation purposes, it is used. 7. Quick and surprise tests method 8. Determine some homework 9. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Introduction to mechanics: Basic Concepts, Scalars and Vectors, Newton's Laws, SI units, Problem Solving in Statics.
Week 2	Force systems: two- (Rectangular Components, Moment, Couple, Resultants)
Week 3	Force systems: two- (Rectangular Components, Moment, Couple, Resultants)
Week 4	Equilibrium: Free-Body Diagram
Week 5	Equilibrium: Free-Body Diagram
Week 6	Centroids and center of gravity
Week 7	Mid-term exam
Week 8	Centroids of area
Week 9	Kinematics of Particles and rigid body

Week 10	Kinematics of Particles and rigid body
Week 11	Kinetics of Particle and rigid body (Force and Acceleration)
Week 12	Kinetics of Particle and rigid body (Force and Acceleration)
Week 13	Kinetics of Particle and rigid body (Force and Acceleration)
Week 14	Hook's law, tension and compression stress
Week 15	Hook's law, tension and compression stress
Week 16	Preparatory week before the final exam

References
• "Engineering Mechanics-Statics and Dynamics", R. C. Hibbeler, 14th edition • "Engineering Mechanics-Statics and Dynamics", JL Meriam and LG Kraige, 8th edition

Course laboratories	
Engineering workshops	
Weeks	Experiments
Week 1	Workshop welding
Week 2	Workshop turning
Week 3	Workshop carpentry
Week 4	Workshop casting
Week 5	
Week 6	
Week 7	

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted

50	Maximum number could be accepted

Course Description

Course Description
This semester includes the following topics: Introduction toMATLAB, create variables, some functionsMATLABUseful, Data Types. Text Files. Introduction to Array Graphing. Input Statements Output Statements. Conditional Statements: Logical Operators, Conditional Statements:ifandelseandelse/ifConditional structures :SwitchLoop Structure: Introduction to Loops Loop Structure: LoopsForRepetition structure: loopsWhile.nested ringsBreaksRepetition Structures: Nested Loops and the StatementBreak.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
computer programmingII/EL124	Course Name / Course Code
Bologna	Academic System
matlab	Programs Included
Actual attendance	Learning Method

Second semester/ 2024-2025	Semester / Year
125hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives

1. Transferring knowledge to students using the programMATLAB.
2. This enhances programming knowledge in research and development..
3. Provides a practical introduction to the technical computing environment.MATLAB. [Data Analysis, Visualization, and Programming Topics].
4. Introduce students to the use of a high-level programming language,MATLAB. Solving scientific problems using applications and examples from engineering..
5. Ability to design script files inMATLABWith interactive input and output, taking advantage of arithmetic expression repetition, decision-making capabilities, and vector and matrix analysis..
6. Gain practical programming skills usingMATLAB.
7. 6. Develop industry standard software techniques to model and solve specific engineering problems using currently available software,MATLAB, andSimulink

Learning outcomes

After successfully completing this unit, students will be able to::

- Performing arithmetic operations on scales, vectors, and matrices.
- Ability to design textsMATLABWith interactive input and output.
- Utilize iterations of arithmetic expressions, decision statements, and various operations on matrices..
- Create 2D and 3D charts of mathematical functions and data.
- Solve a number of different problems. Learning outcomes Graduation skills.
- Writing assignments and textsMATLABTo solve engineering problems in various fields.
- Evaluate advanced modeling and analysis techniques to solve practical and complex design problems.

Teaching and learning methods

Think-Pair-Share: Incorporate think-pair-share activities where students individually think about a programming problem or concept, collaborate with a classmate to discuss their ideas, and then share their ideas with the larger class..

This encourages critical thinking, collaboration and active participation..

Case-based learning: Provides real-life case studies or scenarios that require students to analyze, design, and implement Python solutions. This enhances
Problem solving skills, critical thinking and application of programming concepts
On practical situations.

Code Review Sessions: Conduct code review sessions where students present
They code in class, explain their thinking process, and ask for feedback. This promotes critical thinking, analysis of code quality, and exchange of constructive feedback..

Tests and Assessments: Incorporate regular tests and assessments to assess students' understanding of Python concepts, grammar, and problem-solving skills. Use online platforms or interactive tools that provide immediate feedback to enhance engagement and promote self-assessment..
Group Projects: Assign students group projects that require collaboration in developing an application.Python or solve a programming problem. This encourages teamwork, division of tasks and coordination, while applying their programming skills.

Homework: Assign students regular programming exercises and projects as homework. Encourage students to actively apply the concepts they have learned in class to real-world scenarios. Provide constructive feedback on their presentations to promote improvement and reinforce learning.

Evaluation methods
For evaluation purposes, it is used. 10. Quick and surprise tests method 11. Determine some homework 12. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	MATLAB basics - The MATLAB environment - Basic computer programming

Week 2	MATLAB basics - Variables and constants, operators and simple calculations
Week 3	MATLAB basics - Formulas and functions - MATLAB toolboxes
Week 4	MATLAB Matrices and Vectors - Matrix and linear algebra review - Vectors and matrices in MATLAB
Week 5	MATLAB Matrices and Vectors - Matrix operations and functions in MATLAB
Week 6	MATLAB programming - Algorithms and structures - MATLAB scripts and functions (m-files)
Week 7	MATLAB programming - Simple sequential algorithms - Control structures (if…then, loops)
Week 8	Mid Term Exam.
Week 9	MATLAB programming - Nested Loops Breaks, Repetition Structures: Nested Loops and the Break Statement
Week 10	MATLAB programming - Reading and writing data, file handling - Personalized functions - Toolbox structure
Week 11	MATLAB graphic functions
Week 12	MATLAB Numerical simulations - Numerical methods and simulations
Week 13	Random number generation - Monte carlo methods
Week 14	Hands-on session Interactive hands-on-session where the whole class will develop one or more MATLAB scripts that solve an assigned problem
Week 15	Review and solve related problems.
Week 16	Preparatory week before the final exam

References

١- MATLAB Handbook with Applications to Mathematics, Science, Engineering, and Finance Jose Miguel David Baez-Lopez, David Alfredo Baez Villegas

٢- MATLAB Commands and Functions(Dr. Brian Vick) (Alfio Quarteroni • Fausto Saleri •Paola Gervasio) Scientific Computing with MATLAB and Octave

٣- INTRODUCTION TO MATLAB FOR ENGINEERING STUDENTS David Houcque Northwestern University (version 1.2, August 2005)

Course laboratories

Computer lab

Weeks	Experiments
Week 1	Experiment No. (1) Introduction to MATLAB, Starting and Quitting MATLAB, Desktop Tools, Basic Commands, Practical Exercises
Week 2	Experiment No. (2) Working with Matrices, Entering Matrix, Subscripts, Basic Matrix Functions, Practical Exercises
Week 3	Experiment No. (3) Expressions, Variable, Numbers, Arithmetic Operators, Functions, Practical Exercises
Week 4	Experiment No. (4) Relational and Logical Operations, Relational Operations, Logical Operation, Bitwise Operation, Logical Functions, Practical Exercises
Week 5	Experiment No. (5) Plotting Function, Creating a Plot Using Plot Function, Adding Plots to an Existing Graph, Multiple Plots in One Figure, Setting Axis Limits, Axis Labels and Titles, Input/Output of Variables (Numbers and Strings), Practical Exercises
Week 6	Experiment No. (7) Flow Control (if, else, switch, for, while, nested loops)
Week 7	Experiment No. (8) MATLAB Simulink Basic, Starting Simulink, Basic Elements, Building a System, Gathering Blocks, Modifying the Blocks, Connecting the Blocks, Running Simulations

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course Description

Course Description
Introduces students to the philosophical and political background of the concept of human rights. Discusses important documents as part of the history of the development of human rights theories. Examines important issues in current political and ethical debates on human rights. Reviews basic legal documents and the work of the most important governmental and non-governmental institutions currently involved in the protection and promotion of human rights. Examines at least one of the current problem areas in the protection of human rights

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Human rightsUM126	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
75hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives

1. Gain an understanding of the philosophical and political backgrounds that underpin the concept of human rights, enabling students to understand the multifaceted nature of this complex field..
2. To identify important historical documents that contributed to the development and formation of human rights theories, and to enrich their knowledge of the history and development of human rights..
3. Engage in critical examination and discussion of current political and ethical debates surrounding human rights, promote critical thinking and encourage students to form their own views on these issues..
4. Study key legal documents and understand the work of critical governmental and non-governmental institutions currently involved in the protection and promotion of human rights. This objective aims to make students aware of the global landscape of human rights protection and how it works..
5. Conduct a detailed examination of at least one current problem area in human rights protection, providing a practical application of knowledge and giving students a deeper understanding of the complexities and challenges facing human rights protection.
6. To promote understanding and appreciation of the importance of human rights in all areas of life, including engineering, while highlighting the importance of ethical considerations in the technical professions..

Learning outcomes

1. Understand the historical, philosophical and political context of

human rights, and appreciate the complexities and dimensions of the concept..
2. Identify important historical documents and milestones that contributed to the development of human rights theories and their role in shaping the current understanding of human rights..
3. Analyze and articulate positions on contemporary political and ethical debates about human rights, demonstrating critical thinking skills and a broad understanding of the issues..
4. Identify and understand the roles of key governmental and non-governmental institutions in promoting and protecting human rights, and demonstrate awareness of the broader global landscape of human rights advocacy.
5. Analyze a specific and current problem area in human rights protection, apply theoretical knowledge to real-world situations and demonstrate problem-solving skills.
6. Appreciate the importance and necessity of human rights considerations in their field of study, electrical engineering, and the broader engineering context..
7. Demonstrate an understanding of the ethical responsibilities and potential impacts of engineering projects on human rights, and prepare them to consider these factors in their future professional practice..
8. Demonstrate competence in researching, analysing and articulating arguments relating to human rights, and demonstrate development in academic skills applicable outside this specific unit.

By achieving these learning outcomes, students will not only have a strong fundamental understanding of human rights and their relevance to their discipline, but will also gain critical thinking and problem-solving skills.

Teaching and learning methods

1. Lectures: Traditional lectures will be used to introduce basic concepts, providing students with a strong theoretical foundation in the philosophical and political backgrounds of human rights, the history of human rights theories, and the role of different institutions in protecting and promoting human rights..
2. Interactive discussions: To facilitate critical thinking and engagement, class sessions often include interactive discussions. These discussions may revolve around analysis of important historical documents, current debates on human rights issues, or case studies of specific problem areas in human rights protection..
3. Group Projects: Students will work in groups to analyze a specific

problem in human rights protection, encouraging teamwork, fostering a deeper understanding of the issue, and enabling students to apply theoretical knowledge to practical scenarios..

4. Research assignments: Individual or group assignments may require students to conduct research on a specific topic related to human rights. This encourages independent learning, develops research skills, and deepens their understanding of the subject..
5. Online Resources: Taking advantage of online resources, such as academic articles, video lectures, podcasts, or documentaries, can supplement course material and provide different perspectives on the topic..

Evaluation methods
For evaluation purposes, it is used. 13. Quick and surprise tests method 14. Determine some homework 15. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Introduction to the course: Overview of the module, its objectives, and learning outcomes. Introduction to the concept of human rights.
Week 2	Philosophical Background: An exploration of the philosophical principles that underpin the concept of human rights.
Week 3	Political Background: Discussion on the political history and influences on the development of human rights.
Week 4	Key Documents in Human Rights - Part I: Overview and analysis of significant historical documents related to human rights.
Week 5	Key Documents in Human Rights - Part II: Continued analysis of crucial historical documents, including their role in shaping current human rights theories. +Quiz
Week 6	Institutions and Human Rights: Examination of the roles of major governmental and non-governmental institutions in human rights protection.
Week 7	Midterm Exam
Week 8	In-depth study of current political and ethical debates in human rights - Part II: Continued discussion and analysis of contemporary debates, encouraging students to articulate positions.
Week 9	Guest Lecture: Inviting a practitioner in the field to provide real-world insights.
Week 10	Begin Group Project: Introduction of a specific current problem area in human rights protection for group projects. +Quiz
Week 11	Group Project Work: Class time allocated for group work on the project, with the instructor available for consultation and guidance.

Week 12	Group Project Presentations: Each group presents their analysis and proposed solutions to the class.
Week 13	Human Rights and Engineering - Part I: Introduction to the intersection of human rights and engineering.
Week 14	Human Rights and Engineering - Part II: Detailed exploration of case studies showcasing the impact of engineering projects on human rights.
Week 15	Course Review and Reflection: Review of the main topics covered in the course, discussion of the relevance of human rights to future careers in engineering, and submission of reflection papers.
Week 16	Preparatory week before the final exam

References
• Donnelly, J. (2013). Universal Human Rights in Theory and Practice. Cornell University Press. • Langlois, A. J. (2018). Human Rights: Protection and Promotion in the 21st Century. Routledge. • https://www.ohchr.org/

Course laboratories	
No Prerequisites	
Weeks	Experiments
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be

	accepted

Course Description

Course Description
The following topics will be covered in this:AThe decision: •Partial differentiation, chain rule, gradient, directional derivatives, tangent planes, Jacobian, Differentials, Linear Integrals, Divergence and Curling, Extreme Values and Lagrange Multipliers. •Second order linear differential equations and their applications. •Fourier series. •Double and triple integrals: area elements, changing order of integration, polar coordinates, Volume elements, cylindrical and spherical coordinates. •Eigenvalues, Eigenvectors and Their Applications. •Laplace Transforms. •Statistics: approximation of expectations, characteristic functions, random vectors (joint distributions, Marginal distributions, expectations, independence, and covariance), and relating data to probability models.(Sample mean and variance, rank statistics and empirical distribution function, and convergence Random variables, law of large numbers, point estimation, central limit theorem, and error limits Confidence interval, sample size calculations, and probability).

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Mathematics II/EE122	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
150hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
Mathematics 2 aims to introduce students to the concept of integration and its importance in electrical engineering. Students will learn different methods of integration and applications of definite integrals and	

numerical integration. In addition, transcendental functions, complex numbers and polar coordinates will be covered in Mathematics 2. The unit objectives can be concluded as follows:

1. Introduce students to the concept of integration and how to solve related problems..
2. Identify different integration techniques and use them correctly to find integrals of different functions..
3. Understand effective ways to use integrals in problems related to electrical engineering applications..
4. Understand how to work with complex numbers and use them with all the mathematical operations associated with them.

Learning outcomes

Students will be able to::

1. Understanding the concept of integration and its importance in engineering applications.
2. Demonstrate proficiency in performing basic integrations..
3. Apply integration techniques, including substitution, integration by parts, partial fractions, and trigonometric substitutions, to solve a variety of engineering problems..
4. Analyze and interpret the geometric and physical significance of definite integrals in the context of electrical engineering, such as calculating areas and volumes..
5. Use numerical integration techniques, such as the trapezoidal rule and Simpson's rule, to approximate definite integrals in practical scenarios..
6. Performing arithmetic operations with complex numbers and finding complex conjugates.
7. Convert equations between rectangular and polar forms.

Teaching and learning methods

The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by looking at the types of simple experiments that involve some sampling activities that interest students.From exceptto I amDAFor evilHATo look atY With helpAndAFor lispoRahAWhiteandAnd "Da"So What?"To clarifyAFor the curriculum (AExampleandWhat?RYen) AndYou will useorABooksAFor methodologyAndYou will useorATo learnAFor

electricityandI amAndNoToolsAFor digital For trainingRYesAFor my number.

Evaluation methods
For evaluation purposes, it is used. 16. Quick and surprise tests method 17. Determine some homework 18. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Integration: Indefinite Integrals, Rules for Indefinite Integrals, Integration of Trigonometric Functions.
Week 2	Solving Initial Value Problems with Indefinite Integrals, Definite Integrals, Rules for Definite Integrals.
Week 3	Assignment + Quiz + Techniques of Integration, Basic Integration Formulas by Substitution, and Integration by Parts.
Week 4	Tabular Integration, Trigonometric Integrals, and Definite Integrals of Odd and Even Functions.
Week 5	Assignment + Quiz + Integration by Trigonometric Substitutions.
Week 6	Integrating Rational Functions by Partial Fractions.
Week 7	Integration by Substitution and Integrating of the Roots.
Week 8	Mid Term + Numerical integration: Trapezoidal Rule and Simpson Rule.
Week 9	Application of Integrals: Area Under a Curve and Finding Area between two Curves.
Week 10	Volume of Solids of Revolution.
Week 11	Length of Plane curves and Area of Surface of Revolution.
Week 12	Assignment + Quiz + Transcendental Functions: Inverse Functions and Logarithmic Functions.
Week 13	Complex Numbers, Complex Numbers and Operations, Graphical Representation of Complex Numbers, and Polar Form of a Complex Number.
Week 14	Polar Coordinates: Definition of Polar Coordinates, Polar Equations and Graphs, Polar and Cartesian Coordinates, and Graphing Polar Coordinate Equations.
Week 15	Assignment + Quiz + Review and solve related problems.
Week 16	Preparatory week before the final exam

References

GEORGE B. THOMAS, JR. "Calculus", 14th edition, Cenveo® Publisher Services, 2018. • Anthony Croft, Robert Davison, Martin Hargreaves, and James Flint "Engineering Mathematics, A Foundation for Electronic, Electrical, Communications and Systems, Engineers", Pearson Education, 2017.

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Second stage

Course Description

Course Description
This section includes a description of the unit, amplifier design: linear amplifier characteristics and features, voltage gain, current gain, power gain, decibel scale, frequency domain characteristics, distortion, definition of small signal in transistor, bias circuits for linear amplification, voltage, current, power gain, input/output resistors, amplifier configurations: common emitter forBJT, common base and common pool, common source ofMOSFET, common gate, common drain. Differential and multistage amplifiers: pairMOSDifferential: Small signal operation, pairBJTDifferential, Differential amplifier with active load, Multistage amplifiers (voltage gain, current gain, etc...), Types of multistage amplifiers (cascade, etc...) Other two-terminal devices: Schottky diodes, power diodes, photocells, infrared transmitters, LCDs, solar cells. Pnpn Other devices: Description and operation of silicon controlled rectifier, diac, thyristor, angle relay, triac, unijunction transistor, phototransistors, photoisolators, programmable unijunction transistor.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
ElectronicII / **EL213**	Course Name / Course Code

Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
125 hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives
The aim of this course is to provide background on: - Loudspeaker design, specifically transistor-based loudspeakers.BJTandMOSFETUsed in discrete circuits and integrated circuits, i.e. microelectronic circuits. Some useful IC components based on these two transistors will be presented and analyzed. - The course also aims to cover differential and multistage amplifiers. - In this course also two other peripheral devices like Schottky diodes, power diodes etc are explained. - DecryptedPnPnAnd other devices and explain their operations.

Learning outcomes
- Identify the main circuit elements and draw the electronic circuit diagram corresponding to a physical set of standard electronic components. - Explain the characteristics and operations of bipolar transistors (BJTs). Expressing that the transistor is bipolar (BJT) is a circuit element and a link.PNIts terminals are called the emitter, base and collector. Polarization of the bipolar transistor (BJT) Using two sources and calculating different current and voltage values as well as the power dissipated in the transistor. - Definition of small signal in transistor. - Ability to know the amplifier configurations for both bipolar transistor (BJT) and field effect transistor (FET). - Explain the characteristics and operations of field effect transistors (FETs) and Explain the structure and types of field effect transistors (JFETs). - Ability to draw a transfer characteristic curve and explain forward conduction using this curve. - Explain the differences between transistors.D-MOSFETsand transistorsJFETs, as well as transistors.E-MOSFETsand transistorsJFETsThe similarity between transistorsD-MOSFETsand transistorsJFETs. - Ability to analyze each of the circuitsBJTandFETAC analysis, voltage gain, current gain, input resistance and output resistance calculation. - Identify and analyze differential and multistage amplifiers.

- Explain two other peripheral devices to students and enable them to use them in their lives.
- is being desecratedPnPnAnd other devices such as:DiacandGTOandTriac.

Teaching and learning methods
The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by looking at the types of simple experiments that involve some sampling activities that interest students.From exceptto I amDAFor evilHATo look atY With helpAndAFor lispoRahAWhiteandAnd "Da"So What?"To clarifyAFor the curriculum (AExampleandWhat?RYen) AndYou will useorABooksAFor methodologyAndYou will useorATo learnAFor electricityandI amAndNoToolsAFor digital For trainingRYesAFor my number.

Evaluation methods
For evaluation purposes, it is used. 15. Quick and surprise tests method 16. Determine some homework 17. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Introduction of amplification with transistors
Week 2	FETs: Basic Definitions, Junction Field-Effect Transistor (JFET)
Week 3	DC Biasing Circuits of JFETs
Week 4	MOSFETs: DEPLETION-TYPE MOSFET,
Week 5	ENHANCEMENT-TYPE MOSFET
Week 6	MOSFET Biasing
Week 7	Differential Amplifiers
Week 8	Multistage Amplifiers
Week 9	Multistage Amplifiers
Week 10	Multistage Amplifiers
Week 11	Mid-term exam
Week 12	Other Two Terminal Devices

Week 13	Other Two Terminal Devices
Week 14	Other Two Terminal Devices
Week 15	PnPn Devices and Others
Week 16	Preparatory week before the final Exam

References

- 1. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 9th Edition, Pearson Education / PHI, 2007.
- Millman J and Halkias .C., Integrated Electronics, TMH, 2007.
- S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, Electronic Devices and Circuits, 2 nd Edition, TMH, 2007. 29
- David A. Bell, Electronic Devices & Circuits, 4th Ediion, PHI, 2007

Course laboratories

Weeks	Experiments
Week 1	Introduction
Week 2	Diode characteristics
Week 3	Zener diode characteristics.
Week 4	P-N junction diode as half-wave rectifier.
Week 5	P-N junction diode as Full -wave rectifier.
Week 6	PN junction diode as full-wave bridge rectifier.
Week 7	clipping and clamping circuits.

Admission

No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course Description

Course Description
This section includes a description of the unit, and when studyingC++ languageIt will cover a variety of topics and concepts that will help you gain a solid understanding of the language and its applications. 1. C++ Programming: Basic grammar and semantics, variables, types, expressions, assignment, mathematical functions, logical and arithmetic operations, simple input and output, functions and parameter passing, procedural programming. 2. Control Structures: Control structures and conditionals, loops, sequences, selections, and iteration functions. 3. Basic data structures: primitive types, arrays, strings, stack and heap allocation. 4. Recursion: Divide and conquer strategies for recursive mathematical functions, recursive tracing.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Computer programming / **EL215**	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
100 hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
1. To Impart the Knowledge to the students with MATLAB software. [This enhances programming knowledge in Research and Development].	

2. To provide a working introduction to the Matlab technical computing environment. [Themes of data analysis, visualization, and programming].
3. To introduce students the use of a high-level programming language, Matlab. [Scientific problem solving with applications and examples from Engineering].
4. Ability to design scripts files in matlab with interactive Input and Output, utilizing arithmetic expression repetitions, decision making capabilities, analysing vectors and matrices.
5. Gain practical skills on programming using MATLAB.
6. To develop industry-standard software techniques to model and solve specific engineering problems using currently available programme, MATLAB, and Simulink

Learning outcomes

After successful completion of this module, students will be able to:

- Undertake arithmetic on scalars, vectors and matrices.
- Ability to design MATLAB scripts with interactive Input and Output.
- Utilizing arithmetic expression repetitions, decision making statements,

different operations on matrices.

- Create 2D and 3D plots of mathematical functions and data.
- Solve a number of various problems Graduate skills learning outcomes.
- Write MATLAB functions and scripts to solve engineering problems in

various fields.

- Evaluate advanced modelling and analysis techniques for the solution of practical and complex design problems.

Teaching and learning methods

The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by looking at the types of simple experiments that involve some sampling activities that interest students.From exceptto I amDAFor evilHATo look atY With helpAndAFor lispoRahAWhiteandAnd "Da"So What?"To clarifyAFor the curriculum (AExampleandWhat?RYen) AndYou will

useorABooksAFor methodologyAndYou will useorATo learnAFor electricityandI amAndNoToolsAFor digital For trainingRYesAFor my number.

Evaluation methods
For evaluation purposes, it is used. 18. Quick and surprise tests method 19. Determine some homework 20. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	MATLAB basics - The MATLAB environment - Basic computer programming
Week 2	MATLAB basics - Variables and constants, operators and simple calculations
Week 3	MATLAB basics - Formulas and functions - MATLAB toolboxes
Week 4	MATLAB Matrices and Vectors - Matrix and linear algebra review - Vectors and matrices in MATLAB
Week 5	MATLAB Matrices and Vectors - Matrix operations and functions in MATLAB
Week 6	MATLAB programming - Algorithms and structures - MATLAB scripts and functions(m-files)
Week 7	MATLAB programming - Simple sequential algorithms - Control structures (if…then,loops)
Week 8	**Mid Term Exam.**
Week 9	MATLAB programming - Nested Loops Breaks, Repetition Structures: Nested Loops and the Break Statement
Week 10	MATLAB programming - Reading and writing data, file handling - Personalized 5 functions - Toolbox structure
Week 11	MATLAB graphic functions
Week 12	MATLAB Numerical simulations - Numerical methods and simulations
Week 13	Random number generation – Monte carlo methods
Week 14	Hands-on session Interactive hands-on-session where the whole class will develop one or more MATLAB scripts that solve an assigned problem
Week 15	Review and solving related problems.
Week 16	Preparatory week before the final Exam

References
• MATLAB Handbook with Applications to Mathematics, Science, Engineering, and Finance Jose Miguel David Baez-Lopez, David Alfredo Baez Villegas • MATLAB Commands and Functions(Dr. Brian Vick) (Alfio Quarteroni • Fausto Saleri •Paola Gervasio) Scientific Computing with MATLAB and Octave • INTRODUCTION TO MATLAB FOR ENGINEERING STUDENTS David Houcque Northwestern University (version 1.2, August 2005)

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Experiment No. (1) Introduction to MATLAB, Starting and Quitting MATLAB , Desktop Tools, Basic Commands, Practical Exercises**
Week 2	**Experiment No. (2) Working with Matrices , Entering Matrix , Subscripts , Basic Matrix Functions , Practical Exercises**
Week 3	**Experiment No. (3) Expressions , Variable , Numbers , Arithmetic Operators , Functions , Practical Exercises**
Week 4	**Experiment No. (4) Relational and Logical Operations , Relational Operations , Logical Operation , Bitwise Operation , Logical Functions , Practical Exercises**
Week 5	**Experiment No. (5) Plotting Function , Creating a Plot Using Plot Function , Adding Plots to an Existing Graph , Multiple Plots in One Figure , Setting Axis Limits , Axis Labels and Titles , Input / Output of Variables (Numbers and Strings) , Practical Exercises**
Week 6	**Experiment No. (7) Flow Control (if , else , switch , for , while , nested loops)**
Week 7	**Experiment No. (8) MATLAB Simulink Basic , Starting Simulink , Basic Elements , Building a System , Gathering Blocks , Modifying the Blocks , Connecting the Blocks , Running Simulations**

Course Description

Course Description
This course covers the following topics: Steady State Sinusoidal Analysis Sine and phase analysis, mesh and nodal AC analysis, Thevenin and Norton AC analysis, superposition AC analysis, AC power calculation.

Circuit analysis in the fieldS, impedance andAdmission in the fieldSCircuit analysis in the fieldSTransient circuits, circuitsRCandRLandRLCIn series and parallel and their full response. Polyphase circuits, single phase three wire system, three phase balanced and unbalanced systems with star and delta connections, power in three phase circuits.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Electrical circuitsI/ **EL211**	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
125 hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
1. Understand that a current-carrying conducting coil induces a current in another coil due to the magnetic field produced by the first coil. 2. Relate an induced emf to a rate of change of magnetic flux and to mutual inductance for two coils with equal number of turn. 3. Understand the physics behind mutually coupled circuits and how to analyze circuits containing mutually coupled inductors. 4. Understand how linear transformers work and how to analyze circuits containing them. 5. Understand how ideal transformers work and how to analyze circuits containing them. 6. Understand how ideal auto transformers work and know how to analyze them when used in a variety of circuits. 7. Explain the basic function of a filter circuit. 8. Distinguish between a passive filter and an active filter. 9. Classify passive filters and explain function of each type of filter. 10. Explain the parameters of a filter. 11. Make analysis of constant K-type or proto-type filters. 12. Solve problems on constant K-type filters. 13. Design different filters. 14. Understand the concept of Network synthesis. 15. Understand the concept of resonance in series RLC circuits. 16. Analyze the quality factor (Q) and its significance in resonant circuits.	

17. Explore the relationship between bandwidth and half-power frequencies in resonant circuits.
18. Investigate the characteristics of resonance in parallel RLC circuits.
19. Comprehensive understanding of single-phase and 3-phase systems, enabling them to effectively analyze and work with various configurations and load conditions.

Learning outcomes

At the end of this module, students will be able to:
1. Define mutual inductance and coupling coefficient.
2. Explain the dot convention rule.
3. Determine the mutual inductance of inductors in series and parallel.
4. Demonstrate the refer to primary and secondary techniques to solve for voltages and currents of an ideal transformer.
5. Drive the transfer function and cutoff frequency of all passive filters.
6. Understand the benefit and characteristic of all passive filter.
7. Understand the concept of resonance in series RLC circuits.
8. Analyze the quality factor (Q) and its significance in resonant circuits.
9. Explore the relationship between bandwidth and half-power frequencies
in resonant circuits.
10. Investigate the characteristics of resonance in parallel RLC circuits.
11. Analyze the characteristics and behavior of single-phase three-wire systems
12. Evaluating both balanced and unbalanced 3-phase systems with star and delta connections.

Teaching and learning methods

The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by looking at the types of simple experiments that involve some sampling activities that interest students.From exceptto I amDAFor evilHATo look atY With helpAndAFor lispoRahAWhiteandAnd "Da"So What?"To clarifyAFor the curriculum (AExampleandWhat? RYen) AndYou will useorABooksAFor methodologyAndYou will useorATo learnAFor electricityandI amAndNoToolsAFor digital For trainingRYesAFor my number.

Evaluation methods
For evaluation purposes, it is used. 21. Quick and surprise tests method 22. Determine some homework 23. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Introduction to Laplace Transform, Selected Function Laplace Transforms, Properties of Laplace Transform and pairs
Week 2	Laplace Inverse, Circuit Elements in S Domain
Week 3	Electrical Circuit Analysis Using Laplace Transform
Week 4	Introduction to Transfer Function, System Poles and Zeros, Electrical Circuit in Transfer Function
Week 5	S-Plane, Natural Response
Week 6	Introduction to The Transient Circuits, The Transient analysis of RC circuit
Week 7	The Transient analysis of RC circuit, The Transient analysis of RLC circuit
Week 8	Transient Analysis Using Laplace Transform
Week 9	Mid-term
Week 10	Introduction to TWO-PORT NETWORKS, Input impedance, output impedance, voltage gain, current gain and power gain
Week 11	Admittance parameters, Impedance parameters, Hybrid parameters, Transmission parameters
Week 12	Conditions for Reciprocity and Symmetry, Interrelationships between Two-Port Parameters
Week 13	Interconnection of Two-Port Networks, Two-Port Network Functions, Some Special Two-Port Networks
Week 14	Series Resonance: quality factor – selectivity – half power – frequency and bandwidth
Week 15	Parallel Resonance: quality factor – selectivity – half power – frequency and bandwidth, series / parallel resonance circuits
Week 16	Preparatory week before the final exam

References
• Electric Circuits, James W. Nilsson, Susan A. Riedel,

Pearson.

- Circuit Analysis: Theory and Practice, Allan H. Robbins and Wilhelm C. Miller
- Fundamentals of Electrical Circuits, CK Alexander and MNO Sadiku, McGraw-Hill Education

Course laboratories	
Weeks	Experiments
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course Description

Course Description
This section includes a description of the unit, vectors; scalar vectors and

vectors, vector components, rules for calculating vectors, vector norm, vector normalization, dot product, cross product, multiplication of three or more vectors, equations of lines in space, and planes in three-dimensional space. Vector-valued functions: limits and continuity, derivatives, forms of curve equations in space, parametric representation, unit tangent and normal vectors, curvature, radius of curvature, motion along a curve, velocity, acceleration, and the normal and tangent components of acceleration. Partial differentiation: function of two or more variables, limits and continuity, partial derivatives, partial derivatives of functions of two variables, partial derivatives of functions of more than two variables, chain rule, chain rule for derivatives, chain rule for partial derivatives, directional derivatives and gradients, directional derivatives, gradient, tangent and vertical vector diagrams, maxima and minima of functions of two variables, Lagrange multipliers. Multiple integrals: double integral, areas and volumes, double integral in polar coordinates, parametric surfaces, surface area, surface integrals, volume evaluation and triple integral.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
mathematicsIII/ **ENG201**	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
100 hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	

This course is designed, MathematicsIII, specifically for undergraduate students in the field of electrical engineering. After completing this unit, students should have developed a clear understanding of the basic concepts of mathematics and a set of skills that allow them to work effectively with the concepts. The basic concepts are:

1) Vectors and space geometry such as topics of standard vectors, vector components, vector calculation rules, vector rule, vector normalization, dot product, cross product, product of three or more vectors, equations of lines in space, and planes in three-dimensional space.
2) Vector-valued functions (vector functions) such as limits, continuity, derivatives, forms of curve equations in space,

parametric representation, tangent and normal vectors, curvature and radius of curvature, motion along a curve, velocity, acceleration, speed, and the normal and tangent components of acceleration.

3) Partial derivatives (differentiations) such as topics of functions of two or more variables, limits and continuity, partial derivatives, partial derivatives of functions of two variables, partial derivatives of functions of more than two variables, chain rule, chain rule for derivatives, chain rule for partial derivatives, directional derivatives and gradients, directional derivatives, gradient, tangent plots and normal vectors, maximum and minimum of functions of two variables, Lagrange multipliers.
4) Multiple integrals such as double integrals, areas and volumes, double integrals in polar coordinates, parametric surfaces, surface area, surface integrals, volume evaluation and triple integrals.

Learning outcomes

After completing this unit, students should demonstrate proficiency in the following skills:

1) To be able to identify vectors by addition, subtraction and multiplication.
2) To be able to understand applications of vectors such as force, velocity and acceleration.
3) Understand the concept of partial differentiation, partial derivative and directional derivative.
4) To be able to calculate gradient, divergence and derivative and understand their applications.
5) Calculate the linearity of functions and determine maximum, minimum and saddle points.
6) Be able to determine the areas and volumes of functions using multiple integration methods.

Teaching and learning methods

The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by looking at the types of simple experiments that involve some sampling activities that interest students.From exceptto I amDAFor evilHATo look atY With helpAndAFor lispoRahAWhiteandAnd "Da"So What?"To clarifyAFor the curriculum (AExampleandWhat?RYen) AndYou will

useorABooksAFor methodologyAndYou will useorATo learnAFor electricityandI amAndNoToolsAFor digital For trainingRYesAFor my number.

Evaluation methods
For evaluation purposes, it is used. 24. Quick and surprise tests method 25. Determine some homework 26. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	**Vectors and Geometry of Space** Scalars and vectors, component of a vector, rules of vector arithmetic, norm of a vector, normalizing of vectors. Assignment No.1
Week 2	**Vectors and Geometry of Space** Dot product, Cross product. Assignment No.2
Week 3	**Vectors and Geometry of Space** Product of three or more vectors Assignment No.3
Week 4	**Vectors and Geometry of Space** Equations of lines in space, planes in 3-space. Assignment No.4 Quiz No.1
Week 5	**Vector-valued functions (Vector Functions)** Limits and continuity, derivatives, forms of a curve equation in space Assignment No.5
Week 6	**Vector-valued functions (Vector Functions)** parametric representation, unit tangent and normal vectors. Assignment No.6
Week 7	**Vector-valued functions (Vector Functions)** Curvature, radius of curvature, motion along a curve, velocity, acceleration and speed

	Assignment No.7
Week 8	**Vector-valued functions (Vector Functions)** Normal and tangential components of acceleration. Assignment No.8 Quiz No.2 **Midterm Exam**
Week 9	**Partial Derivatives (Differentiations)** Function of two or more variables, limits and continuity, partial derivatives. Assignment No.9
Week 10	**Partial Derivatives (Differentiations)** Partial derivatives of functions of two variables, partial derivatives of functions with more than two variables. Assignment No.10
Week 11	**Partial Derivatives (Differentiations)** the chain rule for derivatives, the chain rule for partial derivatives, directional derivatives and gradients, directional derivatives, the gradient, Assignment No.11
Week 12	**Partial Derivatives (Differentiations)** maxima and minima of functions of two variables, Lagrange multipliers. Assignment No.12 Quiz No.3
Week 13	**Multiple integrals** Double integral, areas and volumes, double integral in polar coordinates Assignment No.13
Week 14	**Multiple integrals** Parametric surfaces, surface area, surface integrals Assignment No.14
Week 15	**Multiple integrals** Evaluation of volume and triple integral. Assignment No.15 Quiz No.4
Week 16	**Preparatory week before the final exam**

References

- Thomas, G. B., Weir, M. D., Hass, J., Heil, C., & Behn, A. (2016). Thomas' Calculus Early Transcendentals. Pearson

Course laboratories	
No Prerequisites	
Weeks	Experiments
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course Description

Course Description
This section includes a description of the unit, the Cartesian coordinate system, the components of the vector and the unit vector field, the dot product, the vector product, the circular cylindrical coordinate system, the spherical coordinate system. Coulomb's law and the electric field strength. Coulomb's law, electric field strength - field of point chargesn, field due to continuous volume charge distribution, linear charge field, charge sheet field, flux line and field diagrams, electric flux density. Electric flux density, Gauss's law, and divergence,Electric flux density,

Gauss's law - application of Gauss's law, differential volume element spacing, Maxwell's first equation, vector factor. Energy and potential, energy and potential energy expended in moving a point charge, linear integration - definition of potential difference and potential, potential field of point charge, potential field of system charge, conservative property, potential gradient, dipole, energy density in electric field. Conductors, Insulators, Capacitance,Current and current density, continuity of current, metallic conductors, conductor properties and boundary condition, image method, semiconductors, nature of insulating material, boundary condition of ideal insulating materials, capacitance, multiple examples of capacitance, capacitance of a two-wire line. Poisson and Laplace equations: Poisson and Laplace equations, singularity theorem, examples of solving Laplace equation (1DExamples of solving the Poisson equation (1D), solve the product of Laplace's equation. The static magnetic field

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Electromagnetic fieldsI/ EL214	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
75 hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
1) Understand the concepts of electrostatics and its applications. 2) Apply vector calculus to understand the behavior of static electric fields in standard configurations. 3) Use their ability to manage electromagnetic laws, in simple situations, to prepare a computational model and perform the necessary calculations: choose appropriate methods; make appropriate approximations; evaluate the reasonableness of the results. 4) Analyze how energy is stored and transferred in an electrostatic field. 5) Understand the effect of materials on electric and magnetic fields. 6) Use their conceptual understanding of electromagnetic laws to qualitatively describe the behavior of problem solving. 7) Use their ability to manage electromagnetic laws, in simple situations, to prepare a computational model and perform the necessary calculations: choosing	

Appropriate methods; make appropriate approximations; evaluate the plausibility of results; analyze how energy is stored and transferred in an electromagnetic field.
8) Describe and analyze the propagation of electromagnetic waves in free space.
9) Understand the principles of regular plane wave propagation.

Learning outcomes

1) Describe and understand the principle of electrostatic fields, Coulomb's law, and electric field strength.
2) Discuss the application of Gauss's law and Maxwell's first equation.
3) Learn about potential difference and electrical potential.
4) Explain electrostatics in physical space, current, current density and conductors.
5) Determine Laplace's equations and their applications.
6) Learn the concepts of static magnetism and its applications.
7) Explain the concepts of electromagnetic fields, waves, and wave propagation.
8) Understanding the relationships between fields under changing conditions over time.
9) Describe and understand the principle of Ampere's circuit law - Maxwell's equation
10) Identify magnetic forces, materials and devices.
11) The ability to distinguish between standard and vector magnetic potential, determine and define it, formulate its solution, and derive the Poët-Savart law and Ampere’s law.

Teaching and learning methods

The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by looking at the types of simple experiments that involve some sampling activities that interest students.From exceptto I amDAFor evilHATo look atY With helpAndAFor lispoRahAWhiteandAnd "Da"So What?"To clarifyAFor the curriculum (AExampleandWhat?RYen) AndYou will useorABooksAFor methodologyAndYou will useorATo learnAFor electricityandI amAndNoToolsAFor digital For trainingRYesAFor my number.

Evaluation methods
For evaluation purposes, it is used. 27. Quick and surprise tests method 28. Determine some homework 29. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Columb law and electric field
Week 2	Columb law and electric field
Week 3	Columb law and electric field
Week 4	Electric flux, Gauss law and divergence
Week 5	Electric flux, Gauss law and divergence
Week 6	Electric flux, Gauss law and divergence
Week 7	Energy and Potential
Week 8	Energy and Potential
Week 9	Conductors, Dielectrics and Capacitance
Week 10	Conductors, Dielectrics and Capacitance
Week 11	Posson's and Laplace equations
Week 12	Posson's and Laplace equations
Week 13	Steady Magnetic Field
Week 14	Steady Magnetic Field
Week 15	Steady Magnetic Field
Week 16	Preparatory week before the final exam

References
1- Mathihew NO Sadiku, “Elements of Electromagnetics”, 6th Edition, OXFORD UNIVERSITY PRESS, 2015. 2- William H. Hayt, Jr. . John A. Buck, "Engineering Electromagnetics", 6th Edition, The McGraw Companies, 2001. 3- Joseph A. Edminister, Mahmood Nahvi, “Electromagnetics”, 4th Edition, McGraw-Hill Education, 2014.

Course laboratories	
Weeks	Experiments
Week 1	
Week 2	

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course Description

Course Description
This section includes a description of the unit, DC Machines: General principle of rotating electrical machines, calculation of induced electromotive force, power, capacity, torque in DC machines, narrowing of DC machines, function of commutator, type of armature windings, calculation of electromotive force per pole, type of excitation connections, armature reaction, commutation, type and characteristics of DC generators, parallel operation of DC generators, losses and efficiency of DC machines. Motors: DC motor operating principle, speed calculation, torque calculation, starting of DC motors, characteristics and types of DC motors, speed control of DC motors and electric braking, testing of DC machines.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Electrical machinesI/ **EL212**	Course Name / Course Code
Bologna	Academic System
	Programs Included

Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
125 hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives

This unit aims to:
1. Understand the basic principles governing the operation of electrical machines such as transformers, motors and generators.
2. Develop the ability to analyze and design electrical machines by studying their construction, characteristics, and performance standards.
3. Develop students' ability to analyze performance parameters of electrical machines, such as torque, power, efficiency, and voltage regulation.
4. Understand the control mechanisms and operational aspects of electrical machines, including speed control methods.
5. Electrical machines are integral parts of various systems, such as power generation, transmission, and industrial processes. Students must understand the integration and coordination of electrical machines within these systems.

Learning outcomes

1. Understand the working principles of DC generators, including basic construction and basic components, such as armature, field winding, brushes, and commutator.
2. Study different types of DC generators, including separately excited generators, slant-wound generators, series-wound generators, and compound-wound generators.
3. Understand the efficiency of a DC generator and identify different types of losses (copper, iron, mechanical, etc.)
4. Understanding motor reaction refers to the distortion of the magnetic field caused by the motor current and the switching process.
5. Apply the equationEMFTo solve different types of generator circuits.
6. Ability to analyze and discuss the various properties of DC generators, such as open circuit property, magnetic property and load property.
7. Understand the parallel operation of a DC generator and determine the output to the load.
8. Analyze and determine engine parameters such as:EMFRear, torque, speed and horsepower.
9. Analyze the main characteristics of DC motors, such as the relationship between torque, speed, efficiency, and output power.
10. Understand DC motor control methods, such as motor voltage control and field attenuation.

11. Understand the different methods and techniques of braking a DC motor.
12. Understand and apply different methods of testing machine calculations.

Teaching and learning methods
1. Lecture method: In this traditional strategy, the teacher presents information through verbal communication, with the addition of visual aids or demonstrations. 2. Active learning: Encourages student participation through sharing, discussion, and problem-solving activities rather than passive listening. 3. Flipped classroom: Students interact with learning materials outside of class (e.g., watching videos, reading texts) and then use class time for activities, discussions, and personal interaction with the teacher. 4. Assessments: Implement regular formative assessments, such as quizzes, Assignments, and in-class exercises, to assess students' understanding and progress. Provide constructive feedback to guide their learning and address Any misconceptions. 5. Review Sessions: Before major exams or assessments, conduct review sessions to summarize key concepts, address common challenges, and provide additional practice problems. This helps consolidate knowledge and enhance understanding.

Evaluation methods
For evaluation purposes, it is used. 30. Quick and surprise tests method 31. Determine some homework 32. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Introduction, Construction of DC Machines
Week 2	Type of Generator, Armature Winding, EMF Equation
Week 3	Total Losses, Distribution of Power, Efficiency
Week 4	Armature Reaction, Compensating Windings, Commutation
Week 5	Commutation, Generator Characteristics
Week 6	OCC characteristics, Voltage Build-up

Week 7	Mid Term Exam
Week 8	Series Generator Characteristics, Voltage regulation, Paralleling DC Generators
Week 9	DC Motor, Back EMF
Week 10	Speed, Torque, Characteristics
Week 11	Losses, Control method
Week 12	Speed Control of Shunt Motors
Week 13	Speed Control of Series Motors
Week 14	Starting, Braking
Week 15	Testing of DC Machines
Week 16	**Preparatory week before the final exam**

References
• Electrical Technology, BL Theraja, Volume-II (AC & DC Machines) • Principles of Electrical Machines By VK Mehta, Rohit Mehta

Course laboratories	
Weeks	Experiments
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	

Week 7	

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course Description

Course Description
The objective of this course is to provide background on: - Amplifier design, specifically MOSFET based amplifiers used in discrete circuits and integrated circuits, i.e. microelectronic circuits. - Some useful IC elements based on these two transistors will be introduced and analyzed. - The course also aims to cover differential and multistage amplifiers. - In this course also, two other peripheral devices such as Schottky diodes, power diodes, etc. are explained. - PnPn and other devices are decoded and their operations are explained.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
ElectronicII/ **EL213**	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
first semester/ 2024-2025	Semester / Year
125 hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
The goal of this course is to establish a background on: - Amplifier design, specifically on MOSFET-based amplifiers used in discrete Circuits and integrated circuits, namely the microelectronic circuits. - Some useful integrated circuit elements based on these two transistors	

will be
introduced and analyzed
- The course also aims to cover the differential and multistage amplifiers.
- In this course also other two terminal devices like schottky diodes , power diodes and others are explained.
- PnPn and other devices are decrypted and explained their operations.

Learning outcomes

- Identify the main circuit elements and draw a electronic circuit diagram corresponding to a physical combination of standard electronic components
- explain the properties and operations of BJTs (bipolar junction transistors).
express that BJT is a P-N junction circuit element and its terminals are called as Emitter,
Base and Collector. polarize a BJT using two sources and calculates various current,
Voltage values and also the power dissipated in a transistor.
- Definition of small signal in transistor.
- Be able to know the amplifier configurations for both BJT and FET.
- explain the properties and operations of FETs (field effect transistors) and
Explain the structure and types of JFETs.
- Be able to draw the transfer characteristics curve and explains forward Conduction using this curve.
- Explain the differences between D-MOSFETs and JFETs, and also EMOSFETs
and JFETs and likeness between D-MOSFETs JFETs.
- Be able to analyze both BJT and FET circuits an ac analysis and calculate voltage gain,
Current gain input impedance and output impedance.
- Identify and analyze the differential and multistage amplifiers.
- Other two terminal devices also explained for the students and they be able to use them in their life.
- PnPn and other devices are desecrated like : Diac,GTO, and Triac.

Teaching and learning methods

The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by looking at the types of

simple experiments that involve some sampling activities that interest students.From exceptto I amDAFor evilHATo look atY With helpAndAFor lispoRahAWhiteandAnd "Da"So What?"To clarifyAFor the curriculum (AExampleandWhat?RYen) AndYou will useorABooksAFor methodologyAndYou will useorATo learnAFor electricityandI amAndNoToolsAFor digital For trainingRYesAFor my number.

Evaluation methods
For evaluation purposes, it is used. 33. Quick and surprise tests method 34. Determine some homework 35. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Introduction of amplification with transistors
Week 2	FETs: Basic Definitions, Junction Field-Effect Transistor (JFET)
Week 3	DC Biasing Circuits of JFETs
Week 4	MOSFETs: DEPLETION-TYPE MOSFET,
Week 5	ENHANCEMENT-TYPE MOSFET
Week 6	MOSFET Biasing
Week 7	Differential Amplifiers
Week 8	Multistage Amplifiers
Week 9	Multistage Amplifiers
Week 10	Multistage Amplifiers
Week 11	Mid-term exam
Week 12	Other Two Terminal Devices

Week 13	Other Two Terminal Devices
Week 14	Other Two Terminal Devices
Week 15	PnPn Devices and Others
Week 16	Preparatory week before the final Exam

References

- . Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 9th Edition, Pearson Education / PHI, 2007.
- Millman J and Halkias .C., Integrated Electronics, TMH, 2007.
- S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, Electronic Devices and Circuits, 2nd Edition, TMH, 2007. 29

Course laboratories

Electronics Lab

Weeks	Experiments
Week 1	Introduction
Week 2	Test a transistor (short) between terminals
Week 3	Test a transistor (open) between terminals
Week 4	ICBO/ICEO Test on a Test Transistor.
Week 5	DC gain (HFE) of a Transistor
Week 6	Input characteristics of BJT transistor
Week 7	Transistor as switch

Admission

No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course description

Course description
This course includes the following. - Introduction to digital technologies: Fundamentals of digital systems: Digital systems, digital signals, analog systems, analog signals, examples - Definitions, number system General number format: binary, octal, decimal, hexadecimal. Number base conversion: arithmetic operations in different number systems, Complements, binary codes, BCD, Ex-3, Gray codes - Standard forms of digital logic gates: Logic gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR Implementations of logical functions using gates, NAND–NOR implementations - Multi-level gate implementations - Multi-output gate implementations Boolean algebra, basic definitions, basic theory and properties, Boolean functions. Minimization Techniques: Boolean Postulates and Laws – De Morgan's Theorem – Principle of Duality – Boolean Expression – Minimization of Boolean Expressions — Minimum – Maximum – Sum of Products (SOP) – Product of Sums (POS) –Karnaugh Chart, Karnaugh Map: Implementing AND-OR, I Don't Care

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Digital Technical I/	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
first semester/ 2024-2025	Semester / Year
100 hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Learning objectives	
1) To develop problem solving skills and understanding of Digital Systems through The application of techniques. 2) To understand Digital signals and the difference from Analogue	

signals.
3) To cover the basic concept of Boolean Algebra.
٤)To establish the basic concepts of Digital Combinational Circuits Design.

Learning outcomes
1) Students should be able to explain about digital number systems. 2) Students should be able to explain about Logic circuits. 3) The student should be able to introduce the methods for simplifying Boolean expressions. 4) To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions

Method of teaching
The main strategy that will be adopt in delivering this module is to encourage students 'participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieve through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Evaluating
For evaluation purposes, it is used. Quick and surprise tests method Determine some homework Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Introduction to Digital Techniques: Basic: Digital systems, Digital Signals, Analogue systems, Analogue signals, Examples.
Week 2	Definitions, System of Numbers: General number formula: Binary and octal numbers.
Week 3	Decimal and hexadecimal numbers.
Week 4	Numbers Base Conversion: Arithmetic operations in different number system.
Week 5	Standard forms Digital Logic Gates: Logic Gates: AND, OR, NOT, NAND and NOR.

Week 6	Standard forms Digital Logic Gates: Logic Gates: AND, OR, NOT, NAND and NOR.
Week 7	Exclusive–OR and Exclusive–NOR Implementations of Logic Functions using gates>
Week 8	Week 8 NAND–NOR implementations – Multi level gate implementations.
Week 9	Week 9 Multi output gate implementations.
Week 10	Boolean Algebra: Boolean Algebra, Basic definitions, basic theorem and properties.
Week 11	Boolean functions.
Week 12	MINIMIZATION TECHNIQUES AND LOGIC GATES: Minimization Techniques: Boolean postulates and laws – De-Morgan's Theorem -Principle of Duality.
Week 13	Boolean expression - Minimization of Boolean expressions —Minterm – Maxterm.
Week 14	Week 14 Sum of Products (SOP) – Product of Sums (POS) – Karnough's diagram.
Week 15	Week 15 Karnaugh map: AND- OR implementation, don't care.
Week 16	**Preparatory week before the final Exam**

references
• Thomas L. Floyd, Digital Fundamentals, 9th Edition

Labs	
Weeks	Experiments
Week 1	Basic logic gates training
Week 2	Implementation of logic circuits
Week 3	Half adder and full adder
Week 4	Multiplexer logic circuit
Week 5	Counter circuit

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be

	accepted

Course Description

Course Description
Introduction to programming fundamentals (what it is and how it works), binary computing, problem solving techniques, and algorithm development. Includes procedural and data abstractions, program design, debugging, testing, and documentation. Covers data types, control structures, functions, parameter passing, library functions, arrays, inheritance, and object-oriented design. Lab exercises in Python.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Computer Programming/ **EL225**	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
100 hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
1. To demonstrate about Python data structures like Lists, Tuples, Sets and Dictionaries. 2. To understand about Functions, Modules and Regular Expressions in Python 2 Programming. 3. To build basic programs using fundamental programming constructs like variables, Conditional logic, looping, and functions. 4. Work with user input to create fun and interactive programs. 5. To be able to introduce core programming basics and various Operators of Python Programming language. 6. To demonstrate about Python data structures like Lists, Tuples, Sets and	

dictionaries
7. To understand about Functions, Modules and Regular Expressions in Python
Programming.

Learning outcomes
The students should be able to 1. Understand basic principles of computers 2. Understand basics of binary computation 3. Understand the programming basics (operations, control structures, data types, etc.) 4. Student should be able to understand the basic concepts of scripting and the contributions of scripting language. 5. Ability to explore python data structures like Lists, Tuples, Sets and dictionaries. 6. Ability to create practical and contemporary applications using Functions, Modules and Regular Expressions. 7. Readily use the Python programming language 8. Apply various data types and control structure 9. Understand class inheritance and polymorphism 10. Understand the object-oriented program design and development 11. Understand and begin to implement code. **Course Description** Introduction to programming basics (what it is and how it works), binary computation, problem-solving methods and algorithm development. Includes procedural and data abstractions, program design, debugging, testing, and documentation. Covers data types, control structures, functions, parameter passing, library functions, arrays, inheritance and object oriented design. Laboratory exercises in Python.

Teaching and learning methods
The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by looking at the types of

simple experiments that involve some sampling activities that interest students.From exceptto I amDAFor evilHATo look atY With helpAndAFor lispoRahAWhiteandAnd "Da"So What?"To clarifyAFor the curriculum (AExampleandWhat?RYen) AndYou will useorABooksAFor methodologyAndYou will useorATo learnAFor electricityandI amAndNoToolsAFor digital For trainingRYesAFor my number.

Evaluation methods
For evaluation purposes, it is used. 36. Quick and surprise tests method 37. Determine some homework 38. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	**Module 1:** Introduction -- Arrays (One dimensional) - Arrays (Two Dimensional --Functions: Built-in function functions (Library functions), and User-Defined functions), Function prototype (Declaration), function call, Passing arguments to a function, return statement, Local and global variables.
Week 2	Functions (Value-Returning) vs. Void (Non Value Returning) functions, function with no argument and no return value, function with no argument but return value, function with argument but no return value, function with argument and return value.
Week 3	Module 2: -- File systems -- Using the Python interpreter -- Introduction to binary computation -- Input / Output.
Week 4	-- Data types and control structures -- Operators (unary, arithmetic, etc.) -- Data types, variables, expressions, and statements -- Assignment statements
Week 5	-- Strings and string operations -- Control Structures: loops and decision.
Week 6	Quiz
Week 7	Module 3: --Modularization and Classes -- Standard modules -- Packages

Week 8	-- Defining Classes
Week 9	-- Defining functions
Week 10	-- Error processing -- Exception Raising and Handling.
Week 11	Module 5: --Object oriented design –- Programming types.
Week 12	-- Object Oriented Programming -- Object Oriented Design
Week 13	-- Inheritance and Polymorphism.
Week 14	Quiz 2
Week 15	Module 6: Remaining materials.

References
• Braunschweig, D. and Busbee, K. L. (2018). Programming Fundamentals – A Modular Structured Approach, 2nd Edition.

Course laboratories	
Weeks	Experiments
Week 1	**Practical Exercises No.1 -- Demonstrate about Basics of Python Programming.**
Week 2	**Practical Exercises No.2 -- Demonstrate about fundamental Data types in Python Programming. (i.e., int, float, complex, bool and string types)**
Week 3	**Practical Exercises No.3 -- Demonstrate the working of following functions in Python.**
Week 4	**Practical Exercises No.4 -- Write a Python program to demonstrate various base conversion functions.**
Week 5	**Practical Exercises No.5 -- Write a Python program to demonstrate various type conversion functions.**
Week 6	**Practical exercises No.6 -- Demonstrate the following**

	Operators in Python **with suitable examples.** **i) Arithmetic Operators** **ii) Relational Operators** **iii) Assignment Operator iv) Logical Operators** **v) Bit wise Operators vi) Ternary Operator** **vii) Membership Operators viii) Identity Operators**
Week 7	**Practical exercises No.7 -- Write Python programs to demonstrate the**

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course Description

Course Description
This section includes a description of the unit, the poles and zeros of the transfer function, the normal response and the level.s. Dual port networks, parameters and ABCD, attenuation and phase functions, and network losses. Coupling circuits. Magnetic coupling, Coupling coefficient, Linear equivalent circuits, Ideal transformers, Autotransformers Filters, FilterskFixed, low frequency and high frequency, modern filter design, filtersButterworthandChebyshev, network transfers and all traffic filters. Introduction to Measurement: Units of Measurement and Measurement Standards Types of devices and performance characteristics: Review of types of devices and static and dynamic characteristics. Errors during the measurement process: Source of errors and error reduction. Measurement Noise and Signal Processing: Sources of measurement

noise, measurement noise reduction techniques, and introduction to signal processing.
Electrical and test measurements: digital meters (voltage-to-time conversion type, voltage measurement type, double slope integration type, voltage-to-frequency type and multimeters), analog meters (electrodynamic type, clamp meters, thermometers), cathode ray spectrometer and digital storage spectrometer.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Electrical circuits II/**EL221**	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
125 hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives

1. Understand that a current-carrying conducting coil induces a current in another coil due to the magnetic field produced by the first coil.
2. Relate an induced emf to a rate of change of magnetic flux and to mutual
inductance for two coils with equal number of turn.
3. Understand the physics behind mutually coupled circuits and how to analyze circuits containing mutually coupled inductors.
4. Understand how linear transformers work and how to analyze circuits containing them.
5. Understand how ideal transformers work and how to analyze circuits containing them.
6. Understand how ideal auto transformers work and know how to analyze
them when used in a variety of circuits.
7. Explain the basic function of a filter circuit.
8. Distinguish between a passive filter and an active filter.
9. Classify passive filters and explain function of each type of filter.
10. Explain the parameters of a filter.
11. Make analysis of constant K-type or proto-type filters.
12. Solve problems on constant K-type filters.
13. Design different filters.
14. Understand the concept of Network synthesis.
15. Understand the concept of resonance in series RLC circuits.

16. Analyze the quality factor (Q) and its significance in resonant circuits.
17. Explore the relationship between bandwidth and half-power frequencies
in resonant circuits.
18. Investigate the characteristics of resonance in parallel RLC circuits.
19. Comprehensive understanding of single-phase and 3-phase systems, enabling them to effectively analyze and work with various configurations
and load conditions.

Learning outcomes

At the end of this module, students will be able to:
1. Define mutual inductance and coupling coefficient.
2. Explain the dot convention rule.
3. Determine the mutual inductance of inductors in series and parallel.
4. Demonstrate the refer to primary and secondary techniques to solve for voltages and currents of an ideal transformer.
5. Drive the transfer function and cutoff frequency of all passive filters.
6. Understand the benefit and characteristic of all passive filter.
7. Understand the concept of resonance in series RLC circuits.
8. Analyze the quality factor (Q) and its significance in resonant circuits.
9. Explore the relationship between bandwidth and half-power frequencies
in resonant circuits.
10. Investigate the characteristics of resonance in parallel RLC circuits.
11. Analyze the characteristics and behavior of single-phase three-wire systems
12. Evaluating both balanced and unbalanced 3-phase systems with star and
delta connections.
3
13. Develop the ability to calculate power in 3-phase circuits.

Teaching and learning methods

The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by looking at the types of simple experiments that involve some sampling activities that interest students.

Evaluation methods

For evaluation purposes, it is used.

39. Quick and surprise tests method
40. Determine some homework
41. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Self-Inductance, Coupled Inductor, Mutual Inductance
Week 2	Mutual Inductance between Two Coupled Inductors, Dot Convention, coefficient of coupling, Inductances in series and Parallel
Week 3	Linear Transformer, Ideal Transformer
Week 4	equivalent circuit's linear, ideal transformers, autotransformer
Week 5	Classification of Filters, Characteristic of Filters
Week 6	Constant-k Filter, modern filter design
Week 7	network transformations and all pass filters
Week 8	Mid-term
Week 9	Source of errors and reduction of errors, Sources of measurement noise, techniques for reducing measurement noise, and introduction to signal processing
Week 10	Digital meters (voltage to time conversion type, potentiometric type, dual slope integration type, voltage to frequency type and multi-meters)
Week 11	analog meters (electrodynamic type, clamp-on meters, and thermocouple meter), cathode ray oscilloscope and digital storage oscilloscope
Week 12	Bridge circuits (Wheatstone, deflection type DC bridge and AC bridges), and their applications
Week 13	Resistive, Inductive and Capacitive transducers, measurement of transducer output, modulation and demodulation in transducers.
Week 14	Level measurement, Pressure measurement: Burden tube, Bellows, Diaphragms, Differential pressure measurement, Flow measurement, Temperature measurement, Force, Load cell.
Week 15	Opt couplers and OID, optical detection, magnetic pickups, Speed measurement, Position measurement, Other digital transducers
Week 16	Preparatory week before the final Exam

References

- Electric Circuits, James W. Nilsson, Susan A. Riedel, Pearson.
- Circuit Analysis: Theory and Practice, Allan H. Robbins and Wilhelm C. Miller
- Modern electronics Instrumentation and measurement techniques by Albert D Helfrick And William D. Cooper

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course Description

Course Description
This section includes a description of the unit, Differential Equations: First order: Separable variable, Exact, Linear, Bernoulli. Second and higher order: Linear equations with constant coefficients, Homogeneous linear equations with constant coefficients, Non-homogeneous equations, Solution of non-homogeneous equations, Variation of coefficients, Higher order linear equations with constant coefficients, FactorD, Cauchy's equation. Fourier series, periodic and non-periodic functions, Euler's formulas, even and odd functions, half-range expansion (Fourier sine and Fourier cosine), complex (exponential) Fourier series, applications of Fourier series in electrical circuits. Sequences and series, convergence and divergence test, geometric series and partial sum, integration, comparison, ratio and root tests, alternating series, power series, Taylor and Maclaurin series, applications of power series.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Mathematics IV/ENG202	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
100 hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives
This course is designed, MathematicsIV, specifically for undergraduate students in the field of electrical engineering. After completing this unit, students should have developed a clear understanding of the basic concepts of mathematics and a set of skills that allow them to work effectively with the concepts. The basic concepts are: 1) First order ordinary differential equations such as the topics of solution concept, general and special solutions, and initial value problem (IVP) and the marginal value problem (BVP), linear and nonlinear ordinary differential equations, and general solutions of first-order ordinary differential equations. 2) Second and higher order ordinary differential equations such as topics of second order homogeneous linear ordinary differential equations (superposition principles), initial value problem. The basis. General solution, homogeneous linear ordinary differential equations with constant coefficients, Euler-Cauchy equations, differential operator (operatorD), methods of solving non-homogeneous linear ordinary differential equations, and solving higher-order linear ordinary differential equations with constant coefficients. 3) Fourier analysis such as topics of periodic and non-periodic functions, Euler's formulas, even and odd functions, half-range expansion (Fourier sine and Fourier cosine), complex (exponential) Fourier series, and applications of Fourier series in electrical circuits. 4) Sequences and series such as convergence and divergence test topics, geometric series and partial sum, integration, comparison, ratio and root tests, alternating series, power series, applications of power series, and Taylor and Maclaurin series.

Learning outcomes
After completing this unit, students should demonstrate proficiency in the following skills: 1) Understand homogeneous and heterogeneous, linear and nonlinear equations. 2) The ability to deduce and calculate differential equations. 3) Solve first, second and higher order ordinary differential equations using different solution methods. 4) Ability to calculate and deduce Bernoulli's theorem. 5) Ability to calculate second-order differential equations and understand their applications in electronic circuits. 6) Understand Fourier series and Euler's formulas. 7) The ability to determine the sum of some infinite series, when it exists. 8) Ability to approximate the sum of some infinite series and analyze the

error. 9) Find geometric representations, power series, Taylor and Maclaurin series for given functions.

Teaching and learning methods
The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by looking at the types of simple experiments that involve some sampling activities that interest students.From exceptto I amDAFor evilHATo look atY With helpAndAFor lispoRahAWhiteandAnd "Da"So What?"To clarifyAFor the curriculum (AExampleandWhat?RYen) AndYou will useorABooksAFor methodologyAndYou will useorATo learnAFor electricityandI amAndNoToolsAFor digital For trainingRYesAFor my number.

Evaluation methods
For evaluation purposes, it is used. 42. Quick and surprise tests method 43. Determine some homework 44. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	**Chapter One First order ODE** An introduction to Differential Equations (DEs). Basic Concepts (Concept of solution, The General and Particular solutions, Initial Value Problem (IVP) and Boundary Value Problem (BVP), Linear and Non-linear ODEs)
Week 2	**Chapter One First order ODE** The General Solutions of First Order ODEs (Separable ODEs, Equations Reduction to Separable Form) Assignment No.1
Week 3	**Chapter One First order ODE** The General Solutions of First Order ODEs (Exact ODEs, Reduction to Exact Form (Integrating Factors)). Assignment No.2

Week 4	**Chapter One First order ODE** The General Solutions of First Order ODEs (Linear ODEs, Reduction to Linear Form (Bernoulli Equation)). Assignment No.3 Quiz No.1
Week 5	**Chapter Two Second and Higher Order ODEs** An introduction to second order ODEs. Homogeneous Linear ODEs of Second Order (Superposition Principles). Initial Value Problem. Basis. General Solution.
Week 6	**Chapter Two Second and Higher Order ODEs** Homogeneous Linear ODEs with Constant Coefficients. Euler - Cauchy Equations. Differential Operator (D-operator). Assignment No.4
Week 7	**Chapter Two Second and Higher Order ODEs** Methods of Solving Non-homogeneous Linear ODEs. Method of Undetermined Coefficients. Method of Variation of Parameters Assignment No.5
Week 8	**Chapter Two Second and Higher Order ODEs** Solving of higher order linear ODEs with Constant Coefficients Assignment No.6 Quiz No.2 **Midterm Exam**
Week 9	**Chapter Three Fourier Analysis** An introduction of Fourier Series. Periodic and non-periodic functions, Euler formulas. Even and Odd functions. Assignment No.7
Week 10	**Chapter Three Fourier Analysis** Half Range Expansion (Fourier Sine and Fourier Cosine). Complex Fourier Series (Exponential). Applications of Fourier Series in Electrical Circuits. Assignment No.8 Quiz No.3
Week 11	**Chapter Four Sequences and series** Convergence and Divergence Test. Geometric Series and Partial Sum. Assignment No.9
Week 12	**Chapter Four Sequences and series** Integral, Comparison. Ratio and Root Tests. Assignment No.10
Week 13	**Chapter Four Sequences and series** Alternating series. Power Series. Applications of Power Series. Assignment No.11

Week 14	**Chapter Four Sequences and series** Taylor and Maclaurin Series. Assignment No.12 Quiz No.4
Week 15	**Chapter Four Sequences and series** Revision Week
Week 16	**Preparatory week before the final exam**

References
• Kreyszig, E. (2010). Advanced engineering mathematics. John Wiley & Sons • Thomas, G. B., Weir, M. D., Hass, J., Heil, C., & Behn, A. (2016). Thomas' Calculus Early Transcendentals. Pearson

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course Description

Course Description
This course includes: Poisson and Laplace equations: Poisson and Laplace equations, singularity theorem, examples of solving Laplace's equation (1D) Examples of solving the Poisson equation (1D), solve the product of Laplace's equation. The static magnetic field Poët-Savart law, Ampere's circular law, Curl, Stoke's theorem, magnetic flux and magnetic flux density. Standard magnetic potential and vector Derivation of laws of static magnetic field, magnetic forces. Magnetic forces, materials and inductance. Force on a moving charge, force on a differential current element, force between differential current elements,

force and torque in a closed circuit. Nature of magnetic materials Magnetism and permeability, magnetic boundary conditions, magnetic boundary conditions, magnetic circuit, potential energy and force on magnetic materials, inductance and mutual inductance.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Electromagnetic fields II/**EL224**	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
second/ 2024-2025	Semester / Year
75 hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
1) Analyze how energy is stored and transferred in an electrostatic field. 2) Understand the effect of materials on electric and magnetic fields. 3) Use their conceptual understanding of electromagnetic laws to qualitatively describe the behavior of problem solving. 4) Use their ability to manage electromagnetic laws, in simple situations, to prepare a computational model and perform the necessary calculations: selection Appropriate methods; make appropriate approximations; evaluate the plausibility of results; analyze how energy is stored and transferred in an electromagnetic field. 5) Description and analysis of the propagation of electromagnetic waves in free space. 6) Understand the principles of uniform plane wave propagation.	

Learning outcomes
1) Describe and understand the principle of electrostatic fields, Coulomb's law, and electric field strength. 2) Discuss the application of Gauss's law and Maxwell's first equation. 3) Learn about potential difference and electrical potential.

4) Explain electrostatics in physical space, current, current density and conductors.
5) Defining Laplace's equations and their applications.
6) Learn the concepts of static magnetism and its applications.
7) Explain the concepts of electromagnetic fields, waves and wave propagation.
8) Understanding the relationships between fields under changing conditions over time.
9) Describe and understand the principle of Ampere's circuit law - Maxwell's equation
10) Identifying magnetic forces, materials and devices
11) Ability to distinguish between standard and vector magnetic potential, identify, define and formulate its solution, and derive the Poët-Savart law and Ampere's law

Teaching and learning methods
The main strategy that will be followed in delivering this unit is to encourage students to participate in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through interactive classes and lessons and by looking at the types of simple experiments that involve some sampling activities that interest students.

Evaluation methods
For evaluation purposes, it is used. 45. Quick and surprise tests method 46. Determine some homework 47. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Poissson's and Laplace's Equations

	Poisson’s & Laplace's equations, Uniqueness theorem,
Week 2	examples of the solution of Laplace's equation (1D), examples of the solution of Poisson’s equation (1D),
Week 3	product solution of Laplace's equation.
Week 4	The Steady Magnetic Field Boit – Savart law,
Week 5	amperes circutal law, Curl, Stocke's theorem
Week 6	magnetic flux and magnetic flux density.
Week 7	The Scalar and Vector Magnetic Potential Derivation of steady – magnetic field laws, magnetic forces. Magnetic Forces,
Week 8	Materials and Inductance Force on moving charge,
Week 9	force on differential current element, force between differential current elements, force and torque on a closed circuit.
Week 10	The Nature of Magnetic Materials Magnetization and permeability,
Week 11	magnetic boundary conditions,
Week 12	the magnetic boundary condition,
Week 13	the magnetic circuit,
Week 14	potential energy and force on magnetic materials,
Week 15	inductance and mutual inductance.
Week 16	Prepare for final exam

References
1- Mathihew NO Sadiku, “Elements of Electromagnetics”, 6th Edition, OXFORD UNIVERSITY PRESS, 2015. 2- William H. Hayt, Jr. . John A. Buck, "Engineering Electromagnetics", 6th Edition, The McGraw Companies, 2001. 3- Joseph A. Edminister, Mahmood Nahvi, "Electromagnetics", 4th Edition, McGraw-Hill Education, 2014.

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be

	accepted
50	Maximum number could be accepted

Course Description

Course Description
This section includes description of the unit, type and construction of transformer, working of transformer, Faraday's and Lenz's laws, general equation of transformer, voltage ratio, current ratio, power rating equations, general equation of volts per cycle from volts per cycle in terms of power rating, losses in transformer, equations of these losses related to transformer variables as a function of frequency and voltage (eddy current loss and hysteresis loss), transformer connection, regulation calculation using voltage values, equivalent circuit of transformer, leakage reactance, equivalent resistances, reactances, impedances, phasor diagrams, short circuit test and open circuit test, regulation calculation using short and open circuit tests, power rating related to window and core area of transformer, efficiency calculation using short and open circuit tests, maximum efficiency, all day efficiency, short circuit times as related current rating, polarity of transformer, parallel operation of transformers, three phase transformers, connection of three phase transformers, importance of connecting transformer neutral to earth, groups Phase, winding transformer, transformer voltage rating, harmonics in transformer, autotransformers and their types, power rating calculation of autotransformers.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Electrical machines II/ **EL222**	Course Name / Course Code

Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
150 hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives
1. The unit aims to introduce students to the basic concepts of transformers, including working principle, primary and secondary windings, and basic materials. 2. Students will learn about different types of transformers, such as step-up and step-down transformers, auto-transformers, and three-phase transformers. 3. Students will learn how to analyze electrical parameters and transformer ratings, such as voltage ratios, power ratings, voltage regulation, and efficiency. 4. Students will also learn transformer configurations and connections, such as delta-delta, delta-wye, and wye-wye connections. 5. In addition, students will understand distribution transformers and calculate efficiency throughout the day.

Learning outcomes
By the end of this unit, students will be able to: 1. Understand the principles and operation of transformers. This includes basic concepts such as transformer construction, magnetic and electromagnetic circuits, and transformer operation. 2. Understand the efficiency aspects associated with power transmission, losses, and voltage regulation. This knowledge is essential for the design and operation of efficient electrical systems. 3. Understanding various performance parameters, including voltage regulation, impedance, voltage drop, and power factor, helps in interpreting transformer specifications and evaluating their suitability for different applications. 4. Understand and analyze ideal transformer, practical transformer on load, phase diagram, and circuit elements of transformer. 5. Magnetic leakage and winding resistance analysis using approximate equivalent circuit 6. Calculate regulation, impedance ratio, reactance, resistance, and approximate voltage drop. 7. Understand transformer tests like open circuit and short circuit tests and calculate static parameters and total losses (iron and copper losses) of transformer circuit.

8. Analyze and understand the copper autotransformer provision in autotransformer.
9. Analyze the parallel operation of single phase transformers and understand the conditions for satisfactory parallel operation.
10. Analysis of three phase transformer connections and calculation of kVA rating, transformation ratio, efficiency, regulation and rated capacity.

Teaching and learning methods
1. Lecture method: In this traditional strategy, the teacher presents information through verbal communication, with the addition of visual aids or demonstrations. 2. Active learning: Encourages student participation through sharing, discussion, and problem-solving activities rather than passive listening. 3. Flipped classroom: Students interact with learning materials outside of class (e.g., watching videos, reading texts) and then use class time for activities, discussions, and personal interaction with the teacher. 4. Assessments: Implement regular formative assessments, such as quizzes, Assignments, and in-class exercises, to assess students' understanding and progress. Provide constructive feedback to guide their learning and address Any misconceptions. 5. Review Sessions: Before major exams or assessments, conduct review sessions to summarize key concepts, address common challenges, and provide additional practice problems. This helps consolidate knowledge and enhance understanding. 6. Midterm Test: Conduct a midterm test to assess students' understanding of the topics covered in the first half of the unit. This test can help identify areas that require further clarification or reinforcement. 7. Final Exam: Conduct a comprehensive final exam to assess students' overall understanding of the unit content. Design the exam to incorporate a variety of question formats, including theoretical concepts, problem solving, and circuit analysis.

Evaluation methods
For evaluation purposes, it is used. 48. Quick and surprise tests method 49. Determine some homework 50. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Principle of working of a transformer, Transformer type and construction, transformer action, Faraday's, and Lenz's law's
Week 2	EMF Equation, general equation, voltage ratio, current ratio, power rating equations, volt per turn form general equation volt per turn in terms of power rating.
Week 3	Ideal transformer, Practical transformer on no load, phasor diagram
Week 4	Transformer on load, Phasor Diagram
Week 5	Equivalent circuit of the transformer, leakage reaction, equivalent resistances, reactance's, and impedances phasor diagrams
Week 6	Approximate voltage drops, Percentage regulation, Regulation calculation using voltage values
Week 7	Mid-term Exam
Week 8	Total Losses, Efficiency, losses in transformer, Equations of these losses relating to transformer variables as a function to frequency and voltage (eddy current loss and hysteresis loss)
Week 9	Transformer Test: Open circuit Test, Short circuit Test
Week 10	Regulation calculation using short and open circuit tests, Efficiency calculation using short and open circuit tests, Maximum efficiency
Week 11	All day efficiency
Week 12	Auto transformers and their types
Week 13	Transformer polarity, Parallel operation of transformers
Week 14	Three-phase transformer
Week 15	Connection of three phase transformers
Week 16	**Preparatory week before the final exam**

References
• Electrical Technology, BL Theraja, Volume-II (AC & DC Machines) • Principles of Electrical Machines ByVK Mehta,Rohit Mehta

Course laboratories	
Machine lab	
Weeks	**Experiments**

Week 1	Exploring the Essentials of DC Machine Lab
Week 2	No-load Characteristics (OCC) of Separately Excited Dc Generator
Week 3	Study the Conditions for Build-up of a DC Shunt Generator
Week 4	Study of Load Characteristics of DC Shunt Generator
Week 5	Speed Control of Separately Excited Dc Motor
Week 6	Load Characteristics of Long Shunt DC Compound Motor
Week 7	Swinburn's Test

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted

Course description
This course includes the following. - Introduction to digital technologies: Fundamentals of digital systems: Digital systems, digital signals, analog systems, analog signals, examples - Definitions, number system General number format: binary, octal, decimal, hexadecimal. Number base conversion: arithmetic operations in different number systems, Complements, binary codes, BCD, Ex-3, Gray codes - Standard forms of digital logic gates: Logic gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR

Implementations of logical functions using gates, NAND–NOR implementations - Multi-level gate implementations - Multi-output gate implementations Boolean algebra, basic definitions, basic theory and properties, Boolean functions. Minimization Techniques: Boolean Postulates and Laws – De Morgan's Theorem – Principle of Duality – Boolean Expression – Minimization of Boolean Expressions — Minimum – Maximum – Sum of Products (SOP) – Product of Sums (POS) –Karnaugh Chart, Karnaugh Map: Implementing AND-OR, I Don't Care

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Digital Technical II	Course Name / Course Code
Bologna	Academic System
	Programs Included
Actual attendance	Learning Method
second semester/ 2024-2025	Semester / Year
50 hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Learning objectives	
1. To establish the basic concepts of Digital Combinational Circuits Design. 2. To understand the basic Arithmetic and digital circuits. 3. To perform Logical and digital Circuits analysis. 4. To develop problem solving skills and understanding of Digital Systems through the application of techniques. 5. To establish the basic design concepts of Digital Sequence machines and counters. 6. To understand the Basic digital memory circuits and types. 7. To perform Logical and digital sequential circuits analysis. 8. To introduce the Basic Digital circuits operation and analysis	

Learning outcomes
1) To outline the formal procedures for the analysis and design of combinational circuits. 2) Students should be able to explain about digital systems and logic circuits. 3) The students should be able to differentiate between combinational and sequential circuits through understanding the clocking and

synchronization.
4) To introduce Latches and Flip-flops Design as Simple Sequential Circuits
Examples
5) To introduce the Basics of Digital Counters Analysis and Design as a sequential machine.
6) To Learn the design and analysis of Shift registers with various types
7) To outline the Basic Digital memory Circuits, types, operation, capacity and organization.

Method of teaching
The main strategy that will be adopt in delivering this module is to encourage students 'participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieve through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Evaluating
For evaluation purposes, it is used. Quick and surprise tests method Determine some homework Midterm exams

Course structure	
weeks	**Material covered**
Week 1	COMBINATIONAL CIRCUITS Adders Arithmetic Operations: half and full adders
Week 2	Subtractions, Subtractions and binary parallel address.
Week 3	Code Conversion: Even and odd party logic, decoders, encoders
Week 4	Comparators, multiplexers and DE multiplexers.
Week 5	Sequential logic circuits Latches: SR latch, Gated SR Latch, D-latch,
Week 6	D-latch with enable Flip- flops: latches
Week 7	Flip- flops, R-S and J-K flip flop
Week 8	Master Slave flip flop, J-K flip flop, T and D flip flop
Week 9	Counters:

	Mode N Counters, ripple counters
Week 10	synchronous counters, ring/Johnson counters
Week 11	Asynchronous counters Mod-N or divided by N Counter
Week 12	Shift registers: Basic principle, serial and parallel data transfer.
Week 13	Shift left/right registers, universal shift register. Shift Registers.
Week 14	Memory design: Classification of memories, ROM, ROM organization, PROM, EPROM, EEPROM, EAPROM, RAM, RAM
Week 15	Organization, Write operation, Read operation, Memory cycle, Timing wave forms, Memory decoding, memory expansion
Week 16	Preparatory week before the final Exam

references
• Thomas L. Floyd, Digital Fundamentals, 9th Edition

Admission	
No Prerequisites	Prerequisites
40	Minimum number could be accepted
50	Maximum number could be accepted