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

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

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

first stage

Bologna process

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

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.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Second stage

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

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

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

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

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

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.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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:

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

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

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

Stage 3

Semester

System

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

Course Description

Course Description
This section includes a description of the unit, and the elements of the communications system (signal analysis). Classification of periodic and aperiodic signals, Fourier series and Fourier transform, system classification, power spectral density, correlations Noise: Types, Power Calculation, Thermal White Gaussian Noise (AWGN), band-limited noise (baseband and extended band), and noise across linear systems. Linear modification:AM/DSB-LC,AM/DSB-SC,AM/SSB-SC,AM/VSB, noise in linear modulation system, frequency division multiplexing (FDM), and commercial futures (TRFandsuper-heterodyne), and noise in linear modulation systems. Angular modulation:NBFM,NBPM,WBPM, and noise in angular modulation systems.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Communications /E3103	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
60hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
1. Understand the basic concepts and principles of signal analysis. 2. Understanding signal and system classifications 3. Analysis and design of various analog modulation techniques such as capacitive modulation (AM) and frequency modulation (FM) and phase modification (PM). 4. Understand the characteristics of different analog communication channels and	

their impact on system performance.
5. Explore the concept of noise in analog communication systems and its effects on signal quality.
6. Learn different techniques to improve signal-to-noise ratio.

Learning outcomes

1. Identify signal analysis techniques using Fourier series and Fourier transform.
2. Discuss the components of a communication system.
3. Summarize what is meant by modification and why the modification.
4. Explain the different types of analog modulation such as amplitude modulation (AM) and frequency adjustment (FM) and modify the phase (PM).
5. Describes the process of modulating and demodulating different types of analog modulation using circuits and blocks.
6. Evaluate the performance of analog communications systems using metrics such as signal-to-noise ratio (SNR) and bandwidth efficiency.

Teaching and learning methods

This unit will be delivered through classroom lectures that provide a good understanding of the unit contents and encourage students to solve tasks through interactive tutorials. Visual teaching will be considered to create a metal image or diagrams to help understand the concepts of the contents.

Evaluation methods

For evaluation purposes, it is used.

51. Quick and surprise tests method
52. Determine some homework
53. Midterm exams

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

Course structure	
weeks	**Material covered**
Week 1	Signal classification of periodic and non-periodic signal
Week 2	Fourier series and Fourier transform
Week 3	Classification of system, power spectral density, correlations
Week 4	**Noise:**Types, power calculation, thermal white Gaussian noise (AWGN)
Week 5	BAND-LIMITED noise (base band and band pass), Noise through linear systems
Week 6	AM/DSB-LC, AM/DSB-SC,
Week 7	AM/SSB-SC, AM/VSB, Noise in AM System
Week 8	Midterm exam
Week 9	Modulation and demodulation of various types of AM
Week 10	Angle modulation: Frequency modulation (FM)
Week 11	NBFM, NBPM, WBPM
Week 12	Modulation and demodulation of FM
Week 13	Phase modulation (PM)
Week 14	Modulation and demodulation of PM
Week 15	Noise in angle modulation
Week 16	**Preparatory week before the final exam**

References
• Communication systems - Simon Haykins
• Communication systems -by AB Carson

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, operational amplifiers: ideal operational amplifier, inverting configuration, non-inverting configuration, differential amplifiers, integrators and differentiators, DC disadvantages, effect of limited open-loop gain and bandwidth on circuit performance, operation of operational amplifiers with large signals, 741 operational amplifier circuit, some applications of operational amplifier. Active Filters: Concept of filters, types, direct implementation approach, simulated inductance methods, variable frequency, measurement methods, state variable filter, cascade implementation approach, single op-amp structures, voltage controlled voltage source circuits, multi-loop feedback circuits. Oscillators: Oscillator Concepts, Low Frequency Oscillators, Phase Shift OscillatorsRC, Vienna bridge oscillators, high frequency oscillators, Hartley oscillators, Colpitts oscillators, Clapp and Meissner oscillators, negative resistance oscillators, crystal oscillators. Voltage and current regulators Zener Diode Stabilizers, Line Regulators, Voltage Regulators, Series Regulators, Switching Regulators, Switching Regulators, Current Regulators, Typical Current, Ground LoadCR. Analog Multipliers: Operation of Analog Multiplier, Its Characteristics and

Applications. Analog multipliers: logarithmic multiplier, square multiplier, trigonometric mean multiplier, time division multiplier, current rationing multiplier.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
ElectronicIV/E3105	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives

1. Understand the principles and applications of operational amplifiers.
2. Gain knowledge about ideal operational amplifier and basic operational amplifier configurations.
3. Learn how to perform an analysis of an ideal operational amplifier circuit.
4. Identify operational amplifier specifications including DC offset parameters and frequency parameters.
5. Develop an understanding of important characteristics such as gain bandwidth, deviation rate, and maximum signal frequency.
6. Understand the concept of negative feedback in loudspeakers.
7. Identify ideal feedback topologies and their applications.
8. Gain knowledge about impedance in feedback amplifiers.
9. Identify practical feedback amplifiers, including voltage feedback, conductivity feedback, and resistance feedback, along with their implementation in operational amplifiers,FET, andBJT.
10. Learn the principles and applications of active filters.
11. Understand the transfer of filters, their types and specifications.
12. Gain insight into filtersButterworthandChebyshev.
13. Gain a comprehensive understanding of active filters for low and high frequencies, band frequencies and stop band frequencies.
14. Learn how to implement and design these filters in different scenarios.

This unit aims to enhance your understanding of electronic systems, their design and practical applications. You will learn about different types of amplifiers and filters, how they work internally, and their use in different electronic configurations. This knowledge will provide a foundation for studying more complex electronics and can be applied in various engineering fields such as communications, signal processing and more.

Learning outcomes

1. Describe the function and operation of operational amplifiers.
2. Distinguish between different types of operational amplifier configurations including inverting, non-inverting and voltage tracking.
3. Perform circuit analysis on ideal operational amplifier systems.
4. Understand and calculate DC offset parameters and frequency parameters of operational amplifiers.
5. Analyze and interpret amplifier specifications including gain bandwidth, deviation rate, and maximum signal frequency.
6. Explain the concept and importance of negative feedback in loudspeakers.
7. Identify and apply ideal feedback topologies in different amplifier designs.
8. Understand and calculate input and output impedances in feedback amplifiers.
9. Design and analysis of practical feedback amplifiers with respect to voltage feedback, transient conductivity and transient resistance.
10. Define and explain the concept and application of active filters.
11. Understanding and applying knowledge of filter transfer, their types and specifications.
12. Design and implementation of filtersButterworthandChebyshev.
13. Create and analyze low-pass, high-pass, bandpass and stop-band filters.
14. Demonstrate proficiency in designing and applying various active filter circuits.

By the end of this unit, students should be able to use this knowledge effectively in their subsequent studies and professional work, demonstrating proficiency in the analysis and design of circuits involving operational amplifiers and active filters. They should also be able to adapt and apply these concepts to solve real-world electronics challenges.

Teaching and learning methods

1. Lectures: Traditional lectures will be used to provide basic knowledge, clarify

complex concepts and guide students through the key aspects of operational amplifiers, feedback amplifiers and active filters. This will include a mix of theoretical concepts and practical examples.
2. Interactive learning sessions: To ensure active participation, interactive sessions such as question and answer rounds, quizzes or short discussions on specific topics can be conducted. These sessions can be useful to check immediate understanding and clarify any doubts or misconceptions.
3. Laboratory Work: Practical laboratory sessions are essential to understanding electronics. Students will work with operational amplifiers and active filters in the laboratory to gain practical experience and knowledge about these components.
4. Group Projects and Assignments: Students will be assigned projects and homework assignments that require them to apply the concepts they have learned in lectures and labs. This will help enhance their problem-solving skills and enhance their understanding.
5. Online learning resources: Access to digital learning resources, such as online tutorials, e-books, and academic articles, can complement the traditional learning experience in classrooms and laboratories.
6. Guest Lectures: Inviting industry professionals and academic experts can provide students with different perspectives and applications of the concepts they are learning in the real world.
7. Review and feedback sessions: Regular review sessions should be conducted to address student queries and provide clarification on complex topics. In addition, review sessions before major assessments will be helpful.
8. Self-study: Encouraging students to independently explore topics outside of the course material can enhance understanding and curiosity about electronics.
These strategies aim to provide a diverse and comprehensive learning experience, combining theoretical knowledge, practical skills and independent learning. This multifaceted approach prepares students for future academic study or employment in the electronics industry.

Evaluation methods
For evaluation purposes, it is used. 54.Quick and surprise tests method 55.Determine some homework 56.Midterm exams

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

Course structure	
weeks	**Material covered**
Week 1	**Chapter One: Operational Amplifier** 1.1 Introduction 1.2 Amplifier Fundamentals 1.3 Operational Amplifier 1.3.1 The Ideal Op-Amp 1.4 Basic Op-Amp Configurations 1.4.1 The Inverting Configuration 1.4.2 The Noninverting Configuration 1.4.3 The Voltage Follower
Week 2	1.5 Ideal Op-Amp Circuit Analysis 1.5.1 Summing Amplifier 1.5.2 The Difference Amplifier 1.5.2.1 Input Signal Modes 1.5.2.2 Common-Mode Rejection Ratio
Week 3	1.5.3 The Integrator Amplifier 1.5.4 The Differentiator Amplifier
Week 4	1.6 Op Amp Specifications – DC Offset Parameters 1.6.1 Offset Currents and Voltages
Week 5	1.7 Op Amp Specifications – Frequency Parameters 1.7.1 Gain–Bandwidth 1.7.1.11 $\boldsymbol{dB}$Open-Loop Bandwidth 1.7.1.2 Closed-Loop Bandwidth

	1.7.2 Slew Rate (SR) 1.7.3 Maximum Signal Frequency
Week 6	**Chapter Two: Feedback Amplifier** 2.1 Negative Feedback **+ Quiz**
Week 7	2.2 Ideal Feedback Topologies 2.2.1 Voltage Amplifier (Series-Shunt) 2.2.2 Current Amplifier (Shunt-Series) 2.2.3 Transconductance Amplifier (Series-Series) 2.2.4 Transresistance Amplifier (Shunt-Shunt)
Week 8	2.3 Impedance in Feedback Amplifiers 2.3.1 Input Impedance – Series Mixing (Voltage & Transconductance) 2.3.2 Input Impedance – Shunt Mixing (Current & Transresistance) 2.3.3 Output Impedance – Series Sampling (Current & Transconductance) 2.3.4 Output Impedance – Shunt Sampling (Voltage & Transresistance)
Week 9	2.4 Practical Feedback Amplifiers 2.4.1 Voltage (Series-Shunt) Feedback 2.4.1.1 Op-Amp Amplifier 2.4.1.2 FET Amplifier 2.4.1.3 BJT Amplifier 2.4.2 Transconductance (Series-Series) Feedback 2.4.2.1 BJT Amplifier 2.4.3 Transresistance (Shunt-Shunt) Feedback 2.4.3.1 Op-Amp Amplifier 2.4.3.2 FET Amplifier
Week 10	**Midterm Exam**
Week 11	**Chapter Three: Active Filter** 3.1 Introduction

	3.2 Filter Transmission, Types, and Specifications 3.2.1 Filter Transmission 3.2.2 Filter Types 3.2.3 Filter Response Specifications 3.2.3.1 Low-Pass Filter 3.2.3.2 High-Pass Filter 3.2.3.3 Band-Pass Filter 3.2.4 Filter Transfer Function
Week 12	3.3 Butterworth and Chebyshev Filters 3.3.1 Butterworth Filter 3.3.1.1 Natural Mode Identification 3.3.2 Chebyshev Filter 3.3.3 The Damping Factor 3.3.4 Critical Frequency and Roll-Off Rate
Week 13	3.4 Active Low-Pass Filter 3.4.1 Single-Pole Filter 3.4.2 Sallen-Key Low-Pass Filter 3.4.3 Cascaded Low-Pass Filters 3.5 Active High-Pass Filter 3.5.1 Single-Pole Filter 3.5.2 Sallen-Key High-Pass Filter 3.5.3 Cascaded High-Pass Filter
Week 14	3.6 Active Band-Pass Filter 3.6.1 Cascaded Low-Pass and High-Pass Filter 3.6.2 Multiple-Feedback Band-Pass Filter 3.6.3 State-Variable Filter 3.6.4 The Biquad Filter 3.7 Active Band-Stop Filter

	3.7.1 Multiple-Feedback Band-Stop Filter
Week 15	**Quizz**
Week 16	**Preparatory week before the final exam**

References

- Robert L. Boylestad, "Electronic Devices and Circuit Theory", 11TH Edition, Pearson Education Limited, 2015.
- Thomas L. Floyd, "Electronic Devices, Electron Flow Version", 9TH Edition, Pearson Education Limited, 2015.

Course laboratories

Electronics Lab

Weeks	Experiments
Week 1	Experiment 1: OP-AMP CIRCUITS
Week 2	Experiment 2: OP-AMP APPLICATIONS
Week 3	Experiment 3: THE COMPARATOR
Week 4	Experiment 4: ACTIVE FILTERS
Week 5	Experiment 5: RC OSCILLATORS
Week 6	Experiment 6: LC OSCILLATORS
Week 7	**Exam**

Admission

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

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

Course Description

Course Description
This section includes a description of the unit, Fourier transform: properties of convolution theory, power spectrum, density and correlations, linear signals and systems, applications. ConversionZ:Convergence region, transformation propertiesZ, conversion pairsZ, inverse transformationZ, analysis and discrete-time systems, applications. Complex Variables Theory: Functions of complex variables, complex differentiation, analytic functions and their properties, integration in the complex plane, Cauchy's theorem, Cauchy's integral formula for simply and doubly connected regions, Taylor and Laurent series, residue theorem. Solving differential equations using power series Legendre's equation, Legendre's polynomials, Bessel functions of the first and second order, properties of the Bessel function. Partial differential equations: wave equation, Laplace equation, solving boundary condition problems, general solution, solution by separation of variables.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Engineering analysisI/E3104	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
45hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

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

Course objectives
1. Understand the principles and techniques of engineering analysis. 2. Develop skills in applying mathematical and computational methods to solve engineering problems. 3. Develop problem solving skills and understanding of Fourier series and Fourier transforms. 4. Understand conversionZ. 5. Learn how to analyze complex variable problems. 6. Develop a solid foundation for solving differential equations using power series.

Learning outcomes
1. Learn about frequency domain analysis using Fourier transform. 2. Conversion applicationZAnd convertZThe reverse. 3. Discrete-time systems analysis, applications. 4. Discuss the complex variable function and the analytic function. 5. Evaluating assignment and integration at the complex level. 6. Solving differential equations using power series

Teaching and learning methods
This unit will be delivered through lectures and tutorials where the student will be able to understand the content of the unit. Active learning will be implemented through collaborative groups to solve exercises, tasks and projects.

Evaluation methods
For evaluation purposes, it is used. 57.Quick and surprise tests method 58.Determine some homework 59.Midterm exams

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

Course structure	
weeks	**Material covered**
Week 1	Introduction, periodic functions properties, sine and cosine form
Week 2	half range series,complex Fourier series
Week 3	Parseval's theorem,Fourier integral,Fourier transform Properties
Week 4	convolution theorem,power spectral, density and correlations, signals and linear systems, applications
Week 5	Region of convergence, properties of Z-transforms
Week 6	Z-transform pairs, the inverse of Z transform
Week 7	Analysis of discrete-time systems, Z-transform applications.
Week 8	Midterm exam and related rates
Week 9	Functions of complex variables, complex differentiation
Week 10	Analytic functions and its properties, integration in the complex plane
Week 11	Cauchy's theorem, Cauchy's integral formula for simply and multiply connected regions
Week 12	Taylor's and Laurent series, the residue theorem
Week 13	Legendre's equation, Legendre's polynomials,
Week 14	Bessel functions of the first and second orders, Bessel function properties.
Week 15	Wave equation, Laplace equation, solution of boundary condition problems, general solution
Week 16	**Preparatory week before the final exam**

References
• "Advanced Engineering Mathematics" by Erwin Kreyszig
• "Principles of Mathematical Analysis" by Walter Rudin
• "Introduction to the Theory of Computation" by Michael Sipser

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

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

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, introduction and review: systems, factory, linear dynamic systems, open-loop and closed-loop (feedback) systems. Control systems modeling: Mathematical model of electrical systems, electromechanical systems, block diagrams, signal flow diagram, Mason's rule. Time domain analysis: first order system response, second order system response, step response analysis and performance specifications, static and dynamic error coefficient. Stability analysis: stability of dynamic systems, Routh-Horwitz stability criterion, root locus analysis.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
ControlI/E3107	Course Name / Course Code
Semester system	Academic System

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

	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
45hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives
1. Understand the basic concepts of control theory. 2. Analysis of linear control systems 3. Design and evaluation of control systems 4. Application of control theory to practical systems 5. Understanding advanced control techniques 6. Simulation and analysis of control systems 7. Stability and performance evaluation 8. Solving control system design problems

Learning outcomes
1. Introduction and Review: - Have a basic understanding of control systems engineering and be able to provide some illustrative examples and their relation to major contemporary issues. - Ability to give a brief history of control systems and their role in society. - The ability to discuss the future of controls in the context of their evolutionary trajectories. - Identify the design elements of control systems and have an appreciation of controls in the context of engineering design. 2. Frequency domain modeling - Finding the Laplace transform of time functions and the inverse Laplace transform - Finding the transfer function from a differential equation and solving the differential equation using the transfer function - Finding the transfer function for linear electrical networks that are constant over time - Finding the transfer function for linear time-invariant mechanical systems - Finding the transfer function for linear rotary mechanical systems that are invariant with time - Finding the transfer function for time-invariant linear electromechanical systems

- Production of similar electrical and mechanical circuits.
- Convert a nonlinear system to a linear system to find the transfer function.

3. Reducing multiple subsystems
- Reduce a block diagram of multiple subsystems to a single block representing the transfer function from input to output.
- Analysis and design of transient response of a system consisting of multiple subsystems)
- Convert block diagrams to signal flow diagrams
- Finding a transfer function for multiple subsystems using Masson's rule
- Represent state equations as signal flow graphs.
- Represent multiple subsystems in state space in sequential, parallel, controller canonical, and observer canonical forms.

4. Response time
- Use the poles and zeros of transfer functions to determine the time response of a control system.
- Quantitatively describe the transient response of first-order systems.
- Write the general response for second-order systems taking into account the location of the pole.
- Find the damping ratio and natural frequency of a second-order system.
- Find the settling time, peak time, overshoot rate and rise time of an underdamped second-order system.
- Approximation of higher order systems and systems with zeros as first or second order systems.
- Describe the effects of nonlinearity on the system time response.

5. Steady state errors
- Finding the steady state error of a unitary feedback system
- Determine the steady-state error performance of the system.
- Design the closed loop system gain to meet the steady state error specifications.
- Find the steady state error of the disturbance input.
- Finding the steady state error of non-unitary feedback systems
- Find the sensitivity of the steady-state error to parameter changes.

6. Stability analysis:
- Create and interpret a basic Roth table to determine system stability.
- Create and interpret a Roth table where the first element in the row is zero or the entire row is zero.
- Use the Routh table to determine the stability of the system represented in the state space.

7. Root placement techniques
- Locate the root
- Statement of the characteristics of the root position
- Draw the root position
- Find the coordinates of the points on the root locus and the associated gains.
- Use the root locus to design a parameter value to meet transient response specifications for systems of order 2 and above.
- Root locus plot for positive feedback systems
- Find the root sensitivity of points along the root locus.
8. Design via root position
- Use the root locus to design cascade compensators to improve the steady-state error.
- Use the root position to design cascade compensators to improve transient response.
- Use the root locus to design cascade compensators to improve both the steady-state error and the transient response.
- Use the root locus to design feedback compensators to improve transient response.
- Implement the designed compensations actually.

Teaching and learning methods

- Active learning: Encourage students to actively engage with the course material through activities such as discussions, group work, case studies, and problem-solving exercises. This helps students build their own understanding of the subject and enhances critical thinking skills.
- Real-world applications: Connect course material to real-world examples and applications to help students see the relevance and usefulness of what they are learning. This can be done through case studies, field trips, or project-based assignments.
- Integrating Technology: Leveraging technology tools and resources to enhance learning experiences. This can include multimedia presentations, online discussion forums, virtual labs, interactive simulations, and educational apps. Technology can facilitate active learning, provide additional resources, and enable collaboration among students.
- Differentiation: Recognizing and accommodating diverse student learning needs and preferences. Offering a variety of instructional methods, such as visual,

auditory, and kinesthetic activities, to meet different learning styles. Providing additional support or challenges based on individual student needs.
- Formative assessment: Incorporate ongoing formative assessments throughout the course to monitor student progress and provide timely feedback. This can include quizzes, short assignments, group discussions, or group presentations. Formative assessments help identify areas where students may need additional support and allow for course modifications as needed.
- Breaking down complex concepts into smaller, manageable parts and providing support and guidance as students build their knowledge and skills.
- Collaborative Learning: Foster a collaborative and inclusive learning environment where students can learn from and with each other. Encourage group work, peer feedback, and discussions to promote active participation, teamwork, and the exchange of ideas.
- Reflection and Cognition: Incorporate opportunities for students to reflect on their learning and develop cognitive skills. Encourage self-assessment, journaling or group discussions where students can analyse their learning, identify strengths and weaknesses and set goals for improvement.
- Flexibility and adaptability: Recognizing that students have different learning speeds and preferences. Providing flexibility in terms of teaching pace, content delivery, and assessment methods to accommodate diverse learning needs and enhance student engagement.
- Continuous improvement: Regularly evaluate the effectiveness of teaching strategies and make adjustments based on student feedback, assessment results, and your own observations. Reflect on course outcomes and look for opportunities for improvement in future iterations.

Evaluation methods
For evaluation purposes, it is used. 60.Quick and surprise tests method 61.Determine some homework 62.Midterm exams

Course structure

weeks	Material covered
Week 1	INTRODUCTION Brief History of Automatic Control - System Configurations and Analysis - Different Between Closed- and Open-Loop - Applications of control systems -
Week 2	MODELING IN THE FREQUENCY DOMAIN Laplace Transform Review - The Transfer Function - electrical Network Transfer Functions, - Translational Mechanical System Transfer Functions -
Week 3	MODELING IN THE FREQUENCY DOMAIN Rotational Mechanical System Transfer Functions - Electromechanical System Transfer Functions - Electric Circuit Analogs - Nonlinearities - Linearization -
Week 4	REDUCTION OF MULTIPLE SUBSYSTEMS Introduction - Block Diagrams - Analysis and Design of Feedback Systems - Signal-Flow Graphs - Mason's Rule -
Week 5	TIME RESPONSE Introduction - Poles, Zeros, and System Response - First-Order Systems - Second-Order System - Underdamped Second-Order Systems - Delay time, Rise time, Peak time, Settling time, Maximum overshoot -
Week 6	TIME RESPONSE System Response with Additional Poles - System Response with Zeros - Effects of Nonlinearities upon Time Response - System Response with Additional Poles - System Response with Zeros - Effects of Nonlinearities upon Time Response -

Week 7	Mid Term
Week 8	STEADY-STATE ERRORS Introduction - Steady-State Error for Unity Feedback Systems - Static Error Constants and System Type -
Week 9	STEADY-STATE ERRORS Steady-State Error Specifications - Steady-State Error for Disturbances - Steady-State Error for Nonunity Feedback Systems - Sensitivity -
Week 10	STABILITY Introduction - Routh-Hurwitz Criterion -
Week 11	STABILITY Routh-Hurwitz Criterion: Special Cases -
Week 12	ROOT LOCUS TECHNIQUES Introduction - Defining the Root Locus - Properties of the Root Locus - Sketching the Root Locus - Refining the Sketch -
Week 13	ROOT LOCUS TECHNIQUES Transient Response Design via Gain Adjustment - Generalized Root Locus - Root Locus for Positive-Feedback Systems - Pole Sensitivity -
Week 14	DESIGN VIA ROOT LOCUS Introduction - Improving Steady-State - Improving Transient Response via Cascade Compensation -
Week 15	DESIGN VIA ROOT LOCUS Improving Steady-State Error and Transient Response - Feedback Compensation - Physical Realization of Compensation Error via Cascade Compensation -
Week 16	Preparatory week before the final exam

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

References
• CONTROL SYSTEMS ENGINEERING BY NORMAN S. NISE K. OGATA, MODERN CONTROL ENGINEERING,5TH EDITION • Modern Control Systems) Richard C. Dorf & Robert H. Bishop (

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

Course Description

Course Description
The student learns about high pressure technology and the type of insulating material used in high pressure and also learns Electrical faults in gases, solids and liquids Classical gas laws, spark voltage, Paschen's law, breakdown field strength, breakdown in uniform and irregular fields, partial breakdown and corona, polarity effect, breakdown in solids and liquids. Electrostatic fields: Electrostatic field distribution, breakdown strength of dielectric materials, fields in homogeneous materials, fields in multilayer materials, stress control, experimental field analysis techniques. High voltage generation: High voltage AC, DC and pulse, transformer testing, series resonant circuits, pulse voltages, operation and construction of pulse generators. High voltage measurement: Voltage measurement by spark gaps, ball gaps, uniform field gaps, electrostatic voltmeter, voltage dividers. Overvoltage and insulation coordination: lightning mechanism

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
High pressure /E3108	Course Name / Course Code
Semester system	Academic System

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

	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
45hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives
High voltage engineering is a branch of electrical engineering that deals with the study and application of high voltages, usually above 1000Volt. It is an important field involved in the design, development and maintenance of equipment and systems that operate at high levels of voltage, including: Including power transmission and distribution systems, transformers, circuit breakers and other electrical equipment.. The study of high voltage engineering involves an understanding of the behavior of electrical insulating materials, the design of insulation systems, and the various phenomena that It occurs at high voltage levels, such as corona discharge and partial discharge. It also includes an evaluation of safety measures and systems. Protection against electrical breakdown and related hazards High voltage engineering has significant practical applications in many industries, including power generation and distribution, transportation, and telecommunications. Medical equipment, and communication systems. It is a very important field that requires careful attention to safety and a deep understanding of For electrical principles To ensure the safe and efficient operation of high voltage equipment and systems.

Learning outcomes

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. 63.Quick and surprise tests method 64.Determine some homework 65.Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Electrical Breakdown in Gases, Solids and Liquids Classical gas laws
Week 2	the sparking voltage Paschen's law, the breakdown field strength
Week 3	Breakdown in uniform and non-uniform fields, partial breakdown and corona, polarity effect, breakdown in solids and liquids.
Week 4	Electrostatic field distribution, breakdown strength of insulating materials
Week 5	fields in homogeneous materials, fields in multilayer materials
Week 6	Stress control, experimental field analysis techniques.
Week 7	AC, DC, and impulse high voltages,
Week 8	testing transformers, series resonant circuits
Week 9	impulse voltages, operation and construction of impulse generators.
Week 10	Voltage measurements by spark gaps
Week 11	sphere gaps, uniform field gaps
Week 12	electrostatic voltmeters, voltage dividers.
Week 13	Over-voltages and Insulation Coordination: The lightning mechanism simulated lightning surges for testing
Week 14	Protection against over-voltages
Week 15	insulation coordination

Week 16	

References
•

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, Electrical Power Sources: Power System Structure and Elements, References Primary energy, power plants, steam, hydroelectricity, gas turbines, nuclear, high pressure hydroelectric power generation, renewable energy sources, solar energy, wind generators, other

renewable sources, single and three phase AC and DC transmission, development of electrical energy in Iraq.
Mechanical design of transmission lines: conductor materials, line supports, sag, sag calculation, wind and ice effect, insulators, voltage distribution on insulator string, string efficiency, string efficiency improvement.
Transmission line parameters: line resistance, line inductance, single-phase lines with multiple conductors, assembly, line inductance for three-phase transmission systems, single-phase and three-phase capacitance. Electrical characteristics of overhead transmission lines
Representation of lines, short, medium and long, equivalent circuit of long transmission line, power factor flow through transmission line, power circuit drawing, line regulation, reactive compensation of transmission line.
Corona: phenomenon, critical effort disabled, critical effort visible, corona losses, factors and conditions affecting corona losses.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Electrical powerI/E3102	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
60hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
This course aims to: 1. Understand the importance of electrical power systems. 2. Understand the main working of electrical power systems. 3. Understanding the parameters of electrical power systems. 4. Improving the performance of electrical power systems. 5. Develop the skills needed to develop electrical power systems. 6. High voltage analysis of power transmission lines	

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

Learning outcomes
1. Learn how power plants work. 2. List the parameters of high voltage transmission lines. 3. Analysis of sagging problems that occur in power transmission lines 4. Discuss the mechanical design of transmission lines. 5. Describe the electrical characteristics of overhead transmission lines. 6. Definition of aura.

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. 66.Quick and surprise tests method 67.Determine some homework 68.Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Structure of power system and its elements, major sources of primary energy,
Week 2	Power stations, steam, hydro, gas turbines, nuclear, MHD generation
Week 3	renewable energy sources, solar energy, wind generators, other renewable sources
Week 4	AC and DC single and 3-phase transmission, development of electric power in Iraq
Week 5	Economics of generation, load curves, choice of size and number of generator units

Week 6	Effect of system voltage on transmission efficiency of power supply system
Week 7	Mid-term + choice of transmission voltage, power factor improvement, most economical power factor
Week 8	Conductor materials, line supports, sag,
Week 9	Calculation of sag, effect of wind and ice,
Week 10	insulators, voltage distribution over an insulator string,
Week 11	string efficiency, improving string efficiency
Week 12	Phenomenon, disruptive critical voltage, visual critical voltage, corona losses, factor and conditions affecting corona losses.
Week 13	Conductor materials, insulating materials, sheathing end armoring materials, types of cables
Week 14	insulation resistance, stress and capacitance, use of inter sheaths, capacitance grading, power factor in cables.
Week 15	capacitance in three core cables, thermal characteristics, comparison between overhead lines and underground cables
Week 16	**Preparatory week before the final exam**

References
• V. K. Mehta and Rohit, “Principles of Power System”, S. Chand, 2005
• Stevenson, W. D. (1994). Power Systems: Analysis and Design. McGraw-Hill
• Hadi Saadat, “Power System Analysis”, Tata McGraw-Hill, 2002.
• T. K. Nagsarkar, “Power System Analysis”, Oxford University Press, 2014.

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

Course Description

Course Description
In this course, concepts will be studied.MBasic microprocessors. The student will learn about the principle of operation of the 8086 processor, its basic structure and architectural composition. The topics that will be studied include: 8086 microprocessor Introduction to the 8086 microprocessor – Microprocessor architecture – Instruction modes – Instruction set and assembly directives – Assembly language programming – Modular programming – Linking and transfer – Stacks – Procedures – Macros – Interrupts and interrupt service routines – Byte and string handling. 8086 system bus architecture 8086 signals - Basic configurations - System bus timing - System design using 8086 - Input and output programming - Introduction to multiprogramming - System bus architecture - Multiprocessor configurations - Coprocessor, tightly coupled and loosely coupled configurations - Introduction to advanced processors. Input/Output Interface Memory interface and I/O interface – Parallel communication interface – Serial communication interface – InterfaceD/AandA/D– Timer – Keyboard/Display Controller – Interrupt Controller – ControllerDMA– Programming and Applications Case Studies: Traffic Light Control, ScreenLED, screenLCD, keypad interface and alarm control screen, microcontroller engineering and programming. microcontroller interface Timers Programming - Serial Port Programming - Interrupt Programming - InterfaceLCDKeyboard – ADC interface, DAC and sensor – External memory interface – Stepper motor and waveform generation.

Ministry of Higher Education and Scientific Research	Educational Institution

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

Department of Electrical Engineering / University of Misan	University Department/Center
Microprocessors /E3106	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
30hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives

- Understanding Microprocessor Architecture: Students should gain a comprehensive knowledge of the 8086 microprocessor architecture, including bus interface, instruction set, and memory organization.
- Programming Skills: Develop proficiency in assembly language programming specifically for the 8086 microprocessor.
- Interconnection Techniques: Learn how to interface the microprocessor with other electronic components and devices.
- Problem Solving: Provide students with the skills to solve practical and theoretical problems using the 8086 microprocessor.

Learning outcomes

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. 69.Quick and surprise tests method 70.Determine some homework 71.Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Introduction to the microprocessor and computer & microprocessor organization
Week 2	Introduction to the microprocessor and computer & microprocessor organization
Week 3	Micro-architecture of the 8086 Microprocessor: Introduction to Microarchitecture of the 8086 Microprocessor. and Software Model of the 8086 Microprocessor
Week 4	Micro-architecture of the 8086 Microprocessor: Introduction to Microarchitecture of the 8086 Microprocessor. and Software Model of the 8086 Microprocessor
Week 5	microprocessors architecture and its operations CPU machine and assembly language Addressing Modes: Register, immediate, direct, register indirect, based-plus-index, register relative, and base relative plus- index addressing
Week 6	microprocessors architecture and its operations CPU machine and assembly language Addressing Modes: Register, immediate, direct, register indirect, based-plus-index, register relative, and base relative plus- index addressing
Week 7	microprocessors architecture and its operations

	CPU machine and assembly language Addressing Modes: Register, immediate, direct, register indirect, based-plus-index, register relative, and base relative plus- index addressing
Week 8	Instruction Set and Programming: Data Movement Instructions
Week 9	Instruction Set and Programming: Data Movement Instructions
Week 10	string Instructions
Week 11	Arithmetic Instructions
Week 12	Arithmetic Instructions
Week 13	Logic Instructions
Week 14	INTERFACING MICROCONTROLLER Programming Timers – Serial Port Programming – Interrupts Programming – LCD
Week 15	& Keyboard Interfacing – ADC, DAC & Sensor Interfacing – External Memory Interface- Stepper Motor and Waveform generation.
Week 16	Prepare for the final exam

References

- Barry B. Brey, "The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, and Pentium Pro Processor Architecture, Programming, and Interfacing", 6th Edition, Prentic-Hall Inc., 2003.

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 description of the unit, synchronous AC generators, construction, salient and non-salient pole types, linear and non-linear analysis of cylindrical rotor, salient pole machines (dual-reaction and general methods), electromotive force equation, motor reaction equation, power, parallel operation of synchronous generators, performance of generator connected to infinite bus, curvesVSynchronous motor, starting method, phase diagram and equivalent circuit, search for synchronous machine.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Electrical machinesIII/E3101	Course Name / Course Code
Semester system	Academic System
	Programs Included

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

Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
60hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives

In general, this unit aims to provide students with adequate knowledge about induction machines, especially in the study of induction machines (single phase induction motor, three phase induction motor, induction generators), and enable them to understand their principles, analyze their performance and apply this knowledge in practical applications in various industries. The objectives can be described in detail in the following points:

1. Understand the basic principles of induction machines: Students should be able to grasp the basic concepts and principles behind the operation ofn, including electromagnetism, magnetic fields, and the interaction between the stator and rotor.
2. Description of construction of induction machines: Students should be able to describe the constructional features and equivalent circuit of different types of induction machines, such as three-phase induction motor, single-phase induction motor, and induction generator.
3. Analyze the performance characteristics of induction machines: Students should be able to analyze and interpret the performance characteristics of induction machines, including torque and speed characteristics, starting, braking, and speed control of motors. Also, students should have the ability to use circuit diagrams and phase diagrams.
4. Calculation and design of induction machine parameters: Students should be able to calculate and design various parameters of induction machines, such as equivalent circuit parameters - stator and rotor resistances and reactances - from no-load test and blocked rotor test, winding arrangements, number of poles, magnetic flux, electromagnetic forces, power factor and efficiency.
5. Understanding speed control techniques for induction machines: Students should have a strong understanding of the operation and control methods of induction machines, including the concept of slip, rotor resistance control, voltage control, and the principle of AC motors such as variable frequency drive.
6. Induction Machine Analysis and Troubleshooting: Students should be able to analyze and troubleshoot common faults and problems that can occur in induction machines, such as unbalanced voltages, rotor faults, stator faults, and bearing failure.

7. Application of knowledge in practical applications: Students should be able to apply their knowledge of induction machines to practical applications, such as motor selection, sizing, and protection.
8. Develop laboratory skills: Students should develop practical skills in conducting experiments and practical exercises related to induction machines, including performance testing, efficiency measurement, and fault diagnosis.
9. Communicate effectively: Students should be able to communicate their ideas and findings related to induction machines effectively, whether in written reports or oral presentations.

Learning outcomes

Learning outcomes in the third year undergraduate induction machines unit:
1. Understand the basic principles of induction machines. This includes understanding the physical construction of induction machines (polyphase induction motors, single phase induction motors and induction generators), familiarizing with the theory of rotating magnetic field, as well as the types of these machines.
2. Determine the electrical parameters of the equivalent circuit of induction machines. Including calculation of stator and rotor resistances and reactances from no-load test and broken rotor test.
3. Calculate losses, power factor, losses, output power and torque from equivalent circuit parameters.
4. Learn the torque characteristics of induction machines and explain how to maximize starting torque or how to get maximum torque.
5. Learn the starting methods of multiphase induction motor such as star delta, soft start and direct methods online and determine the appropriate method for starting induction motors.
6. Identify the possible techniques for controlling the speed of induction motors and apply each technique.
7. Identifying methods of controlling the speed of induction motors such as the variable resistance method, the variable voltage method, and modern methods such as the variable frequency motor.VFD. As well as identifying the appropriate method in industrial applications.
8. Identify the methods of breaking down inductive machines: such as the method of conduction and generation. And apply each method.
9. Identify induction generators: including construction, working principle, types, speed and power characteristics, and applications.

10. Identify the different types of single phase induction motor, their advantages, disadvantages and suitable application for each.
11. Analyze the methods of rotor field theory of single-phase induction motor, such as double rotor field theory and symmetrical component analysis, as well as identify the characteristics and windings of single-phase induction motor.
12. Finally, by understanding the circuit diagram, students are able to get an overview of a single-phase induction motor, including design, operation and calculation of the parameters required at any operating point.

Teaching and learning methods

The following strategies can be used to help students absorb information simply:
1. Interactive lectures: Using multimedia in the classroom such as animated videos on the working principles of electrical machines enhances students' imagination. Also, engaging students in group discussions promotes active learning and encourages peer interaction.
2. Choose interactive lessons and real number examples from the laboratory or familiar in industry.
3. Using laboratories as an approach to link the theoretical aspect to reality and simplify understanding of the curriculum through interactive experiments.
4. Practical activities: Assign interesting practical activities to develop students' creativity.
5. Computer simulation: The use of computer simulation and software tools can provide a virtual environment for students to experiment with induction machines. Simulation can help students visualize complex concepts and observe the effect of different parameters on the performance of the machine.
6. Case Studies: Providing real-life case studies or industry examples can help students understand how induction machines are used in practical applications. This can enhance problem-solving skills and critical thinking abilities.

Evaluation methods

For evaluation purposes, it is used.

72. Quick and surprise tests method
73. Determine some homework
74. Midterm exams

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

Course structure	
weeks	**Material covered**
Week 1	Construction and principal operation of 3-Phase Induction Motors, production of rotating magnetic field
Week 2	Equivalent circuit of 3-Phase Induction Motors, No-load test, and blocked rotor test.
Week 3	Power stages, efficiency, and losses of 3 phase induction motor
Week 4	Torque-speed characteristics, starting and maximum torque
Week 5	Starting of 3-phase induction motor: Variable resistance in stator, auto-transformer method, star-delta method, and soft starting methods.
Week 6	Speed control of 3-phase induction motor, braking of 3-phase induction motor
Week 7	Induction generator. Working principle, construction,
Week 8	Types of induction generator, applications, characteristics of slip-torque and the output power
Week 9	Single phase induction motors: Construction and working principle,
Week 10	Production of rotating magnetic field, double field theory, symmetrical theory.
Week 11	Torque speed characteristics, starting methods of 1 phase induction motor
Week 12	Types of single-phase induction motor, Application of 1 phase induction motor
Week 13	General equivalent circuit, no-load test, and blocked rotor test, phasor diagram of 1 phase induction motor
Week 14	Power stages, losses, separation of mechanical and iron losses, and efficiency
Week 15	Speed control of 1 phase induction motor, circle diagram of 1 phase induction motor
Week 16	**Preparatory week before the final exam**

References
• Theraja BL Theraja AK. A Textbook of Electrical Technology. New Delhi India: S. Chand; • Principles of electrical machines V. K. Mehta, Rohit Mehta, Pub, S. Chand, India

Course laboratories	
Machine lab	
Weeks	Experiments
Week 1	Name plate, classifications of insulations, Polarity test of stator windings, Connections of stator windings, Running and reversing the direction of rotation of 3 phase induction motor
Week 2	Starting of 3 phase induction motor, soft starting, Autotransformer, and star delta test
Week 3	speed control of 3 phase induction motor voltage control method, VFD method
Week 4	Single phase induction motors: starting, running, and reversing
Week 5	No load and blocked rotor test and finding the efficiency of 1 phase induction motor
Week 6	Torque-slip test of 1 phase induction motor.
Week 7	Induction generator, working principle, characteristics of speed-power.

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

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

Course Description

Course Description
This section includes a description of the unit, digital communications, NistQuest sampling theory, pulse modulation.PAM,PWM,PPMTime division multiplexing (TDM)TDM), noise in pulse modulation, pulse code modulationPCM/TDM, modify data (DM), quantization noise inPCMandDMSignal format (unipolar, bipolar, and phase-divided Manchester), digital sinusoidal modulationASK,PSK,FSKNoise inASK,PSK,FSK(Probability of error using coherent matching filter and incoherent detection) Transmission line: equivalent circuit, characteristic impedance, phase velocity, reflection coefficient, standing wave, quarter wave transformer, smith chart calculation and short circuit matching.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
communicationII/E3203	Course Name / Course Code
Semester system	Academic System
	Programs Included

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

Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
60hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives

1. Explore the concept of sampling theory.
2. Identify different pulse modulation techniques (PAM,PWM,PPM)
3. Understand multiple signaling techniques such as:FDMandTDM
4. Study the theory behind demodulation techniques to recover the original message signal from the modulated signals.
5. This course covers pulse code modification.PCMIts types and applications.
6. Understand the types and applications of delta modulation.DM.
7. Perform signal coordination and pocket digital modulation.
8. Understanding the concepts of transmission lines

Learning outcomes

1. Discuss the Nyquist sampling theory.
2. Analysis of the sampling process in time and frequency domains.
3. Summarize what is meant by pulse modulation.
4. DescriptionPAMandPWMandPPM.
5. Determine the generation and detection of pulse modulation.
6. Discuss the signal coordination.
7. Explain the pocket digital configuration.
8. Identify the characteristics of transmission line concepts.

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. 75.Quick and surprise tests method 76.Determine some homework 77.Midterm exams

Course structure	
weeks	**Material covered**
Week 1	sampling theorem
Week 2	pulse modulation PAM
Week 3	pulse modulation PWM AND PPM
Week 4	Signal multiplexing TDM and FDM
Week 5	pulse code modulation PCM
Week 6	data modulation (DM)
Week 7	Midterm
Week 8	signaling format (unipolar, bipolar, and spilt-phase Manchester),
Week 9	Noise quantization in PCM and DM
Week 10	sinusoidal digital modulation ASK, PSK, FSK,
Week 11	noise in ASK, PSK, FSK
Week 12	Transmission line:Equivalent circuit
Week 13	characteristic impedance, phase velocity
Week 14	reflection coefficient, standing wave, quarter-wave transformer
Week 15	smith chart calculation and stub matching.
Week 16	**Preparatory week before the final exam**

References

• Modern Digital and Analog Communication systems – bP Lathi • Communication systems -by AB Carson

Course laboratories	
Communications Lab	
Weeks	Experiments
Week 1	Signal analysis
Week 2	AM modulation
Week 3	AM demodulation
Week 4	FM modulation
Week 5	FM demodulation
Week 6	Analysis of sampling theorem
Week 7	Signal analysis

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, Frequency domain analysis: Frequency domain analysis, Bode plot, Frequency domain stability, Nyquist stability criterion. Lead compensation, lag compensation, Lead and lag compensation. State space analysis: Mathematical modeling of dynamical systems in state space (mechanical and electrical systems), transfer functions, diagonalization,

eigenvalues and eigenvectors, determination of state transition matrix, solution of state equations, Carley-Hamilton theorem, controllability and observation. Design of state space control systems: placement of electrodes, state controllers (full, reduced and minimum types), design of servo systems. Differential-integral-differential control design: Tuning rules for differential-integral-differential controllers, differential-integral control in plants, Ziegler-Nichols rules, modifications of differential-integral-differential control schemes. System sensitivity, two-degree-of-freedom control, design of robust control systems.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
ControlII/E3207	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
45hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
1. Understand the basic concepts of control theory. 2. Analysis of linear control systems 3. Design and evaluation of control systems 4. Application of control theory to practical systems 5. Understanding advanced control techniques 6. Simulation and analysis of control systems 7. Stability and performance evaluation 8. Solve control system design problems.	

Learning outcomes
1- Frequency response techniques

- Determine and plot the frequency response of the system.
- Draw approximations of the frequency response of the system.
- Draw a nestquest diagram
- Use the NistQuest criterion to determine the stability of the system.
- Find stability, gain margin and phase using NistQuest and Bode plots.
- Find the bandwidth, peak magnitude and peak frequency of the closed-loop frequency response considering the closed-loop response parameters of peak time, settling time and overshoot ratio.
- Find the closed loop frequency response considering the open loop frequency response.
- Find the closed loop response parameters of peak time, settling time and overshoot ratio considering the open loop frequency response.

2- Design via frequency response
- Use frequency response techniques to adjust gain to meet transient response specifications.
- Use frequency response techniques to design cascade compensators to improve steady-state error.
- Use frequency response techniques to design cascade compensators to improve transient response.
- Use frequency response techniques to design cascade compensators to improve both steady-state error and transient response.

3- State space analysis
- Finding a mathematical model called the state space representation of a time-invariant linear system
- Modeling of electrical and mechanical systems in state space
- Convert the transfer function to state space.
- Converting the state space representation into a transfer function
- Linear representation of state space

4- Design via state space
- Design a state feedback controller using pole mode for systems represented in phase shift form to meet transient response specifications Determine whether the system is controllable
- Design of a state feedback controller using pole mode for non-phase variable systems to meet transient response specifications.
- Design of a state feedback controller using pole mode for systems represented in the form of a standard controller
- Determine whether the system is observable.

- Design of a state feedback controller using pole mode for systems not represented in the standard controller form
- Design of steady-state error characteristics of systems represented in state space.
5- Control designPID
- the introduction
- Ziegler-Nichols rules for adjusting controllersPID
- Control unit designPIDUsing frequency response approach to design controllersPIDUsing a computational optimization approach
- Control scheme modificationsPID
- Two degree of freedom control
- Zero-mode approach to improve response characteristics
6- Powerful control systems
- Appreciate the role of robustness in control system design.
- Understand uncertainty models, including additive uncertainty, multiplicative uncertainty, and parameter uncertainty.
- Understand the different approaches to address the robust control design problem using root locus, frequency response andITAETo controlPIDThe internal model and semi-quantitative feedback methods.

Teaching and learning methods
- Active learning: Encourage students to actively engage with the course material through activities such as discussions, group work, case studies, and problem-solving exercises. This helps students build their own understanding of the subject and enhances critical thinking skills. - Real-world applications: Connect course material to real-world examples and applications to help students see the relevance and usefulness of what they are learning. This can be done through case studies, field trips, or project-based assignments. - Integrating Technology: Leveraging technology tools and resources to enhance learning experiences. This can include multimedia presentations, online discussion forums, virtual labs, interactive simulations, and educational apps. Technology can facilitate active learning, provide additional resources, and enable collaboration among students. - Differentiation: Recognizing and accommodating diverse student learning needs and preferences. Offering a variety of instructional methods, such as visual, auditory, and kinesthetic activities, to meet different learning styles. Providing

additional support or challenges based on individual student needs.
- Formative assessment: Incorporate ongoing formative assessments throughout the course to monitor student progress and provide timely feedback. This can include quizzes, short assignments, group discussions, or group presentations. Formative assessments help identify areas where students may need additional support and allow for course modifications as needed.
- Breaking down complex concepts into smaller, manageable parts and providing support and guidance as students build their knowledge and skills.
- Collaborative Learning: Foster a collaborative and inclusive learning environment where students can learn from and with each other. Encourage group work, peer feedback, and discussions to promote active participation, teamwork, and the exchange of ideas.
- Reflection and Cognition: Incorporate opportunities for students to reflect on their learning and develop cognitive skills. Encourage self-assessment, journaling or group discussions where students can analyse their learning, identify strengths and weaknesses and set goals for improvement.
- Flexibility and adaptability: Recognizing that students have different learning speeds and preferences. Providing flexibility in pace, content delivery, and assessment methods to accommodate diverse learning needs and enhance student engagement.
- Continuous improvement: Regularly evaluate the effectiveness of teaching strategies and make adjustments based on student feedback, assessment results, and your own observations. Reflect on course outcomes and look for opportunities for improvement in future iterations.

Evaluation methods
For evaluation purposes, it is used. 78.Quick and surprise tests method 79.Determine some homework 80.Midterm exams

Course structure	
weeks	**Material covered**
Week 1	**FREQUENCY RESPONSE TECHNIQUES**

	- Introduction - Asymptotic Approximations: Bode Plots - Introduction to the Nyquist Criterion - Sketching the Nyquist Diagram
Week 2	**FREQUENCY RESPONSE TECHNIQUES** - Gain Margin and Phase Margin via the Nyquist Diagram - Stability, Gain Margin, and Phase Margin via Bode Plots
Week 3	**FREQUENCY RESPONSE TECHNIQUES** - Stability via the Nyquist Diagram - Relation Between Closed-Loop Transient and Closed-Loop Frequency Responses - Relation Between Closed- and Open-Loop Frequency Responses - Relation Between Closed-Loop Transient and Open-Loop Frequency Responses - Steady-State Error Characteristics from Frequency Response - Systemswith Time Delay
Week 4	**DESIGN VIA FREQUENCY RESPONSE** - Transient Response via Gain Adjustment, - Lag Compensation - Lead Compensation - Lag-Lead Compensation
Week 5	**STATE SPACE ANALYSIS** - Introduction, Some Observations, - The General State-Space Representation, - Applying the State-Space Representation,
Week 6	**STATE SPACE ANALYSIS** - Converting a Transfer Function to State Space - Converting from State Space to a Transfer Function - Linearization
Week 7	**Mid Term**
Week 8	**DESIGN VIA STATE SPACE** - Introduction - Controller Design - Controllability - Alternative Approaches to Controller Design

Week 9	**DESIGN VIA STATE SPACE** Observer Design - Observability - Alternative Approaches to - Observer Design - Steady-State Error Design via Integral Control -
Week 10	**PID Control Design** Introduction - Ziegler–Nichols Rules for Tuning PID Controllers - Design of PID, -
Week 11	**PID Control Design** Controllers with Frequency-Response Approach Design of PID - Controllers with Computational Optimization Approach Modifications of PID Control Schemes -
Week 12	**PID Control Design** Two-Degrees-of-Freedom Control - Zero-Placement Approach to Improve Response Characteristics -
Week 13	**Robust Control Systems** Introduction - Robust Control Systems and System Sensitivity - Analysis of Robustness -
Week 14	**Robust Control Systems** Systems with Uncertain Parameters - The Design of Robust Control Systems - The Designof Robust PID-Controlled Systems -
Week 15	**Robust Control Systems** The Robust Internal Model Control System - Design Examples - The Pseudo-Quantitative Feedback System -
Week 16	**Preparatory week before the final exam**

References

- CONTROL SYSTEMS ENGINEERING BY NORMAN S. NISE
- K. OGATA, MODERN CONTROL ENGINEERING, 5TH EDITION

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, integrated circuit technologies, basic operating characteristics and parameters, and circuits.CMOS, and circlesTTL, and practical considerations in use.TTL, and performance comparisonCMOSandTTL, and emitter-coupled logic circuits (ECL), and digital circuitsBiCMOS, andPMOS, andNMOS, andE2MOS. Memory Circuits: Semiconductor Memories: Types and Architecture. Programmable Logic DevicesFPD(Field Programmable Device), andPLD(programmable logic device), andPLA(programmable logic arrays), andPAL(programmable array logic), andSPLD/CPLD(Simple/Complex Programmable Logic Device), andGAL(general matrix logic), and programmingPLD, andASIC, digital system applications, and introduction toFPGALinear Digital Integrated Circuits: Introduction, Comparator Operation, ConvertersD/A(transformersD/ADual weights, convertersD/AR/2R, convertersD/AIC), convertersA/D(transformersA/DParallel encoder, convertersA/Dcounter slope,

transformersA/DSuccessive approximation, transformersA/D IC), lonlinessICTimer (astable, monostable and bistable using 555 timer), voltage controlled oscillator, phase locked loop, coupling circuits.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
ElectronicV/E3205	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
45hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives

1. Understand the principles and applications of oscillators in electronics.
2. Understand the concepts of feedback oscillators, including positive feedback requirements and oscillation conditions.
3. Identify the different types of continuous feedback oscillators and continuous feedback oscillators, including movable bridge oscillators, phase shift oscillators, andTwin-T, and oscillatorsColpitts, and oscillatorsClapp, and oscillatorsHartley, and oscillatorsArmstrong, and crystal control oscillators.
4. Gain knowledge about relaxation oscillators, with emphasis on different wave generation techniques.
5. Gain a comprehensive understanding of the concept of voltage regulation, including line and load regulation.
6. Identify different voltage regulators, including linear series regulators, linear switching regulators, and switching regulators.
7. Study the different configurations of switching regulators, including step-down, step-up and inverter configurations.
8. Understand the concepts of multiple oscillators, including stable, asstable, and bistable multiple oscillator circuits.
9. Identify different types of circuits used in multiple oscillators, using gates and transistors.

10. Identify the timerIC 555and its operations, including single and astable oscillator operations.
The aim of this unit is to provide students with a comprehensive understanding of oscillators, voltage regulators and timing circuits, along with their design and practical applications. The knowledge and skills gained can be applied in many areas of electronics engineering, including telecommunications, power systems, signal processing and control systems.

Learning outcomes

1. Explain the basic concepts and operations of oscillators.
2. Describe the purpose and function of feedback oscillators.
3. Distinguish between different types of feedback oscillators and feedback oscillators, and explain their operating principles.
4. Design and analyze circuits for different types of oscillators, including relaxation oscillators.
5. Describe the principles of voltage regulation, including line and load regulation.
6. Distinguish between different types of voltage regulators, including series, switching, and step-down regulators.
7. Design and analyze circuits for different types of voltage regulators and their configurations.
8. Describe the principles of multiple oscillators and explain the working of monostable, asstable and bistable circuits.
9. Analysis and design of multivibration circuits using gates and transistors.
10. Temporary work descriptionIC 555In different situations and design related circuits.
Upon successful completion of this unit, students should be able to demonstrate a solid understanding of the operation, design and applications of oscillators, voltage regulators and timing circuits. This will enable them to apply these concepts to real-world electronics design and analysis tasks, enhancing their practical skills and readiness for industry.

Teaching and learning methods

1. Lectures: Lectures form the backbone of knowledge delivery, where the instructor introduces the basic concepts, theories and applications related to oscillators, voltage regulators and timing circuits.

2. Demonstrations: Instructor-led demonstrations of different types of oscillators, voltage regulators, and timing circuits can provide students with a better understanding of operating principles and designs.
3. Group Projects: Group assignments and projects encourage students to design, implement, and troubleshoot circuits collaboratively. This can enhance teamwork and problem-solving skills.
4. Self-study: Assignments and additional reading materials can be provided to encourage self-study. Understanding electronics often requires study and practice at your own pace.
5. Online tutorials and simulations: Modern learning tools such as electronic circuit design and online simulation platforms can be used to understand, visualize and practice the design and analysis of electronic circuits.
6. Tests and Examinations: Regular midterm and final tests and examinations will be used to assess the student's understanding and knowledge of the subjects.
7. Discussion sessions: Interactive sessions can be arranged to discuss the difficulties faced by the student during self-study or laboratory work, which enhances the collaborative learning environment.
8. Feedback and Reflection: Students should be encouraged to give and receive feedback on their work. This will help them identify their strengths and areas for improvement.
These strategies aim to create a comprehensive learning environment that combines theoretical knowledge, practical skills, independent research and teamwork. This comprehensive approach prepares students for a successful career in electronics and related fields.

Evaluation methods
For evaluation purposes, it is used. 81.Quick and surprise tests method 82.Determine some homework 83.Midterm exams

Course structure	
weeks	**Material covered**
Week 1	**Chapter One: Oscillators**

	1.1 The Oscillator 1.2 Feedback Oscillator 1.2.1 Positive Feedback 1.2.2 Conditions for Oscillation
Week 2	1.3 RC Oscillators 1.3.1 Vienna Bridge Oscillator 1.3.2 Phase-Shift Oscillator 1.3.3 Twin-T Oscillator
Week 3	1.4 LC Oscillators 1.4.1 Colpitts Oscillator 1.4.2 Clapp Oscillator 1.4.3 Hartley Oscillator 1.4.4 Armstrong Oscillator 1.4.5 Crystal-Controlled Oscillator
Week 4	1.5 Relaxation Oscillators 1.5.1 Triangular-Wave Oscillator 1.5.2 Sawtooth Voltage-Controlled Oscillator (VCO) 1.5.3 Square-Wave Oscillator
Week 5	**Quiz**
Week 6	**Chapter Two: Voltage Regulators** 2.1 Voltage Regulation 2.1.1 Line Regulation 2.1.2 Load Regulation
Week 7	2.3 Basic Linear Shunt Regulators
Week 8	2.4 Basic Switching Regulators 2.4.1 Step-Down Configuration 2.4.2 Step-Up Configuration 2.4.3 Voltage-Inverter Configuration
Week 9	**Midterm Exam**
Week 10	**Chapter Three: Timing Circuits** 3.1 Multivibrator 3.1.1 Monostable Multivibrator Circuits 3.1.1.1 Simple NAND Gate Monostable Circuit 3.1.1.2 NOT Gate Monostable Multivibrator
Week 11	3.1.1.3 NOR Gate Monostable Multivibrator 3.1.1.4 Monostable Multivibrator circuit using transistors

Week 12	3.1.2 Stable Multivibrator Circuits 3.1.2.1 NAND Gate Astable Multivibrator 3.1.2.2 Stable multivibrator using NPN transistors 3.1.2.3 Switching Times and Frequency of Oscillation 3.1.3 Bistable Multivibrator Circuits 3.1.3.1 Schmitt Trigger
Week 13	3.2 The IC 555 Timer 3.2.1 Monostable Operation
Week 14	3.2.2 Astable Operation
Week 15	**Quiz**
Week 16	**Preparatory week before the final exam**

References

- Robert L. Boylestad, "Electronic Devices and Circuit Theory", 11TH Edition, Pearson Education Limited, 2015.
- Thomas L. Floyd, "Digital Fundamentals", 11TH Edition, Pearson Education Limited 2015.

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, Introduction: Why numerical methods, Solving nonlinear equations (finding roots): graphical method, bisection method, iteration method, Newton's method, secant method. Solving sets of linear equations: matrix notation, Gaussian elimination method, evaluating the inverse of a matrix, matrix inverse method, factorization methodLUGauss-Seidel iteration method, eigenvalues and eigenvectors. Solving a set of nonlinear equations. Numerical interpolation: polynomial interpolation, linear interpolation, quadratic interpolation, higher order interpolation (Lagrange interpolation), error in polynomial interpolation. Numerical calculus: derivatives of polynomial interpolation, trapezoidal and Simpson rules for numerical integration. The role of statistics in engineering, descriptive statistics, probability, discrete random variables and probability distributions, continuous random variables and probability distributions, joint probability distribution, sampling distributions and point estimation of coefficients, one-sample statistical interval

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Engineering analysisII/E3204	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method

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

Second semester/ 2024-2025	Semester / Year
45hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives
1. Understand the principles and techniques of numerical analysis II. 2. Develop skills in applying mathematical and computational methods to solve numerical engineering problems. 3. Develop problem solving skills and understand how to solve nonlinear equations. 4. Understand the solution of sets of linear equations. 5. Learn how to analyze numerical interpolation problems. 6. Develop a solid foundation for solving differential equations using numerical methods.

Learning outcomes
1. Design and improve engineering systems, taking into account factors such as efficiency, safety, and sustainability. 2. Application of the finite difference method to use Lagrange interpolation and Newton interpolation 3. Analysis of nonlinear equations, applications. 4. Evaluating the accuracy, stability and convergence of numerical methods used in engineering analysis. 5. Design and improve engineering systems by integrating engineering principles and numerical analysis methods. 6. Solve differential equations using numerical analysis. 7. Effectively communicate numerical analysis concepts and results through written reports and presentations.

Teaching and learning methods
This unit will be delivered through lectures and tutorials where the student will be able to understand the content of the unit. Active learning will be implemented through collaborative groups to solve exercises, tasks and projects.

Evaluation methods

For evaluation purposes, it is used.

84. Quick and surprise tests method
85. Determine some homework
86. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Introduction, Solution of non-linear equations (roots finding)graphical method, bisection method
Week 2	Solving Nonlinear Equation by method of iteration, Newton's method
Week 3	Solving Nonlinear Equation by the secant method
Week 4	Matrix notation, Gaussian elimination method
Week 5	Gauss-Seidel iteration method, Gauss-Jrodan elimination method
Week 6	evaluation of the inverse of a matrix, matrix inverse method, LU factorization method
Week 7	Mid-term + Eigenvalue and Eigenvectors. Methods of evaluation matrix function.
Week 8	Finite Difference Method Forward difference
Week 9	Finite Difference Method Backward & Divided difference
Week 10	Polynomial interpolation, linear interpolation, quadratic interpolation, higher degree interpolation (LaGrange's interpolation)
Week 11	Newton's Interpolation, error in polynomial interpolation.
Week 12	Derivatives from interpolating polynomials trapezoidal rules for numerical integration
Week 13	Simpson's rules for numerical integration
Week 14	Initial value problems by Euler and modified Euler Method,
Week 15	4^{th}order Runge-Kutta Methods
Week 16	Preparatory week before the final exam

References

• "Advanced Engineering Mathematics" by Erwin Kreyszig • "Advanced Engineering Mathematics" by Dennis G.Zill • "Principles of Mathematical Analysis" by Walter Rudin

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

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, distribution system configuration: various distribution system circuit components, representation and parameters of radial, toroidal, spike, coaxial, and interconnected systems. Electrical design of distribution systems: voltage level, selection of various system components, transformers, cables, overhead lines, switching and protection equipment, voltage drop and power loss calculations, economic considerations.

Distribution within large buildings: single mains, single ground supply, loop supply, double feed and bundled supply, vertical and horizontal supply systems, main, sub and final distribution boards. Industrial power distribution: special features, equipment layout, cable trenches, cable trays, grounding, emergency power supply. Reactive power control in distribution systems: individual, group and central compensation, advantages, size and location of reactive power control equipment. Electrical load management: objectives, devices that control different methods of load control, and practical implementation problems.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Electrical powerII/E3202	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
60hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
1. Study the main features of transmission lines 2. Design of optimal transmission lines 3. Improving the performance of transmission lines 4. Understanding the distribution system 5. Study the types of distribution systems. 6. Identify the types of control systems in the power system.	

Learning outcomes
1. Identify the main parameters of high voltage transmission lines 2. Discuss resistance, inductance and capacitance in transmission lines. 3. Analysis of transmission line types

4. Discuss the performance of transmission lines based on area.
5. Description of the distribution system.
6. Identify the main types of distribution systems.

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. 87.Quick and surprise tests method 88.Determine some homework 89.Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Line resistance, line inductance, single-phase line with multi-conductors, bundling,
Week 2	Line inductance of three-phase transmission systems,
Week 3	Single-phase and three-phase capacitance.
Week 4	Representation of lines, short, medium, long TL,
Week 5	the equivalent circuit of a long transmission line,
Week 6	power factor flow through a transmission line,
Week 7	power circle diagram, line regulation, reactive compensation of transmission line

Week 8	Various distribution system circuit components,
Week 9	Representation and parameters radial, ring, spike, spindle, and interconnected systems
Week 10	Voltage level, selecting various system components, transformers, cables, overhead lines
Week 11	Voltage drop & power loss calculations, economic considerations.
Week 12	Single rising mains, individual floor supply, ring supply, double feed and grouped supply,
Week 13	Vertical and horizontal supply systems, main, sub main, and final distribution boards
Week 14	Special features, equipment layout, cable trenches, cable trays,
Week 15	Grounding, emergency power supply
Week 16	**Preparatory week before the final exam**

References
• V. K. Mehta and Rohit, “Principles of Power System”, S. Chand, 2005
• Stevenson, W. D. (1994). Power Systems: Analysis and Design. McGraw-Hill
• Hadi Saadat, “Power System Analysis”, Tata McGraw-Hill, 2002.
• T. K. Nagsarkar, “Power System Analysis”, Oxford University Press, 2014.

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

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

Course Description

Course Description
He providesCourse Description This is a brief summary of the most important characteristics of the course and the Learning outcomes expected of the student. ProofreadWhether he has made the most of the learning opportunities available. This must be linked to the description The program.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Digital signal processing /E3208	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
study And review on Concepts to treat Signals Digital Theories , Most important Tools And systems Implementation.In addition to education Students How to apply Transfers Frequency on various Signals And design Filters Quantity And digital Using Roads Modern.	

Learning outcomes
A-Knowledge and understanding A1-to understand Texts academy And that Using Strategies Learning Solution Questions in end the chapter. A2 -development skills To convert Concepts Theory To process Signal Digital to The concept Practical A3 -Find points power And weakness For roads to treat Signal Digital

for- Subject-specific skills for1-Read some research related to digital signal processing. for2- Visit some websites related to digital signal processing. for3- Reading some catalogs related to some practical devices for digital signal processing.

Teaching and learning methods
1. LecturesFace to face 2. Episodesdiscussion 3. solutionExamples in groups

Evaluation methods
For evaluation purposes, it is used. 90.Quick and surprise tests method 91.Determine some homework 92.Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Fundamentals of discrete time systems: Introduction, basic definitions,
Week 2	Important Discrete Time (DT) signals, DT systems, and Fourier transform of sequences.
Week 3	The Z transform: Definition of Z-transform
Week 4	inverse Z-transforms,
Week 5	relationships between system representations,
Week 6	computation of frequency response.
Week 7	Realizations of digital filters: Direct form realizations of IIR filters,

Week 8	cascade realizations of IIR filters,
Week 9	parallel realizations of IIR filters,
Week 10	and realizations of FIR filters.
Week 11	Sampling: Sampling of continuous time signals, changing the sampling rate,
Week 12	Multi-rate signal processing, interpolation, and decimation.
Week 13	Digital filter design: Design of IIR and FIR filters.
Week 14	Discrete Fourier transform: properties,
Week 15	circular convolution, and Fast Fourier Transform "FFT"
Week 16	Prepare for the final exam

References
• **Discrete by time signal processing, by Oppenheim, Prentice Hall, 2009.**

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 description of the unit, synchronous AC generators, construction, salient and non-salient pole types, linear and non-linear analysis of cylindrical rotor, salient pole machines (dual-reaction and general methods), electromotive force equation, motor reaction equation, power, parallel operation of synchronous generators, performance of generator connected to infinite bus, curvesVSynchronous motor, starting method, phase diagram and equivalent circuit, search for synchronous machine.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Electrical machinesVI/E3201	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
45hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	

In general, this unit aims to provide students with adequate knowledge about synchronous machines (synchronous generators and synchronous motors), and enable them to understand their principles, analyze their performance and apply this knowledge in practical applications in various industries. The objectives can be described in detail in the following points:

1. Understand the basic principles of synchronous machines: Students should be able to grasp the basic concepts and principles behind operation including the concept of synchronous speed, excitation, the relationship between rotor speed and resulting frequency, and the interaction between rotor and motor.

2. Description of the construction of synchronous machines: Students should be able to describe the constructional features (types of salient and non-salient poles) and equivalent circuit of synchronous machines.

3. Analyze the performance characteristics of synchronous machines: Students should be able to analyze and interpret the performance characteristics of synchronous machines, including linear and nonlinear methods.
4. Calculating Voltage Regulation for a Large Synchronous Machine: In this unit, students should learn how to determine voltage regulation from no-load test and blocked rotor test, using the methodMMFAnd the wayEMFPotier triangle method for cylindrical rotor type and two-interaction method for salient rotor type.
5. Determination of Power and Torque: Sufficient details are given in this unit to derive equations for calculating the developed power and maximum power of synchronous machines.
6. Understanding Parallel Operation of Synchronous Generators: Parallel operation of synchronous generator can be considered the most important sub-heading in this unit: Students should learn the conditions for connecting two or more generators in parallel and synchronization and the methods of connecting a generator to an infinite busbar.
7. Understanding of synchronous machine control: Students should have a solid understanding of the effect of changing rotor excitation, load and prime mover speed on synchronous current and synchronous power.
8. Starting of Synchronous Motors: Students should have adequate knowledge about the starting methods of synchronous motor.
9. Applications: In this unit, students should have sufficient knowledge about the application of cylindrical generators and salient rotor generators, as well as the

application of synchronous motor when it operates as a synchronous condenser.
10. Hunting Effect: Students should understand the hunting effect, its causes and the role of damper coils in generator mode as well as in motor mode.
11. Analysis and Troubleshooting of Synchronous Machines: Students should be able to analyze and troubleshoot common faults and errors that can occur in synchronous machines, such as unbalanced voltages, rotor faults, stator faults, and bearing failures.
12. Develop laboratory skills: Students must develop practical skills in conducting experiments and practical exercises related to synchronous machines, including performance testing, efficiency measurement, and fault diagnosis.
13. Communicate effectively: Students should be able to communicate effectively about their ideas and findings related to synchronous machines, both in written reports and oral presentations.

Learning outcomes

Learning outcomes in the Synchronous Machines unit in the third year of university studies:
1. Understand the basic principles of synchronous machines. This includes understanding the physical construction of synchronous machines (synchronous generator, synchronous motors), and familiarizing yourself with the theory of rotating magnetic field.
2. Identify the different types of synchronous generators, their advantages, disadvantages and the appropriate application of each.
3. Determine the electrical parameters of the equivalent circuit of synchronous machines. Including calculation, motor reactance (synchronous), leakage reactance, motor resistance, generated emf, and internal emf.
4. Understand the effect of motor reaction on internal electromotive force.
5. Study the operation analysis of synchronous machines and determine the voltage regulation from no-load test and blocked rotor test, using the synchronous impedance method, the positive electromotive force method, and the Pothier triangle method.
6. Calculate the developed power, power factor, losses, torque and how to obtain maximum torque from synchronous machines.
7. Learn the parallel operation of synchronous generators as well as the conditions and methods for connecting the generator to an infinite busbar.
8. Learn the methods of starting a synchronous motor.

9. Discuss the effect of excitation power factor of synchronous motor. 10. Know the appropriate application of synchronous machines. 11. Realization of the fishing effect in synchronous machine.

Teaching and learning methods
The following strategies can be used to help students absorb information simply: 1. Interactive lectures: Using multimedia in the classroom such as animated videos on the working principles of electrical machines enhances students' imagination. Also, engaging students in group discussions promotes active learning and encourages peer interaction. 2. Choose interactive lessons and real number examples from the laboratory or familiar in industry. 3. Using laboratories as an approach to link the theoretical aspect to reality and simplify understanding of the curriculum through interactive experiments. 4. Practical activities: Assign interesting practical activities to develop students' creativity. 5. Computer Simulation: The use of computer simulation and software tools can provide a virtual environment for students to experience synchronous machines. Simulation can help students visualize complex concepts and observe the effect of different parameters on the performance of the machine. 6. Case Studies: Providing real-life case studies or industry examples can help students understand how synchronous machines are used in practical applications. This can enhance their problem-solving and critical thinking skills. 7. Assessments: Conduct regular assessments, tests, and quizzes to measure students' understanding and monitor their progress. This provides feedback and identifies areas that may require additional support or clarification.

Evaluation methods
For evaluation purposes, it is used. 93.Quick and surprise tests method 94.Determine some homework 95.Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Synchronous Machines (Alternators): Working principle, construction, salient and non-salient pole types, relationship between speed and frequency.
Week 2	Equivalent circuit, phasor diagram, generated EMF equation, factors affecting on the generated EMF and armature reaction equation.
Week 3	Voltage regulation, linear and no linear analysis, MMF method (general method).
Week 4	EMF method (Synchronous impedance method) and Determination of the leakage reaction and armature reaction, Potier triangle method.
Week 5	Power stages, efficiency, and losses of synchronous generator, maximum developed torque of cylindrical rotor.
Week 6	Theory of salient-pole machines (two-reactance and general methods), EMF method, slip-test.
Week 7	Mid-term +Torque and power equations of a synchronous generator of salient pole rotor.
Week 8	Parallel operation of synchronous generators, Conditions for Paralleling an alternator with infinite busbars, Synchronization, Methods of synchronization.
Week 9	Performance of generator connected to infinite-busbar.
Week 10	Synchronizing current, Synchronizing power and torque, effect of unequal voltage, distribution of load and V-curves of synchronous generator.
Week 11	Effect of change of field excitation, Effect of change in mechanical input.
Week 12	Synchronous motors: Construction and working principle, phasor diagram and equivalent circuit.
Week 13	Starting methods, power stages, torque developed, and the efficiency of synchronous motor.

Week 14	Effect of excitation on armature current and power factor, V-curves of synchronous motors.
Week 15	Hunting of synchronous motor and finally Synchronous condenser.
Week 16	**Preparatory week before the final exam**

References

- Theraja BL Theraja AK. A Textbook of Electrical Technology. New Delhi India: S. Chand;
- Principles of electrical machines V. K. Mehta, Rohit Mehta, Pub, S. Chand, India

Course laboratories

Weeks	Experiments
Week 1	Working principal test of synchronous generator, types of excitations, configurations of the armature windings, and the equivalent circuit.
Week 2	Generated emf test and relationship between the speed of a prime mover and the generated frequency of a synchronous generator.
Week 3	Voltage regulation test, study the effect of armature reaction at different loads on a synchronous generator.
Week 4	Load test and determine the efficiency at various loads.
Week 5	Working principal test of synchronous motor, Starting test of synchronous motors
Week 6	Power factor of the synchronous motor and study V-curves of the synchronous motor
Week 7	Synchronous motor as a synchronous condenser and the applications of synchronous motor

Admission

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

Stage Four

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

Semester system

Course Description

Course Description
This section includes a description of the unit, Design in the discrete domain: Chano's sampling theorem, Ideal sampling. Sample and numerical equivalent, Stability in levelZ- Pulse and fixed step transforms, Estimation methods - Sampling effect - Direct discrete design - Discrete root locus, Digital compensator design. Design examples Discrete State Variables Design: Discrete Pole Setting-State and Output Feedback-Estimated State Feedback-Discrete Optimal Control-Dynamic Programming-Design Examples Optimal and Robust Control System Design: Optimal Control Review, Linear Quadratic Regulator, Kalman Filter, Robust Control, Optimal ControlH2andH∞, Strong stability and strong performance, strong multivariate control. Lyapunov

stability analysis, Lyapunov stability analysis of systemsLTITypical reference control systems, quadratic optimal control Nonlinear Systems: Common physical nonlinearities, phase plane methods, singular points, stability of nonlinear systems, construction of phase paths. Descriptive function methods: basic concepts, derivation of descriptive functions for common nonlinearities, stability analysis by descriptive function approach, jump resonance, Lyapunov stability criterion

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
ControlIII/E4103	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
60hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives
1. Understanding the latest in digital control systems. 2. Understand the background behind digital control systems. 3. Raising critical awareness about the performance of digital control systems. 4. Develop the skills necessary to develop digital control systems. 5. Gain practical experience by learning, applying and implementing digital control systems.

Learning outcomes
1. Know the difference between digital control system and classical control system. 2. Discuss how to analyze a digital control system. 3. Discuss the status of the digital control system. 4. Determine the optimal control system. 5. Describe the types of optimal control system.

6. Improve the performance of the digital control system in various ways.

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. 96.Quick and surprise tests method 97.Determine some homework 98.Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Shanno's sampling theorem, ideal sampling, Sample and Hold-Digital equivalents
Week 2	Stability in the Z-plane, discrete root locus
Week 3	Digital compensator design
Week 4	Discrete pole placement-state and output feedback-estimated state feedback-discrete
Week 5	Optimal control-dynamic programming
Week 6	Review of optimal control, the linear quadratic regulator.
Week 7	Mid-term + The Kalman filter, robust control, H2 and H∞ optimal control
Week 8	Robust stability and robust performance, multivariable robust control

Week 9	Liapunov Stability analysis, Liapunov Stability analysis of LTI systems,
Week 10	Model reference control systems, quadratic optimal control
Week 11	Common physical nonlinearities, the phase plane methods,
Week 12	Singular points, stability of nonlinear systems, construction of phase trajectories.
Week 13	Basic concepts, derivation of describing functions for common non linearity's stability
Week 14	Describing function approach, Jump resonance.
Week 15	Lyapunov stability criterion.
Week 16	**Preparatory week before the final exam**

References
• S.Roland; "Advanced Control Engineering". Elsevier, 2001.
• K. Ogata; "Modern Control Engineering", Prentice Hall, 2009.

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

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

Course Description

Course Description
This section includes a description of the unit, Introduction: Basic devices and characteristics: Diode, Transistor, Thyristor (SCR), and a converterGTO, triac, and propertiesSCRDynamic on/off operation. Operating modesSCRAnd stopping and protecting it, and designing the trigger circuit, and serial and parallel operation ofSCR, and cooling. Rectifiers: Full-wave, half-wave and uncontrolled rectifiers, half-wave and full-wave rectifiers, single-phase half-wave rectifiers, two-phase rectifiers, bridge, three-phase half-wave and bridge rectifiers, pulse rectifiersp, and effectsFWD, Device and Transformer Specifications. Transformer Operation: Interference, Principles, Pulse 2, Pulse 3, and Pulse 4 TransformerspBridge, overlapFWD, power factor and interference effects, regulation, reflection and delay angle control. DC line switching and breakers: Classifications of inverters, forced switching and parallel capacitors, step-down switches, step-up switches. Transformers: Analysis of single phase bridge transformers and center tap transformers, square and quasi-square wave output, operation of three phase bridge transformer, square and quasi-square wave output, voltage and frequency control technique of toroidal transformers: principles, circulating currents and blocked group operations, types and applications. Single phase AC voltage controllers: AC regulators, tap changers for transformers, control of multi-winding transformers, integrated circuit control.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Power electronics /E4104	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
45hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	

1. Understand and gain knowledge about different power semiconductor devices.
2. To familiarize students with the operating principle, design and synthesis of various power conversion circuits and their applications.
3. Preparing students to analyze and design various power conversion circuits.
4. Provide a solid foundation for further study of power electronics circuits and systems.

Learning outcomes

After completing the course, students are expected to:
1. Gain knowledge about the basic concepts and techniques used in power electronics.
2. Analysis of single-phase controlled transformers and their performance parameters.
3. Ability to analyze different single-phase and three-phase power transformer circuits and understand their applications.
4. Develop basic topologies for switching organizations.DC - DC.
5. Explain the operation of inverters and AC to DC converters.
6. Enhance the ability to identify the basic requirements for the application of power electronics-based design.
7. Develop the skills needed to build, troubleshoot and repair power electronics circuits.
8. Enhance the ability to understand the use of power transformers in commercial and industrial 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 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. 99.Quick and surprise tests method 100. Determine some homework 101. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Principle devices and characteristics: diode, power transistor, thyristor (SCR), GTO and triac, SCR dynamic properties at switching ON and OFF.
Week 2	Methods of SCR turning ON, turning OFF and protection, trigger circuit design, series and parallel operation of SCR, cooling.
Week 3	Uncontrolled, half and full wave rectifiers
Week 4	single phase half wave, biphase, bridge 3-phase half wave and bridge
Week 5	P-pulse rectifiers, effects of FWD
Week 6	Specifications of devices and transformers
Week 7	Overlap, principles, 2 pulse, 3 pulse, p pulse and bridge converters, FWD overlap
Week 8	Mid-term
Week 9	Power factor and effects of interference, regulation, inversion and delay angle control.
Week 10	Inverter classifications, forced commutations and parallel capacitors
Week 11	Step down choppers, step up chopper
Week 12	Analysis of single-phase bridge and center tapped source inverters, square and quasi-square wave output
Week 13	Operation of 3-phase bridge inverter, square and quasi-square wave output, inverter voltage and frequency control technique.
Week 14	Cyclo-converters: Principles, circulating currents and blocked group operations, types and applications.

Week 15	AC regulators, transformer tap changers, control of multi-winding transformers, integral cycle control.
Week 16	Preparatory week before the final exam

References
• Power Electronics by PS Bhimra, Khanna Publishers.
• Power Electronics by MH Rashid, PHI.
• Power Electronics by MD Singh and KB Khanchandani, TMH.

Course laboratories	
Power Electronics Lab	
Weeks	Experiments
Week 1	Single phase half, full wave uncontrolled rectifier
Week 2	Three phase half, full wave uncontrolled rectifier
Week 3	Three phase half, full wave controlled rectifier
Week 4	Buck and Boost converter
Week 5	PWM wave and square wave voltage inverter
Week 6	Single phase cycle converter
Week 7	Single phase AC control

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

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

Course Description

Course Description
This section includes a description of the unit, monostable multioscillator, astable multioscillator, bistable multioscillator, multioscillator applications, timer.IC 555Basic operating characteristics of logic circuits, circuitsCMOScirclesTTL(Bipolar), Emitter Coupled Logic Circuits (ECL), circlesPMOSandNMOScirclesE^2CMOS, analog to digital converter, analog to digital conversion methods, digital to analog converter

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering /	University Department/Center

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

University of Misan	
Advanced electronicsI/E4105	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
45hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives

1. Provide a comprehensive understanding of the different types of integrated circuit technologies, including:CMOSandTTLandECLandE^2CMOSThe student will understand the basic operating characteristics, parameters and practical considerations.
2. The unit aims to give students a comprehensive understanding of signal conversion methods including analogue to digital conversion (ADC) and digital to analog conversion (DAC). It will also cover the basic concepts of sampling errors, filtering, and signal processing.

Learning outcomes

Upon successful completion of this unit, students will be able to:
1. Integrated Circuit Technologies: Understand and compare the operational characteristics and parameters of different integrated circuit technologies such asCMOSandTTLandECLandE^2CMOS.
2. Signal Conversion and Processing: Demonstrate comprehensive knowledge of various signal conversion methods including analog to digital conversion (ADC) and digital to analog conversion (DAC), as well as the errors associated with them.

Teaching and learning methods

Learning and teaching strategies for the Advanced Electronics unit include:
1. Lectures: Basic theoretical concepts will be introduced through lectures. The lectures will also provide overviews of integrated circuit technologies, signal conversion and processing, digital storage devices, and programmable logic devices.

2. Workshops and tutorials: These interactive sessions will be used to work on typical problems, enhance understanding of lecture materials, and discuss course topics in detail.
3. Group Projects: Students will be divided into small groups to work on projects, which encourages collaborative learning and the development of teamwork skills. Projects will involve designing and implementing circuits using different types of integrated circuits and programmable logic devices.
4. Self-study: Outside of the scheduled classes, students are expected to do independent study. This will include reading before lecture, follow-up work after lecture, review, and completing assignments.
5. Assessments: A combination of formative and summative assessments will be used to monitor student learning. These may include lab reports, project reports, quizzes, and final exams.
6. Online Resources: Relevant online resources, including educational videos, webinars, online readings, and quizzes will be provided to complement the learning experience. This also allows for flexible learning at the student's own pace.
7. Guest Lectures/Seminars: Industry experts may be invited to deliver guest lectures or seminars to provide insight into the real-world application of advanced electronics.
8. Office Hours/Feedback Sessions: Teachers will hold regular office hours and feedback sessions to provide individual assistance to students, address any difficulties or concerns, and provide personal feedback on students' progress.

Evaluation methods
For evaluation purposes, it is used. 102. Quick and surprise tests method 103. Determine some homework 104. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	**Chapter One: Integrated Circuits Technologies** 1.1 Fixed-Function Logic Gates

	1.2 Basic Operational Characteristics and Parameters 1.2.1 DC Supply Voltage 1.2.2 Logic Levels 1.2.3 Noise Immunity 1.2.4 Noise Margin 1.2.5 Power Dissipation 1.2.6 Propagation Delay Time 1.2.7 Speed-Power Product (SPP) 1.2.8 Loading and Fan-Out 1.2.8.1 CMOS Loading 1.2.8.2 TTL Loading
Week 2	1.3 CMOS Circuits 1.3.1 The MOSFET 1.3.2 CMOS Inverter 1.3.3 CMOS NAND Gate 1.3.4 CMOS NOR Gate 1.3.5 Open-Drain Gates 1.3.6 Tri-state CMOS Gates 1.3.7 Implementing Logic in CMOS
Week 3	1.4 TTL (Bipolar) Circuits 1.4.1 The Bipolar Junction Transistor 1.4.2 TTL Inverter 1.4.3 TTL NAND Gate 1.4.4 Open-Collector Gates 1.4.5 Tri-state TTL Gates 1.4.6 Schottky TTL
Week 4	1.5 Practical Considerations in the Use of TTL 1.5.1 Current Sinking and Current Sourcing

	1.5.2 Using Open-Collector Gates for Wired-AND Operation 1.5.2.1 Pull-up Resistor 1.5.3 Connection of Totem-Pole Outputs 1.5.4 Open-Collector Buffer/Drivers
Week 5	1.5.5 Unused TTL Inputs 1.5.5.1 Tied-Together Inputs 1.5.5.2 Inputs to VCC or Ground 1.5.5.3 Inputs to Unused Output
Week 6	1.6 Emitter-Coupled Logic (ECL) Circuits 1.7 PMOS, NMOS, and E^2CMOS 1.7.1 PMOS
Week 7	1.7.2 NMOS 1.7.3 E^2CMOS
Week 8	**Chapter Two: Signal Conversion and Processing + Quiz** 2.1 Analog-to-Digital Conversion 2.1.1 Sampling and Filtering 2.1.1.1 The Sampling Theorem 2.1.1.2 The Need for Filtering 2.1.1.3 Aliasing Concept Illustration
Week 9	2.1.2 Holding the Sampled Value 2.1.3 Analog-to-Digital Conversion
Week 10	2.1.3.1 Quantization Process
Week 11	2.2 Methods of Analog-to-Digital Conversion 2.2.1 Flash ADC 2.2.2 Dual-Slope ADC 2.2.3 Successive-Approximation ADC 2.2.4 Segma-Delta ADC 2.2.5 Testing Analog-to-Digital Converters

	2.2.6 Analog-to-Digital Conversion Errors 2.2.6.1 Missing Code 2.2.6.2 Incorrect Code 2.2.6.3 Offset
Week 12	2.3 Methods of Digital-to-Analog Conversion 2.3.1 Binary-Weighted-Input DAC 2.3.2 R/2R Ladder DAC
Week 13	2.3.3 Performance Characteristics of DACs 2.3.3.1 Resolution 2.3.3.2 Accuracy 2.3.3.3 Linearity 2.3.3.4 Monotonicity 2.3.3.5 Settling time
Week 14	2.3.4 Digital-to-Analog Conversion Errors 2.3.4.1 Nonmonotonicity 2.3.4.2 Differential Nonlinearity 2.3.4.3 Low or High Gain 2.3.4.4 Offset Error
Week 15	2.3.5 The Reconstruction Filter
Week 16	**Preparatory week before the final exam**

References

Thomas L. Floyd, “Digital Fundamentals”, 11TH Edition, Pearson Education Limited 2015. •

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, which is an independent study under the supervision of department members. Each student is expected to conduct research in an attempt to explore and identify a potential study area suitable for a major design project. A specific engineering problem from within the identified study area must then be identified. The results of this study must be documented and presented in the form of a design project proposal. Research Methodology: Overview of research and methodologies Research concepts, need for research, types of research, steps in conducting research. Literature Review: What is a literature review?, Why is a literature review needed?, How to conduct a literature review? Selecting and defining the research problem: Formulating the problem - why is it needed? What are the criteria for selecting the problem? Defining variables, evaluating problems, functions of the hypothesis. Conducting research: research activities, preparations before conducting research Examples of research at the university: differences between graduate and undergraduate research, research at the graduate level (PhD and Masters), research at the undergraduate level (Bachelor), preparations for the final year university project.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Engineering project /C4106	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
45hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	

1. Overview of research and its methodologies Research concepts, the need for research, types of research, steps for conducting research
2. 2- Literature Review, What is a Literature Review?, Why is a Literature Review Needed?, How is a Literature Review Conducted?
3. Selection and definition of the research problem. Formulating the problem - why is it needed? What are the criteria for selecting the problem? Defining variables, evaluating problems, functions of the hypothesis.
4. Conducting the research. Research activities, preparations before conducting the research
5. Examples of research at university. Differences between graduate and undergraduate research, research at the graduate level (PhD and Masters), research at the undergraduate level (BA), preparations for the final year undergraduate project
6. Transferring practical knowledge to students and training them to implement technical procedures in their project work.
7. Providing students with the opportunity to refer to, read and review research articles, journals and conference proceedings relevant to their project work and use this as a starting point for their final presentation.
8. Work effectively in a group when completing a small-scale art project.
9. This enables and empowers students to implement the project on their own and implement their innovative ideas to highlight risk and risk recovery issues by adopting appropriate assessment methodologies and demonstrating them at the global level.

Learning outcomes

1. Possesses the theoretical and practical knowledge required in the field of electrical engineering.
2. Uses his theoretical and practical knowledge in the fields of mathematics, science, and electrical engineering to find engineering solutions.
3. Identifies and defines an electrical engineering problem, then models and solves it by applying appropriate analytical or numerical methods.
4. Design a system under realistic constraints using modern methods and tools.
5. Designs and conducts an experiment and analyzes and interprets the results.
6. Possesses the necessary qualifications to perform multidisciplinary work either individually or as a member of a team.
7. Access information, conduct literature searches, use databases and other

knowledge sources, and keep up with developments in science and technology.
8. Plans the project and manages time, and plans his professional development.
9. Has an advanced level of experience in computers and software, and is proficient in the use of information and communications technology.
10. Has proficiency in oral or written communication; has advanced command of the English language.

Teaching and learning methods
Lecture, discussion, question and answer, observation, field trip, group work, report preparation and/or presentation, experiment, training and practice, case study, problem solving, brainstorming, project design/management.

Evaluation methods
For evaluation purposes, it is used. 105. Determine some homework 106. Discussion 107. The seminar 108. Report writing

Course structure	
weeks	**Material covered**
Week 1	PROJECT WORK + 1 hr research methodology
Week 2	PROJECT WORK + 1 hr research methodology
Week 3	PROJECT WORK + 1 hr research methodology
Week 4	PROJECT WORK + 1 hr research methodology
Week 5	PROJECT WORK + 1 hr research methodology
Week 6	PROJECT WORK + 1 hr research methodology
Week 7	PROJECT WORK + 1 hr research methodology
Week 8	PROJECT WORK + 1 hr research methodology

Week 9	PROJECT WORK + 1 hr research methodology
Week 10	PROJECT WORK + 1 hr research methodology
Week 11	PROJECT WORK + 1 hr research methodology
Week 12	PROJECT WORK + 1 hr research methodology
Week 13	PROJECT WORK + 1 hr research methodology
Week 14	PROJECT WORK + 1 hr research methodology
Week 15	PROJECT WORK + 1 hr research methodology
Week 16	**Preparatory week before the final exam**

References
Determined by the faculty member in charge and the student. •

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, systems for each unit. Node equations, synchronous machines in power station. Fault calculations: Symmetrical three-phase faults, Symmetrical components (symmetrical components of asymmetrical phases, Power in terms of symmetrical components, Sequence impedance of series networks, Positive, negative and zero sequence networks, Asymmetrical faults in power systems. Load flow solutions: Gauss-Seidel method, Newton-Raphson method, data for load flow studies, practical power flow problems using computer algorithms. Power system stability: Stability problem, Dynamics of synchronous machines, Swing equation, Power angle equation, Steady state stability, Transient stability, Equal area criterion, Numerical solution of swing equation, Stability of multiple

machines, Computer program for transient stability, Design methods for improving transient stability. Effect of fault on stability, Study of stability of typical power systems

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Power systems analysisI/E4101	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
60hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
1- Learn and study how to convert real values in electrical networks into a value per unit. 2- FormationYbusandZbus. 3- Network analysis under balanced and unbalanced error conditions and interpretation of the results. 4- Understanding the study of energy flow and the method of load flow 5- Developing knowledge of the stability of the power system that includes two automatic systems.	

Learning outcomes
1. Learn how to convert real values in electrical networks to values per unit. 2. Determine the solution using matrices.Z busandY bus. 3. List the various terms associated with the detailing of electrical networks and their components.

4. Summarize what is meant by electrical faults in networks.
5. Discuss the types of faults that occur in electrical networks.
6. Describe balanced and unbalanced faults.
7. Determine how to calculate the fault current in both cases.
8. Learn how to calculate load flow.
9. Discuss the processes of calculating load flow using numerical methods.
10. Discuss the different properties of the Newton-Raphson method and the Gauss-Seidel method.
11. Explain the stability system in electrical networks.
12. Determine the oscillation equation in the stability calculation.
13 Explain the equal-area method and find the critical removal angle and critical removal time.
14 Explain stability in multiple machines.
15. Learn about transition stability programs and design methods to improve transition stability.

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.

109. Quick and surprise tests method
110. Determine some homework
111. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	An introduction to the power system and its components and how to convert values into per-units.
Week 2	Methods for solving node equations using matrices Z bus and Y bus.
Week 3	Solving exercises on topics with a quiz exam
Week 4	Explain the types of faults that occur in electrical networks and how to calculate the fault current
Week 5	Three-phase faults or the so-called balanced faults The process of selecting circuit breakers
Week 6	symmetrical components (symmetrical components of unsymmetrical phasors, power in terms of symmetrical components
Week 7	Mid-term Exam+ sequence impedance of sequence networks, +ve, -ve, and zero sequence networks,
Week 8	unsymmetrical faults on power systems, L-G, LL, LLG, faults and open conductor fault
Week 9	An introduction to the load flow and types of bus bar in electrical networks
Week 10	Gauss-Seidel method for load flow studies + quiz exam
Week 11	Newton-Raphson method, data for load flow studies, practical power flow problems utilizing computer algorithms
Week 12	Power System Stability, Stability problem, dynamics of synchronous machines.
Week 13	Swing equation, power angle equation, steady state stability, transient stability.
Week 14	Equal area criterion, numerical solution of swing equation, multi-machine stability.
Week 15	computer program of transient stability, design methods for improving transient

	stability. Effect of fault on stability + quiz exam.
Week 16	**Preparatory week before the final exam**

References
• Power System Analysis by Hadi Saadat, 2nd Edition • Power System Analysis by John J. Grainger and William D. Stevenson

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

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

Course Description

Course Description
Mathematical models of electromagnetic wave propagation in different media, transient and steady state analysis of transmission lines, impedance matching and microwave network analysis.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
microwavesI/E4108	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
30hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
This course aims to teach the student the definition of microwave engineering, the designation of frequency bands and applications of microwave circuits and devices. Find the characteristics of different transmission lines and impedance matching in the microwave region.	

Learning outcomes
By the end of this course the student will be able to understand the topics: Electromagnetic field theory Maxwell's equations for time-varying fields, fields in media and boundary

conditions, wave equation and plane wave solution, energy and power, reflection from media interface, oblique incidence at dielectric interface
microwave transmission lines
Transmission lines and solutions, reflection and transmission coefficients, standing wave, line impedance and admittance, impedance matching, Smith chart.
Impedance matching and adjustment
Matching using lumped elements, single-phase tuning, two-phase tuning, quarter-wave transformer, small reflection theorem, binomial multi-section matching transformers, Chebyshev multi-section matching transformers, conical lines, Bode-Fano criterion
Microwaves and Cavities
General solutions for transmission electron microscope and microelectron microscope waves, parallel plate waveforms, rectangular wave equations, power transfer and power losses in rectangular waves, circular wave equations, power transfer and power losses in circular waves, rectangular cavity, circular cavity, factorQCavity resonator.

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.

112. Quick and surprise tests method
113. Determine some homework
114. Midterm exams

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

Course structure	
weeks	**Material covered**
Week 1	Microwave spectrum; application of Microwave Engineering; equation for time varying EM waves; fields in media and boundary conditions.
Week 2	The wave equation and basic plane wave solutions; plane waves in dielectric and conducting media.
Week 3	Derivation and solution of TL equations; Parameters and characteristics of TL; High frequency effects;
Week 4	Transients on TL; Coaxial TL;
Week 5	Rectangular and circular waveguide; Excitation of waveguides-electric and magnetic currents, Excitation of waveguides-aperture coupling
Week 6	**Impedance Matching and Tuning** Matching with lumped elements, single-stub tuning, double-stub tuning, quarter-wave transformer
Week 7	theory of small reflection, binomial multisection matching transformers, Chebyshev multisection matching transformers, tapered lines, the Bode-fano criterion
Week 8	**Microwave Waveguides and Cavities** General solutions for TEM
Week 9	TE and TM waves, parallel plate waveguides, rectangular waveguide equations,
Week 10	power transmission and power losses in rectangular waveguide,
Week 11	circular waveguide equations,
Week 12	power transmission and power losses in circular waveguide
Week 13	rectangular cavity, circular cavity, Q factor of a cavity resonator.
Week 14	Transmission (ABCD) matrix,
Week 15	Single and double-stub tuned designs; in Strip-lines and waveguide
Week 16	

References

- Microwave Engineering by David M. Pozar, 4thEd, 2012

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, information theory, self-information, source entropy and source entropy rate, mutual information, channel model.BSCandTSC, joint and condition entropy, capacity and efficiency of symmetric and asymmetric discrete channel, optimal threshold tuning of continuous channel (Shannon equation). Encoding Discrete References: Code efficiency and redundancy, fixed-length codes, variable-length codes, Fanau code, Huffman code, Shannon code, non-binary source coding, source extension for higher coding efficiency. Channel coding: Even and odd parity error detection codes, probability of undetected errors. Error correction codes, linear block codes (generator and parity check matrices), Hamming distance, Hamming weight, Hamming limit, and error correction capabilities. Decoding linear block codes (syndromes). Cyclic codes: Polynomial generator, irregular code (multiplication), regular periodic code (division), and implementation of a logic circuit for encoding and decoding regular periodic codes. Convolution codes, coding logic (generation), tree diagram, fixed diagram and trellis diagram for convolution code. Decoding convolution code

using Viterbi algorithm.

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Information theory /E4102	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
First semester / 2024-2025	Semester / Year
60hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
1. Give students an overview of information theory. 2. Understand the basics of coding theory. 3. Teach students source coding and channel coding methods. 4. This is the advanced topic of communication theory. 5. Give students everything they need to detect errors in digital signals.	

Learning outcomes
1. Understand Shannon's theory. 2. Perform all calculations related to source and channel encoding. 3. Summarize what is meant by coding. 4. Discuss the importance of entropy. 5. Identify probability theories related to information technology. 6. Definition of coding. 7. Design communication systems with information technology in mind. 8. Explain the different coding methods.

Teaching and learning methods
The main strategy that will be adopted in delivering this unit is to encourage student participation in exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classroom, interactive

lessons, and by considering simple problem types that involve some activity of interest to students. Lectures provide students with an explanation of the core material in the course. Students are expected to attend all lectures, lessons, and mid-term tests in order to maximize learning.

Evaluation methods
For evaluation purposes, it is used. 115. Quick and surprise tests method 116. Determine some homework 117. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Introduction to Information theory
Week 2	Probability and Entropy
Week 3	Channel models
Week 4	Source coding
Week 5	Source coding
Week 6	Channel coding - Introduction
Week 7	Linear block codes
Week 8	hamming distance, hamming weight, hamming bound
Week 9	Mid-term exam
Week 10	Decoding of linear block codes
Week 11	Cyclic code symmetric
Week 12	Cyclic code is not symmetric.
Week 13	Decoding of cyclic code
Week 14	Convolutional coding
Week 15	Convolutional coding-Decoding

Week 16	**Preparatory week before the final exam**

References
• Lathi, B. P. (1995). Modern digital and analog communication systems. Oxford University Press. • Communication Systems, S. Haykin, John Willy & Sons. • Bateman, A. (1999). Digital Communications: Design for the real world. Addison-Wesley. • Stremler, F. G. (1990). Introduction to communication systems.

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, Spread Spectrum Modulation: A Model of a Spread Spectrum System, Generation of Quasi-Noise Sequences (PN), direct sequence spread spectrum signals (DS-SS), frequency hopping spread spectrum signals (FH-SS), synchronization in spread spectrum systems, comparison of spread spectrum methods, application of spread spectrum

modulation. Digital Multiplexers: Introduction to Multiplexing, SystemPAM/TDMIntroduction to Digital Multiplexing, Digital Multiplexing Classification, Digital Communications Multiplexing Hierarchy, North American Hierarchy, LinesT, systemPCM-TDM(Conveyor systemT1), linesE. Detect multiple users and connectionsOFDM. Introduction to Multi-User Detection (MUD), communicationsOFDM(Multi-carrier): Basic principles, channel noise in a systemOFDM, systemOFDMZero-padded, periodic repetition of the prefix in a systemOFDM, equationOFDM

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Digital communications /E4202	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
60hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
1. To give students an overview of the latest theories in the field of communication. 2. Understand the basics of multi-wavelength and spread spectrum. 3. Teach students spread spectrum techniques. 4. Introducing the basics of digital collector. 5. Give students everything they need to know about multi-user discovery.	

Learning outcomes
1. Understanding spread spectrum.

2. Discuss digital multiplexers.
3. Summarize what is meant by multi-carrier modulation.
4. Discuss the importance ofOFDM.
5. Learn about the theories of multi-user detection.
6. Definition of equation.
7. Design of advanced modification systems.

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. 118. Quick and surprise tests method 119. Determine some homework 120. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Introduction to digital communication
Week 2	Spread spectrum -Direct Sequence
Week 3	Spread spectrum – Frequency hopping
Week 4	synchronization in spread spectrum systems

Week 5	comparison of spread spectrum, applications of spread spectrum.
Week 6	Introduction to Multiplexing
Week 7	Multiplexing hierarchy
Week 8	T Lines
Week 9	Mid-term exam
Week 10	Introduction to Multicarrier modulation
Week 11	Introduction to OFDM modulation
Week 12	Noise in OFDM channel
Week 13	Demodulation of OFDM signal
Week 14	OFDM equalization
Week 15	Recap of all studies and application of communication systems.
Week 16	**Preparatory week before the final exam**

References

- Lathi, B. P. (1995). Modern digital and analog communication systems. Oxford University Press, Inc.
- Communication Systems, S. Haykin, John Willy & Sons.
- Bateman, A. (1999). Digital Communications: Design for the real world. Addison-Wesley.
- Stremler, F. G. (1990). Introduction to communication systems.

Course laboratories

Weeks	Experiments
Week 1	Analog Modulation – AM
Week 2	Analog Modulation – PM, FM
Week 3	Digital Modulation – PAM
Week 4	Digital Modulation – ASK, FSK, PSK

Week 5	Introduction to Communication modulation using Matlab
Week 6	OFDM using Matlab
Week 7	Spread spectrum using Matlab

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

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

Course Description

Course Description
In this course we cover:Intelligent control methods. Intelligent control architecture. Symbolic reasoning system, rule-based systems, artificial intelligence approach. Knowledge representation. Expert systems. Concept of artificial neural networks and their basic mathematical model, McCulloch-Pitts neuron model, simple perceptron, Adaline and Madalene, multilayer feedforward perceptron. Learning and training of neural network. Data processing: gradient, Fourier transform, principal component analysis and wavelet transforms. Hopfield network, self-organizing network and recurrent network. Neural network based controller. Introduction to fuzzy sets and fuzzy sets, basic fuzzy set operation and approximate logic. Introduction to fuzzy logic modeling and control. Structure and operation of fuzzy controller: fuzzy rule processing, Mamdani type fuzzy rule processing, fuzzy rule release, application degree, output clipping, Sugeny pattern processing, fuzzy controller operations (fuzzification, defuzzification...), fuzzy controller-likePD, the foggy console-likePI, the foggy console-likePIDStability and performance of fuzzy controllers. Fuzzy controller parameter selection: iterative design procedure of fuzzy controllers, gradient factor selection, membership function selection, fuzzy rule formulation, de-fuzzification methods. Fuzzy modeling and control schemes for nonlinear systems. Self-organized fuzzy logic control. Fuzzy logic control of nonlinear time delay system. Evolutionary computing: Genetic algorithm background, working principle of genetic algorithm, search space. Notation: binary, octal, fitness function, single-objective and multi-objective optimization. Reproduction: roulette wheel selection, tournament selection. Genetics: crossover, single-point and multi-point, mutation, inversion, elitism. Basic concepts about ant colony improvement (ACO), improve bacterial colonies (BCO), particle swarm optimization (PSOAnt colony improvement application (PSO) and genetic algorithms in solving the traveling salesman problem, an introduction to hybrid models.

Ministry of Higher Education and	Educational Institution

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

Scientific Research	
Department of Electrical Engineering / University of Misan	University Department/Center
Smart control /E4203	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
60hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	

Learning outcomes
1. Know the difference between digital control system and classical control system. 2. Discuss how to analyze a digital control system. 3. Discuss the status of the digital control system. 4. Determine the optimal control system. 5. Describe the types of optimal control system. 6. Improve the performance of the digital control system in various ways.

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. 121. Quick and surprise tests method 122. Determine some homework

123.	Midterm exams

Course structure	
weeks	**Material covered**
Week 1	INTRODUCTION: Approaches to intelligent control. Architecture for intelligent control. Symbolic reasoning system,
Week 2	rule-based systems, the AI approach. Knowledge representation. Expert systems.
Week 3	ARTIFICIAL NEURAL NETWORKS: Concept of Artificial Neural Networks and its basic mathematical model,
Week 4	McCulloch-Pitts neuron model, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron.
Week 5	Learning and Training the neural network. Data Processing: Scaling, Fourier transformation, principal-component analysis and wavelet transformations
Week 6	Hopfield network, Self-organizing network and recurrent network. Neural Network based controller.
Week 7	FUZZY LOGIC SYSTEM: Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning. Introduction to fuzzy logic modeling and control. Structure and operation of a fuzzy controller: Fuzzy rules processing, Mamdani-type fuzzy processing, fuzzy rules firing, the applicability degree, clipping of the output, Sugenotype processing, fuzzy controller operations (fuzzification, defuzzification……),
Week 8	PD-like fuzzy controller, PI-like fuzzy controller, PID-like fuzzy controller, stability and performance of fuzzy controllers. Fuzzy controller parameters choice: Iterative design procedure of fuzzy controllers, scaling factor choice, membership function choice,
Week 9	Fuzzy rules formulation, defuzzification methods. Fuzzy modeling and control schemes for nonlinear systems. Self-organizing fuzzy logic control. Fuzzy logic control for nonlinear time-delay system.
Week 10	GENETIC ALGORITHM: Evolutionary computing: Background of genetic algorithm (GA), working principle of GA, search space. Encoding: Binary, Octal, Fitness function, single objective and multi objective optimization.
Week 11	Reproduction: Roulette –wheel selection, Tournament selection. Genetic operators: cross-over, single point and multi-point, mutation, inversion, elitism.
Week 12	Bio-inspired computing: Basic concepts on ant colony optimization (ACO),
Week 13	bacteria colony optimization (BCO), particle swarm optimization (PSO).

Week 14	Application of PSO and GA in solving traveling sales man problem,
Week 15	Introduction to Hybrid models.
Week 16	Preparing for final exam

References
•

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, methods of digital-to-analog conversion, signal conversion and processing. RAM (RAM), read-only memory (ROM), programmable read-only memories (PROM,EPROM,EEPROM), flash memory, memory expansion, microcomputer organization, microprocessor organization, memory organization, memory addressing modes, microcontrollers and embedded systems, programmable logic controller (PLC), controllerArduinoSimple programmable logic devices (PLDs)SPLD), complex programmable logic devices (CPLD), field-programmable gate array (FPGA)FPGA)

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center

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

Advanced electronicsII/E4205	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
45hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description

Course objectives

1. The aim is to provide a comprehensive overview of different digital storage devices such as RAM (RAM) and read-only memory (ROM) and flash memory (Flash memory). It will also cover concepts related to memory processes, organization, and types.
2. This unit aims to provide students with an understanding of programmable logic devices such asSPLDsandCPLDsandFPGAsStudents will learn about its structure, operation and applications.
3. The unit also aims to develop practical skills through laboratory work and design projects. This will allow students to apply their theoretical knowledge to practical problems and situations.
4. The unit aims to link the concepts learned to real-world electronics applications, helping students understand how these concepts are used in industry.
5. Stimulate critical thinking and problem-solving skills in students, thus enabling them to design advanced electronic circuits and troubleshoot.
6. This unit also aims to prepare students for more advanced study or professional work in electronics, by providing a solid foundation in advanced electronics concepts.

Learning outcomes

1. Digital Storage Devices: Explain how different digital storage devices work such as RAM (RAM) and read-only memory (ROM) and flash memory (Flash memory), and the ability to distinguish between them based on their operations and organization.
2. Programmable Logic Devices: Understand the principles of programmable logic devices includingSPLDAnd devicesCPLDAnd devicesFPGAAnd its applications in electronics.
3. Practical skills: Apply theoretical knowledge to practical situations, demonstrate

proficiency in laboratory work, and complete design projects related to advanced electronics.
4. Real-world applications: Apply the concepts learned in the unit to real-world electronics applications, and demonstrate an understanding of their practical use in industry.
5. Critical Thinking: Demonstrate critical thinking and problem-solving skills in advanced electronic circuit design and troubleshooting.
6. Preparation for Further Study: Demonstrate a solid foundation in advanced electronics concepts, preparing them for further study or professional work in the field of electronics.

Teaching and learning methods

Learning and teaching strategies for the Advanced Electronics unit include:
1. Lectures: Basic theoretical concepts will be introduced through lectures. The lectures will also provide overviews of integrated circuit technologies, signal conversion and processing, digital storage devices, and programmable logic devices.
2. Workshops and tutorials: These interactive sessions will be used to work on typical problems, enhance understanding of lecture materials, and discuss course topics in detail.
3. Group Projects: Students will be divided into small groups to work on projects, which encourages collaborative learning and the development of teamwork skills. Projects will involve designing and implementing circuits using different types of integrated circuits and programmable logic devices.
4. Self-study: Outside of the scheduled classes, students are expected to do independent study. This will include reading before lecture, follow-up work after lecture, review, and completing assignments.
5. Assessments: A combination of formative and summative assessments will be used to monitor student learning. These may include lab reports, project reports, quizzes, and final exams.
6. Online Resources: Relevant online resources, including educational videos, webinars, online readings, and quizzes will be provided to complement the learning experience. This also allows for flexible learning at the student's own pace.
7. Guest Lectures/Seminars: Industry experts may be invited to deliver guest lectures or seminars to provide insight into the real-world application of advanced

electronics. 8. Office Hours/Feedback Sessions: Teachers will hold regular office hours and feedback sessions to provide individual assistance to students, address any difficulties or concerns, and provide personal feedback on students' progress.

Evaluation methods
For evaluation purposes, it is used. 124. Quick and surprise tests method 125. Determine some homework 126. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	**Chapter Three: Digital Storage Devices** 3.1 Semiconductor Memory Basics 3.1.1 Basic Memory Operations
Week 2	3.2 The Random-Access Memory (RAM) 3.2.1 Static RAMs (SRAMs) 3.2.2 Basic Asynchronous SRAM Organization 3.2.3 Synchronous SRAM with Burst Feature
Week 3	3.2.4 Cache Memory 3.2.5 Dynamic RAM (DRAM) Memory Cells 3.2.6 DRAM Organization 3.2.6.1 Address Multiplexing
Week 4	3.2.6.2 Fast Page Mode 3.2.6.3 Refresh Cycles
Week 5	3.2.7 Types of DRAMs 3.2.7.1 FPM DRAM 3.2.7.2 EDO DRAM

	3.2.7.3 BEDO DRAM 3.2.7.4 SDRAM 3.2.7.5 DDR SDRAM
Week 6	3.3 The Read-Only Memory (ROM) 3.3.1 The Mask ROM 3.3.2 Internal ROM Organization 3.3.3 ROM Access Time
Week 7	3.4 Programmable ROM 3.4.1 PROM 3.4.2 EPROM
Week 8	3.5 The Flash Memory 3.5.1 Flash Memory Cell 3.5.2 Flash Memory Array
Week 9	**Chapter Four: Programmable Logic Devices+ Quiz** 4.1 Simple Programmable Logic Devices (SPLDs) 4.1.1 SPLD: The PAL 4.1.2 SPLD: The GAL
Week 10	4.1.3 Simplified Notation for PAL/GAL Diagrams 4.1.4 Macrocells
Week 11	4.2 Complex Programmable Logic Devices (CPLDs) 4.2.1 Classic CPLD Architecture 4.2.1.1 Shared Expanders 4.2.1.2 Parallel Expanders
Week 12	4.2.2 LUT CPLD Architecture 4.2.3 PLA (Programmable Logic Array(
Week 13	4.3 Macrocell Modes 4.3.1 The Combinational Mode 4.3.2 The Registered Mode
Week 14	4.4 Field-Programmable Gate Arrays (FPGAs) 4.4.1 Configurable Logic Blocks

Week 15	4.4.2 SRAM-Based FPGAs 4.4.3 FPGA Cores
Week 16	**Preparatory week before the final exam**

References

Thomas L. Floyd, "Digital Fundamentals", 11TH Edition, Pearson Education Limited 2015.

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

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

Course Description

Course Description
This section includes a description of the unit, system protection: switching equipment, circuit breakers, required quantities of protection, primary and backup protection, current transformers, voltage transformers, relays, protection system, overcurrent protection, overcurrent and directional protection, distance protection, unit protection, differential relays, generator protection, transformer protection, protectionTL., engine protection. Power System Control: Introduction to power system control and its importance, power system operation methods, main functions of operation. SystemSCADAControl centers, control unit control, communication subsystem, remote terminal unit, data logging. Economical transmission: Characteristics of power generation units, problems of economic transmission with and without considering losses, increased fuel cost, penalty factor, economical energy exchange. Control of voltage, power and frequency. Evaluation of the effect of speed change on bending characteristics

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Power systems analysisII/E4201	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
60hour/semester	Number of Study Hours

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

1/9/2024	Preparation Date of Description

Course objectives

1- The student should be familiar with the types of protection used in the power system.
2- The student should learn about relays, their types and uses.
3- The student should be familiar with the current transformers and voltage transformers used in the protection process.
4- The student should learn how to calculate the economic operation of power plants.
5- The student should learn about the SCADA system and how to use it in the power system.

Learning outcomes

1. Identify the protection system and its importance in the energy system.
2. Identify the types of electrical switches and circuit breakers.
3. Learn about the development of relays, their working principle and uses.
4. Identify types of protection such as overload protection, direct protection, distance protection and differential protection.
5. Discuss system protection and hardware protection.
6. Describe the operation of current transformers and voltage transformers.
7. Learn how to design current transformers and voltage transformers and the most important problems that may occur in them.
8. Identify power generation units and their economic operation.
9. Discuss the process of distributing electrical energy and calculating its losses.
10. Identify the penalty factor and economic energy operation.
11. Discuss the effect of speed change on sag properties.
12. Identify the control of the power system and its importance.
13 Understand the operation of the power system and the main work tasks.
14. Getting to know the systemSCADACentral control system and sub-communication system.
15. Learn how to use the systemSCADAIn power generation, transmission and distribution.

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. 127. Quick and surprise tests method 128. Determine some homework 129. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Introduction to the protection system used in the power system.
Week 2	Switchgear, circuit breakers, required quantities of protection.
Week 3	Development of relays, their uses and components.
Week 4	Over-current protection, over-current and directional, distance protection, unit protection, differential relaying.
Week 5	Apparatus protection, system protection and relays used in it+ quiz exam
Week 6	Current transformers, voltage transformers CT & VT.
Week 7	Mid-term Exam+ Design of CT and VT used in protection and solving the problem of saturation and Ferro resonance.
Week 8	Characteristics of power generation units, economic dispatch.
Week 9	Dispatch problems with and without consideration of losses, incremental fuel cost.
Week 10	Penalty factor, economic power interchange. Voltage, power and frequency control.+ quiz exam

Week 11	Evaluation of the effect of speed change on drop characteristics.
Week 12	Introduction to power system control and its importance.
Week 13	Modes of power system operation, major tasks of operation.
Week 14	SCADA system, control centers, controller tuning, communication sub system, remote terminal unit, data logging.
Week 15	Use of SCADA system in power generation, transmission and distribution system + quiz exam.
Week 16	**Preparatory week before the final exam**

References
• Power system stability and control P. Kundur • Fundamentals of Power System Economics Daniel Kirschen Goran Strbac. • Power system SCADA Smart Grids by Mini S. Thomas

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 servo mechanism: motor-controlled DC motors, field-controlled DC motors, motor-generator transfer function. Two-phase servo motors: main requirements for servo motors, two-phase servo motor transmission function, motorIMAs a servo motor, medicine cup construction, introduction to speed generators and induction speed generators. Shaded pole motors: construction, operating principle, speed reversing and speed change.

Universal and single phase AC motors Principles, torque and speed equations, universal and small AC motors, speed change, applications. Single Phase Repulsion Motors: Principles of Repulsion and Repulsion Motors, Repulsion MotorIM, engine of dissonanceIM. Stepper motors: permanent magnet stepper motors, variable reluctance stepper motors, torque and speed characteristics, step angle and speed. Reluctance Motors: Single Phase and Three Phase Reluctance Motors, Construction and Operating Principle. Linear Induction Motor: Construction, Operating Principle and Applications

Ministry of Higher Education and Scientific Research	Educational Institution
Department of Electrical Engineering / University of Misan	University Department/Center
Special machines /E4204	Course Name / Course Code
Semester system	Academic System
	Programs Included
Actual attendance	Learning Method
Second semester/ 2024-2025	Semester / Year
45hour/semester	Number of Study Hours
1/9/2024	Preparation Date of Description
Course objectives	
1. Providing comprehensive knowledge in the emerging field of special electrical machines. 2. To enable the student to understand the different machines made of permanent magnets and their applications. 3. Applications that will be used in electrical machines with their performance and theory of operation. 4. Develop a simple mathematical model for engineering problems and perform static analysis.	

Learning outcomes

After completing the course, students are expected to:
1. Be able to explain the control aspect of special electrical machines.
2. Able to understand the construction of special machines, and different coils.
3. Able to analyze different types of special machines, their characteristics and industrial applications.
4. Use phase diagrams and performance characteristics to explain motor operation.
5. Able to interrupt various losses in special machines and their efficiency.
6. Enhance the ability to identify the basic requirements for the application of special machine-based design.

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. 130. Quick and surprise tests method 131. Determine some homework 132. Midterm exams

Course structure	
weeks	**Material covered**
Week 1	Introduction to machines: Basic Concepts
Week 2	Single phase AC commutator motor: Principles, torque and speed equations
Week 3	Single phase AC commutator motor: speed changing, applications
Week 4	Universal motors: Principles, torque and speed equations, speed changing and applications

Week 5	Repulsion principles and repulsion motors, repulsion start IM, repulsion IM.
Week 6	Armature-controlled DC motors, field-controlled DC motors, motor generator transfer function
Week 7	Main requirements of servos, two-phase servo motor transfer function, the IM as a servo motor, drug cup construction
Week 8	Mid-term
Week 9	Introduction to tacho generators and induction tacho generators
Week 10	Permanent magnet stepper motors, variable reluctance stepper motors
Week 11	torque-speed characteristics, step angle and speed of stepper motor
Week 12	Single and three phase reluctance motors
Week 13	Reluctance motors: Construction and principles of operation.
Week 14	Linear induction motor: Construction, principles of operation, applications
Week 15	Brushless DC Motor: Construction, principles of operation, types of BLDC, applications
Week 16	Preparatory week before the final exam

References

- Special electrical machines by K. Venkata Ratnam, University press, 2009, New Delhi.
- A Course in Electrical Technology by JBGupta, SKKataria & Sons,12th Edition
- Jacek F. Gieras (2008), Advances in electric machines, Springer, Illustrated edition.

Course laboratories

Weeks	Experiments
Week 1	Single Phase AC Commutator Motor: Modeling and Simulation
Week 2	Single Phase AC Commutator Motor: Speed-Torque Characteristics

Week 3	DC SERVO MOTOR: Modeling and Simulation
Week 4	DC SERVO MOTOR: Speed-Torque Characteristics
Week 5	Stepper Motor Control
Week 6	Brushless DC Motor: Modeling and Simulation
Week 7	Brushless DC Motor Control

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