Module Description Forms for the Electrical Engineering Department

Course Syllabi:

1. Course Number & Title (Credit Hours, Required or Elective):
ENLA102 –English Language (2.0, Required)

2. Catalog Description:
Academic English I is an introductory course designed to enhance the English language proficiency of non-native English speakers who are preparing to pursue higher education or professional opportunities in English-speaking environments. The course focuses on developing essential skills in reading, writing, speaking, and listening within academic contexts. Emphasis is placed on academic language usage, critical thinking, and effective communication strategies.

3. Prerequisite(s):
None

1. Textbook(s) and/or other required materials:
New Headway Oxford Elementary, Pre-intermediate, and Intermediate

2. Course Objectives:
In this course, students will learn:

- Develop the ability to read and understand a variety of academic texts, including articles, essays, and research papers.
- Identify main ideas, key points, supporting details, and arguments within texts.
- Learn and apply the principles of academic writing, including clear thesis statements, logical organization, and coherent paragraphs.
- Develop proficiency in different types of academic writing such as summaries, analyses, argumentative essays, and research papers.
- Improve listening skills by engaging with academic lectures, discussions, and presentations.
- Develop effective note-taking strategies to capture important information, main ideas, and key details during listening activities.
- Enhance oral communication skills through class discussions, group activities, and presentations.
- Learn how to conduct academic research using library resources, databases, and online sources.
- Evaluate the credibility, relevance, and reliability of sources for academic writing.
- Review and reinforce grammar rules and structures relevant to academic writing (e.g., verb tenses, sentence structure, and subject-verb agreement).
- Expand academic vocabulary related to specific disciplines and topics covered in the course.
- Develop critical thinking skills by analyzing and evaluating arguments, evidence, and assumptions in academic texts.

3. Topics:

- Present tenses(present simple , present continuous)
- Past tenses (past simple , past continuous)
- Quantity , articles
- Question, questions word.
- Verbs patterns , future forms
- Present perfect , Indefinite past , ever and never
- Vocabulary, Synonyms, Antonyms, word endings, word stress, right word, wrong word, verbs with similar meaning, adjective and noun.

4. Class/laboratory Schedule:

No Lab

5. Design Project:

No project

6. Computer/software Use:

Students typically use word in writing their reports of problem based learning.

7. Evaluation Methods:

- (Quiz (20 min), report, homeworks 40%, and one hour mid exam 10%) Three hours final exam 50%

8. Contribution to Professional Component:

In this course, Students will learn how to conduct academic research using library resources, databases, and online sources. They will develop skills in evaluating the credibility, relevance, and reliability of sources for academic writing and research projects.

9. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcome 1-7):

1. Enhance oral communication skills through class discussions, group activities, and presentations. (4)

13. Prepared by:

Waleed Salman Mohammed, 2025.

Course Syllabi:

1. Course number and title

PHY102 - Physical Electronics (5.0, Required)

2. Catalog Description

Principles of physics

Simple electronics circuits

3. Prerequisite(s):

None

4. Textbook(s) and/or other required materials:

Donald A. Neamen, "Semiconductor Physics and Devices: Basic Principles," McGraw Hill International Edition, Fourth Edition,2012

Boylestad, Robert L., and Louis Nashelsky. "Electronic Devices and Circuit Theory 11th ed." (2018).

5. Course Objectives:

1. To understand the concepts of atomic structure, the dual nature of matter, energy levels, quantum numbers, and crystal structure.
2. To understand the ability to analyze electronic ballistics.
3. To develop problem solving skills and understanding electron mobility, explain conduction in metals, semiconductor types, and the Fermi energy level.
4. Introducing the basic principles of the diode, its types, structure and properties, analyzing its circuits, and studying its most important applications in electronic circuits.
5. Introducing the basic principles of the BJT transistor, its structure and characteristics, analyzing its basic circuits,

6. Topics:

Students will learn:

- Atomic structure
- Insulators and semiconductors
- The mobility, The conductivity
- Diodes circuits and problem solving.
- BJTs circuits and problem solving.

7. Class/laboratory Schedule:

No lab

8. Design Project:

No project.

9. Computer/software Use:

Students typically use word in writing their reports.

10. Evaluation Methods:

- (Quiz (20 min), report, homeworks 40%, and half mid exam 10% one hour)
- Three hours final exam 50%

11. Contribution to Professional Component:

For Physical electronics in engineering, students will learn about the application of electronic devices and circuits at the atomic and subatomic levels. Physical electronics contributes to the professional component by advancing the understanding of electronic devices and materials, enabling the design of electronic systems with enhanced performance and functionality.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For physical electronics in Engineering students will learn:

1. Identify, formulate, and solve engineering questions in semiconductors problems by applying principles of engineering, science, and mathematics. (1)
2. An ability to communicate effectively with a range of audiences (4)

13. Prepared by:

Ruaa Muthana Ali 2025

Course Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):

MATH 103- Mathematics I (4.0, Required)

2. Catalog Description:

This module covers a wide range of topics, including algebra, trigonometry, calculus, and transcendental functions. Students will develop skills in problem-solving, critical thinking, and mathematical modeling, which are crucial for analyzing and solving engineering problems. The module begins with a review of algebraic operations and equations, ensuring students have a strong foundation in manipulating mathematical expressions. It then progresses to trigonometry, introducing concepts such as angles, triangles, and trigonometric functions, which are essential for engineering applications involving forces, waves, and oscillations. Calculus forms a significant part of the module, where students learn both differential and integral calculus. They will explore concepts such as limits, derivatives, and integration techniques, enabling them to analyze rates of change, optimize engineering processes, and understand the principles of motion and accumulation.

3. Prerequisite(s):

None

4. Textbook(s) and/or other required materials:

- Thomas' Calculus, George Thomas, Maurice D. Weir, Joel Hass, with the assistance of

- Christopher Heil, 2013.
- Thomas' Calculus Early Transcendentals, George Thomas, Maurice D. Weir, Joel Hass, Pearson, 2014.

5. Course Objectives:

1. Understand the fundamentals of Matrices, Determinants and complex numbers and their properties.

2. Analyze and graph functions, including determining their domain and range.

3. Evaluate limits and determine continuity of functions.

4. Apply differentiation rules to find derivatives.

5. Apply integration rules and techniques, including integration by parts and partial fractions.

6. Solve problems involving definite and indefinite integrals.

7. Understand and graph trigonometric functions, and apply their properties to solve problems.

8. Perform derivations and integrations involving trigonometric functions.

9. Apply logarithmic and exponential functions in solving problems, and perform derivations and integrations involving these functions.

6. Topics:

1. Matrices, Determinants, complex numbers, and their properties.

2. Introduction to Calculus:

Real numbers and number systems. Functions and their properties. The concept of limits and its applications.

3. Differentiation:

Definition and basic properties of derivatives. Rules for differentiation..
Application of Differentiation, Max. and Min. of Function.

4. Integration:

Indefinite integrals. Definite integrals and their properties. Techniques of integration: substitution, integration by parts, by partial fractions. Applications of integration: area under curves.

5. Transcendental Functions:

Exponential and logarithmic functions and their properties. Trigonometric functions, their derivatives. Inverse trigonometric functions and their derivatives.

7. Class/laboratory Schedule:

No lab.

8. Design Project:

No Project

9. Computer/software Use:

10. Evaluation Methods:

- Quiz (20%), report (10%), homework (10%), one-hour midterm exam (10%), and three hours final exam (50%).

11. Contribution to Professional Component:

Mathematics plays a key role to develop the students' ability to transfer their mathematical understanding (and the associated methods) to diverse engineering application areas.

12. Relationship to Student Outcomes: Course Learning Objectives:

Course Learning Objectives (related Student Outcomes 1-7):

For Mathematics I students will learn:

1. Understanding extreme values problem, Maximize the output power (1)

13. Prepared by:

Qasim Hadi Kareem, 2024-2025

1. Course Number & Title (Credit Hours, Required or Elective):
HRAD103 – Human Rights and Democracy (2.0, Required)

2. Catalog Description:
– Human Rights and Democracy
Introducing Human Rights and learn about international Human Rights conventions.

3. Prerequisite(s):
None

4. Textbook(s) and/or other required materials:

Human Rights and Democracy: Prof. Dr. Ghassan Karim Majzab and Prof. Amjad Zein Al-Abidin Tohme 2018.

5. Course Objectives:

- Introducing students to human rights and their duties towards individuals and society.

- Encouraging students to study human rights, which helps develop their thinking skills regarding human rights and freedoms while exposing them to its positive aspects.

- Familiarizing students with how to engage with international and regional treaties, their internal legislations, and deriving knowledge related to these rights, as well as understanding their real and civilizational role in people's lives.

- Enabling students to acquire knowledge about the constitution and the legislative and judicial authorities.

6. Topics:
Students will learn:

- Studying theories of human rights and democracy.

- clarifying the historical stages of human rights and their development.

- Explaining the most important rights and duties granted to individuals, which are constitutionally guaranteed and contribute to improving their lives.

- Promoting the idea of social justice for all individuals without discrimination based on religion, race, or color.

- Emphasizing and strengthening the spirit of citizenship, fostering a sense of belonging to the land and nation, and committing to laws and regulations.

• Enhancing students' critical thinking skills and building their confidence in discussions about human rights.

• Introducing students to the real mechanisms and approaches of international and local engagement with human rights.

• Developing knowledge related to human rights and understanding their true civilizational impact on people's lives.

7. Class/laboratory Schedule:
2 hours / week

8. Design Project:
None.

9. Computer/software Use:
None

10. Evaluation Methods:
Exams (2 hours mid exam 10%, 2 hours final exam 50%)
Reports, Assignments, Quizzes, Oral Discussions, 40%

11. Contribution to Professional Component:

Definition and Importance of Human Rights and fundamental classifications of rights (civil, political, economic, social, and cultural) and how human rights emerged throughout history.

International charters and agreements, such as the Universal Declaration of Human Rights and Understanding the importance of justice and equality in society .The impact of racial, religious, and social discrimination on individuals. How individuals can defend their rights and the rights of others .The importance of promoting a culture of human rights in society.

12. Relationship to Student Outcomes:
Course Learning Objectives (related Student Outcomes 1-7):
Human rights and democracy guide engineers to uphold ethical standards and ensure their solutions respect individual freedoms and societal well-being. They promote inclusive, responsible decision-making that considers global and societal impacts. (5)

13. Prepared by:
Asmaa Falih Jassm, (2024-2025)

1. Course Number & Title (Credit Hours, Required or Elective):
WSP106- Technical Workshop, (1.0, Required)

2. Catalog description:
Technical workshop aims to improve the student's skills that deals with an electronic component and any physical entity in an electronic system used to affect the electrons or their associated fields in a manner consistent with the intended function of the electronic system. Components are generally intended to be connected together, usually by being soldered to a printed circuit board (PCB), to create an electronic circuit with a particular function (for example an amplifier, radio receiver, or oscillator). Components may be packaged singly, or in more complex groups as integrated circuits. Some common electronic components are capacitors, inductors, resistors, diodes, transistors, etc. Components are often categorized as active (e.g. transistors and thyristors) or passive (e.g. resistors, diodes, inductors and capacitors.

3. Prerequisite: for computer efficiency:
None

4. Text book, title, author, and year. a. other supplemental materials.
- Technical workshop (Materials & Devices) authored by Assist. Lecturer Mazin N. Ali supervised by Prof. Mohammed H. Hafiz- 2016.

- Electrical & Electronics Engineering, Amrita School of Engineering, 2014

- Electronics Workshop Lab Manual, Polytechnic, Bilaspur, 2010

6. Course objectives:
The Workshop aims to provide students with skills:
- Identify all the pieces used in the computer and network industries
- Check and test electronic parts used in computers and electronic devices.

6. Topics:
- Understanding the goal and rules Electrical Safety Principles
- Understand the principles of resistor and ohms law with problem solution and design circuits
- Understand the principles of capacitor and method and circuit with test
- Understand the principles of transformer and it tests
- Learn how to deal with fuses and understanding diode function and test
- Understanding the Zener and LED circuit and test
- Project Management
- Mini power supply project team

7. Class/ laboratory schedule:

8. Design project:
Two mid exam and two problems based learning

9. computer/software use:
Student use word to write there reports, and power point for presentation

10. Evaluation methods

Mid exam and quizzes

11. Contribution to professional component

Understand the useful with the electronic and electrical devices and soldering the circuits.

12. Adopted graduate outcomes

1. Ability to skillfully communicate orally with a gathering of people and in writing with various managerial levels.(4)
2. Ability to work adequately on teams and to set up objectives, plan activities, meet due dates, and manage risk and uncertainty. (7)
3. Ability to understanding engineering problems to make inferences. (1)

C- Emotional and value goals

C.1 Develop and enhance the student's thinking skills and move him to the level of higher thinking -

C.2 creates the student's confidence to design and build circuits.

C.3 raising the spirit of cooperation and working within a team

C.4 to bring out creative ideas among students by raising the spirit of competition

Teaching and learning methods

1. Strategic thinking skills within a group.
2. Critical thinking strategy in learning.
3. Brainstorming.

Evaluation methods

1. Learning soldering processes
2. Feedback from the student.
3. Exams of all kinds.
4. Reports and applied projects.

Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

Enhances lifelong learning by engaging students in self-directed practical tasks and exposing them to evolving industry tools and standards. (6)

13 Prepared by:

Mazin N. Ali, 2024-2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):

DCC104 – DC Electrical Circuits (4.0, Required)

2. Text book, title, author, and year. a. other supplemental materials.

- C.K. Alexander and M.N.O Sadiku, Fundamentals of Electric Circuits 4th Edition, McGraw-Hill Education, 2009.
- Boylistad, Introductory Circuit Analysis10th Edition, Pearson, 2015.

3. Catalog Description:

This course introduces the fundamental principles of direct current (DC) electrical circuits. Topics covered include circuit analysis techniques, Ohm's Law, Kirchhoff's Laws, series and parallel circuits, circuit theorems, capacitors, and inductors. Emphasis is placed on understanding theoretical concepts, practical application, and hands-on experimentation.

4. prerequisites or co-requisites:

None

5. Course Objectives:

- To develop problem solving skills and understanding of circuit theory through the application of techniques.
- To understand voltage, current and power from a given circuit.
- This course deals with the basic concept of electrical circuits.
- To understand Ohm's Law.
- To understand Kirchhoff's current and voltage Laws problems.
- To perform mesh and Nodal analysis.
- To perform Thévenin theorem Norton theorem and maximum power transfer theorem.
- To develop problem solving skills and understanding Superposition theorem, Millman's theorem, substitution theorem, reciprocity theorem, source Transformation.
- Understand the behavior of capacitors and inductors in DC circuits.
- Gain hands-on experience through laboratory experiments and practical demonstrations.
- Apply DC circuit principles to real-world applications.

6. Topics:

- Systems of units, charge, current, current density, voltage, efficiency, circuit elements.
- Types of sources: independent and dependent voltage sources and their transformation, new and renewable energy sources.
- Ohm's Law and temperature effect.
- Nodes, Branches, and Loops.
- Equivalent resistance: series, parallel, (series-parallel), delta and star connections.
- Kirchhoff's Laws to analysis DC circuits.
- Mesh analysis and nodal analysis.
- Network Theorems: the superposition theorem, Thevenin's theorem, Norton's theorem, Millman's theorem, substitution theorem, reciprocity theorem, and source transformation.

- The behavior of the capacitors and inductors in the DC Circuits.

7. Class/laboratory Schedule:

Material Covered in the lab:

- Basic Information and Ohm's law.
- Series and parallel circuits.
- Voltage and current divider.
- Delta-Star connection.
- Methods of Analysis: Mesh Analysis and Nodal Analysis.
- Circuit Theorems: Thevenin, Superposition and Norton's Theorems.
- Maximum power Transfer**.**

8. Design Project:

No project.

9. Computer/software Use:

Students typically use word in writing their reports.

10. Evaluation Methods:

- (Quizzes 10%, report 10%, class works 10%, and half mid exam 10% one hour).
- Three hours' final exam 50%.

11. Contribution to Professional Component:

The following strategies are used to contribute to professional component:

- Designing and developing lab experiments that align with the course objectives and provide students with hands-on experience.
- Conduct problem-solving sessions to help students tackle challenging problems and reinforce students' understanding of circuit theory and analysis techniques. Encourage active participation and provide guidance on problem-solving strategies.
- Introduce students to emerging technologies and advanced techniques.
- Demonstrate the practical applications of DC electrical circuits in industry or academia. This can help students see the real-world significance of the concepts they are learning.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

1. Apply fundamental laws (Ohm’s Law, Kirchhoff’s Laws) to analyze DC circuits. (1)
2. Solve complex circuit problems using systematic techniques such as mesh and nodal analysis. (1)

13. Prepared by:

Khalid Jumaa Kazim, 2024-2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):

COMP105 – Computer (4.0, Required)

2. Catalog Description:

This C++ theory course is meticulously designed to provide students with a foundational understanding of computer science principles, starting from the core hardware and software components that drive today's computing systems. Students will delve into the conceptual realms of algorithms and flowcharts, gaining the ability to conceptualize and structure problem-solving processes effectively. The curriculum will also cover basic computer network types, offering insight into the interconnected world of computing. Furthermore, the course will introduce essential skills in Microsoft Office tools, such as Word and Excel, equipping students with the versatile capabilities needed in a variety of professional contexts.

3. Prerequisite(s):

None

4. Textbook(s) and/or other required materials:

1. "C++ Primer" by Stanley B. Lippman, Josée Lajoie, and Barbara E. Moo: A comprehensive guide to the C++ language, including modern C++ standards and practices.
2. "Accelerated C++: Practical Programming by Example" by Andrew Koenig and Barbara E. Moo: This book emphasizes practical programming and offers a fast-paced introduction to C++.
3. "Effective Modern C++" by Scott Meyers: For understanding the nuances of modern C++ and best practices.

5. Course Objectives:

- Understand and describe the core principles of computer science, the interplay between hardware and software, and the role they play in computing.
- Comprehend the process of algorithm development and flowchart creation for effective problem-solving in computer programming.
- Grasp the foundational knowledge of computer networks and their classifications, along with their communication protocols.
- Acquire proficiency in the use of Microsoft Office Word and Excel.
- Gain comprehensive understanding of C++ programming fundamentals, including data types, operators, control structures such as if and switch statements, iterative processes with for and while loops, functions, and the use of matrices and matrix operations for complex data handling.

6. Topics:

- Introduction to computer hardware and IT, covering types of computers and networks.
- Understanding CPU, memory, and I/O devices, as well as buses, BIOS, and storage.
- Exploring computer languages, flowcharts, and algorithms, with a focus on C++.
- Learning about C++ language fundamentals, including data types and operators.

- Examination of program control structures in C++, such as if statements, switch-case statements, and logical operators.
- Introduction to program control loops, including for loops and do-while loop statements, and their functions.
- Exploring advanced concepts such as loop functions (e.g., jump, go to, infinite loops), C++ math functions, and arrays (both one-dimensional and two-dimensional).
- Understanding the concept of functions and their role in programming.
- Solving advanced problems using the concepts and techniques learned throughout the course.

7. Class/laboratory Schedule:

The course includes scheduled class and laboratory sessions.

8. Design Project:

Students are required to complete a design project as part of the course curriculum.

9. Computer/software Use:

Students typically use CodeBlock IDE and Microsoft Office.

10. Evaluation Methods:

- Quiz (20 min) 10% , homeworks 10% ,lab report 10%, class project 10%, half mid exam one hour 10%, and Three hours final exam 50%

11. Contribution to Professional Component:

In the Computer Programming course, students contribute to the professional component by actively engaging in class activities, meeting deadlines, and collaborating with peers. Effective communication, problem-solving skills, and ethical conduct are emphasized, fostering a professional learning environment. Students demonstrate their commitment to lifelong learning and mastery of programming concepts through active participation and dedication to excellence in their work.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

1. Students learn C++ programming, problem-solving, and critical thinking through hands-on coding tasks. (1)
2. They collaborate on life learning and apply skills to solve practical engineering problems. (6)

13. Prepared by:

Rasha Subhi Ali, 2024-2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):
COMP105 – Computer Lab (4.0, Required)

2. Catalog Description:
The accompanying C++ lab course is designed to complement the theoretical knowledge gained in lectures with hands-on experience, reinforcing students' understanding of computer science's foundational pillars. In this practical setting, students will apply the principles of algorithms through the construction of flowcharts and translate these into executable C++ code, solidifying their grasp of logical sequencing and problem-solving. The lab sessions will provide practical exercises in understanding network types and simulating network configurations, as well as projects using Microsoft Office Word and Excel to manage and present data effectively. These exercises aim to build competency in using software tools in conjunction with programming skills. By practicing in a lab environment, students will develop a proficiency in C++ that will serve as a cornerstone for their future endeavors in technology and programming.

3. Prerequisite(s):
None

4. Textbook(s) and/or other required materials:

4. "C++ Primer" by Stanley B. Lippman, Josée Lajoie, and Barbara E. Moo: A comprehensive guide to the C++ language, including modern C++ standards and practices.
5. "Accelerated C++: Practical Programming by Example" by Andrew Koenig and Barbara E. Moo: This book emphasizes practical programming and offers a fast-paced introduction to C++.
6. "Effective Modern C++" by Scott Meyers: For understanding the nuances of modern C++ and best practices.

5. Course Objectives:

1. Apply C++ programming concepts to write, execute, and troubleshoot code involving various data types and operators.
2. Implement control structures and functions to create efficient and readable code that adheres to best practices.
3. Employ conditional statements (if/else) and switch cases to handle decision-making processes within a program.
4. Utilize for and while loops to perform repetitive tasks, understanding the nuances of iteration in programming.
5. Construct and manipulate matrices using C++ to perform matrix operations, simulating real-world applications and data modeling.

6. Topics:

- Learn basic concepts of how to use computer
- Basic concepts in Microsoft word and Excel
- Operator ,If and select-case
- logical + bitwise

- While, For Loop and infinite loop
- Mathematical functions
- Array and Functions

7. Class/laboratory Schedule:

The course includes scheduled class and laboratory sessions.

8. Design Project:

Students are required to complete a design project as part of the course curriculum.

9. Computer/software Use:

Students typically use CodeBlock IDE and Microsoft Office.

10. Evaluation Methods:

- Quiz (20 min) 10% , homeworks 10% ,lab report 10%, class project 10%, half mid exam one hour 10%, and Three hours final exam 50%

11. Contribution to Professional Component:

In the Computer Programming Lab course, students contribute to the professional component by actively engaging in practical programming exercises and projects. They demonstrate proficiency in coding, problem-solving skills, and adherence to coding standards. Through collaboration with peers, effective communication, and meeting project deadlines, students develop essential teamwork and project management skills. Additionally, by seeking help when needed and continuously improving their coding abilities, students exhibit a commitment to lifelong learning and professional development in the field of computer programming.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

1. Students gain a thorough understanding of fundamental computing concepts, enhancing their problem-solving abilities (Student Outcome 1).
2. Collaboration in group projects cultivates effective teamwork and communication skills, essential for functioning in diverse teams (Student Outcome 4).
3. Mastery of programming languages and tools enables students to design, implement, and evaluate computer-based systems (Student Outcome 3).
4. Ethical conduct and awareness of professional responsibilities are emphasized, acknowledging the societal impact of computing (Student Outcome 5).
5. Engagement in continuous learning prepares students for ongoing professional development and adaptation to evolving technologies (Student Outcome 6).

13. Prepared by:

Rasha Subhi Ali, 2024-2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):

EDR122 – Engineering Drawing (2.0, Required)

2. Catalog Description:

This course provides a comprehensive exploration of fundamental concepts in Engineering Drawing, also known as Technical Drawing or Engineering Graphics, is a discipline that involves creating detailed visual representations of engineering designs, concepts, and components. At the end of this course, students are able to: Produce an engineering drawing to communicate. Draw a complete drawing with proper dimensions and scale. Differentiate different type of drawings. Read and analyze engineering drawings. Produce work in a given time. Using the computer in the engineering drawing.

3. Prerequisite(s):

None

4. Textbook(s) and/or other required materials:

- D. A. Madsen, D. P. Madsen, and J. E. Briesacher, Engineering Drawing and Design, 5th ed., Clifton Park, NY: Delmar Cengage Learning, 2011.
- F. E. Giesecke, A. Mitchell, H. C. Spencer, I. L. Hill, and J. T. Dygdon, Technical Drawing with Engineering Graphics, 15th ed., Upper Saddle River, NJ: Pearson, 2016.

5. Course Objectives:

In this course, the student will learn the basic and applied concepts of engineering drawing with the following fundamentals:

- Develop Fundamental Skills: The aim is to develop fundamental skills in engineering drawing, including the ability to create accurate and precise technical drawings using appropriate drawing instruments and techniques.
- Understand Drawing Standards and Conventions: The aim is to familiarize students with drawing standards and conventions used in engineering, enabling them to create drawings that adhere to industry guidelines and ensure clear communication of design intent.
- Interpret and Create Orthographic Projections: The aim is to enable students to interpret and create orthographic projections of objects, including understanding the principles of multi view projection, selecting appropriate views, and accurately representing three-dimensional objects in two dimensions.
- Familiarize with Computer-Aided Design (CAD): The aim is to introduce students to computer-aided design (CAD) software and develop their proficiency in using CAD tools to create and modify technical drawings, improving efficiency and accuracy in engineering design and documentation.
- To demonstrate proficiency in creating and interpreting engineering drawings: Develop the skills to create accurate and detailed engineering drawings using both manual drafting techniques and computer-aided drafting (CAD) software. Additionally, gain the ability to interpret and understand engineering drawings, including orthographic projections, sections, and assembly drawing.

6. Topics:

- Fundamental Concepts of Engineering Drawing
- Lines and Lettering
- Orthographic Projection
- Sectional Views and Dimensioning
- Introduction to CAD (Computer-Aided Design)
- isometric Projection and Electrical and Electronic Symbols

7. Class/laboratory Schedule:

No lab.

8. Design Project:

Teamwork Project: First-year students will design a basic electronic circuit, creating schematic diagrams using CAD software. The project includes a simple report explaining the circuit's function, evaluated on diagram accuracy, circuit functionality, and report quality.

9. Computer/software Use:

Students typically use CAD software to draw basic figures, and word to write their reports.

10. Evaluation Methods:

- 20 min quiz (10%), Project and reports (10%), Assignments (10%), homework (10%), one-hour midterm exam (10%), and three hours final exam (50%).

11. Contribution to Professional Component:

EDR122 – Engineering Drawing contributes significantly to professional engineering education by teaching students' precision in technical drawing, adherence to industry standards, and proficiency in computer-aided design (CAD).

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For the engineering drawing course, students will learn:

9. Relationship to Student Outcomes:

Course Learning Objectives (Outcomes 1-7):

For Engineering Drawing, students will learn:

1. Developing foundational visualization and technical communication skills essential for adapting to evolving engineering tools and standards. (6)

13. Prepared by:

Waleed Salman, 2024-2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):
MEC124 – Principles of Mechanical Engineering (4.0, Required)
2. Catalog Description:
Static mechanic
Dynamic mechanic
3. Prerequisite(s):
None
4. Textbook(s) and/or other required materials:

- Statics and Dynamics Engineering Mechanics Twelfth Edition R. C. Hibbeler
- E-Learning Material Engineering Mechanics By Sri Soumya Ranjan Mishra
- Engineering Machines – Basudev Bhattacharya (Oxford University Press).

5. Course Objectives:
In this course, for mechanic students will:
1. Learn the basic concept of static and dynamic mechanics
2. Develop problem solving skills and understanding the concepts of forces, resultant forces and momentum.
3. Understand friction, centroid and moment of Inertia.
4. Solve Newton's and thermodynamics Laws problems.
5. Know heat transfer conduction mechanism for different shapes.
6. Topics:
In this course, students will learn about:
- Fundamentals of Engineering Mechanics, units system
- Forces and Force Systems, Resultant of Forces
- Moment of a force, Equilibrium
- Analysis of trusses
- Centroid & Moment of Inertia
- Friction
- Kinetics of particle, rectilinear motion, curvilinear motion
- Rectangular components of curvilinear motion
- Normal and tangential component of acceleration
- Force, mass and acceleration, Newton’s 2'nd law
- Work and energy
- Thermodynamic system, Zeroth and First Law of Thermodynamics
- Second law of thermodynamics and Carnot cycle
- Heat transfer mechanism in one dimension conduction for plane walls, cylinders and spheres

7. Class/laboratory Schedule:
No lab
8. Design Project:
No project

9. Computer/software Use:
Students typically use word in writing their reports.

10. Evaluation Methods:

- (Quiz (20 min), report, homeworks 40%, and half mid exam 10% one hour)
- Three hours final exam 50%

11. Contribution to Professional Component:
In this course, students learn details about fundamental principles such as static mechanics, thermodynamics, and heat transfer. Understanding these concepts is crucial for analyzing and solving complex engineering problems encountered in professional practice. Students learn to apply theoretical principles to real-world engineering problems. The course also emphasizes communication skills, including report writing, and presentations. Effective communication is essential for conveying engineering concepts, designs, and results to colleagues, clients, and stakeholders.

12. Relationship to Student Outcomes:
Course Learning Objectives (related Student Outcomes 1-7):
For Principles of Mechanical engineering students will learn:

1. Identify, formulate, and solve engineering questions in semiconductors problems by applying principles of engineering, science, and mathematics. (1)
2. An ability to communicate effectively with a range of audiences (4)

13. Prepared by:
Ruaa Muthana Ali 2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):
ACC123 – AC Electrical Circuits (4.0, Required)

2. Text book, title, author, and year. a. other supplemental materials.

- C.K. Alexander and M.N.O Sadiku, Fundamentals of Electric Circuits 4th Edition, McGraw-Hill Education, 2009.
- Boylistad, Introductory Circuit Analysis 10th Edition, Pearson, 2015.

3. Catalog Description:
This course introduces students to the principles and analysis techniques of alternating current (AC) electrical circuits. Topics covered include sinusoidal waveforms, impedance, phasors, AC circuit analysis methods, power calculations, and three-phase systems. Emphasis is placed on understanding theoretical concepts and their practical applications in engineering.

4. Prerequisites or co-requisites:
DCC104 – DC Electrical Circuits

5. Course Objectives:

- To understand the basic principles of alternating current and voltage, frequency, cycle, radian angle, reactance, impedance, etc.
- Knowledge of electric circuit elements (inductor and capacitor).
- To make the student able to deal with sinusoidal varying quantities mathematically in order to analyze AC circuits and calculate currents, voltages in AC circuits and understand the phasor relationship between these quantities.
- Applying the same network circuit theorems for DC circuits to AC circuits by taking into consideration the complex number representation of AC quantities.
- To understand different types of power in AC circuits and understand the idea of the maximum power transfer.
- To understand the power factor and power factor correction.
- Analysis of three phase circuits and compare them with single phase circuits.
- Apply AC circuit principles to real-world applications.

6. Topics:

- Generation of single-phase voltage, waveforms - instantaneous value, relation between time and angle, max values of sinusoidal voltage and current, frequency and period of the sinusoidal waveform, form factor and peak factor.
- Analysis of single-phase AC circuit, impedance and admittance, series, parallel, and series/parallel circuits, phasor diagram, delta and star connections.
- Kirchhoff's law: KVL-KCL in the frequency domain.
- Nodal analysis and mesh analysis.
- Superposition theorem, source transformation, Thevenin, Norton Equivalent circuits.
- Instantaneous and average power, maximum average power transfer

- Effective or RMS Value, complex power, conservation of AC power, phasor diagram.
- Power factor and power factor correction,
- Balanced three-phase system, positive phase sequence source, negative phase sequence source, balanced Wye-Wye connection, balanced Wye-Delta connection, balanced Delta-Delta connection, balanced Delta-Wye connection.
- Power in a balanced system.
- Unbalanced three phase system analysis, phasor diagram, power calculations.

7. Class/laboratory Schedule:

- AC capacitive and inductive reactances.
- Resistor and inductor in series.
- Resistor, inductor and capacitor parallel. And Frequency measurements.
- Series - parallel resistor, inductor and capacitor circuits and AC superposition theorem.

8. Design Project:

No project.

9. Computer/software Use:

Students typically use word in writing their reports.

10. Evaluation Methods:

- (Quizzes 10%, report 10%, class works 10%, and half mid exam 10% one hour).
- Three hours' final exam 50%.

11. Contribution to Professional Component:

The following strategies are used to contribute to professional component:

- Designing and developing lab experiments that align with the course objectives and provide students with hands-on experience.
- Conduct problem-solving sessions to help students tackle challenging problems and reinforce students' understanding of AC circuit analysis techniques.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

1. Ability to distinguish, identify, define, formulate, and solve engineering problems by applying principles of engineering, science and mathematics. (1)

13. Prepared by:

Alaa Majeed Ali 2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):

MAT121– Mathematics II (5.0, Required)

2. Catalog Description:

Mathematical concepts, including vector analysis, sequences and infinite series, partial derivatives, gradients, and the chain.

3. Prerequisite(s):

None

4. Textbook(s) and/or other required materials:

- Thomas' Calculus by George B. Thomas, 2017
- Advanced engineering mathematics by E.Kreyszig

5. Course Objectives:

In this course, for Mathematics II students will:

1. Apply concepts of vector algebra to statics.
2. Find the line of intersection of two planes (of a line and a plane)
3. Study sequence and infinite series
4. Analyses partial derivatives for plane and space
5. Find the instantaneous rate of z change in any direction at a point by directional derivative.

6. Topics:

In this course, students will learn about:

- Vectors, vector representation, vector operation, dot product, cross product, triple product.
- Equation of line and planes in space, intersection planes.
- Vector functions and their derivatives.
- Partial derivatives: first order partial derivatives, Higher order partial derivatives.
- Chain rule.
- Gradients, directional derivative.
- Sequence and infinite series
- Power and Taylor series

7. Class/laboratory Schedule:

No lab

8. Design Project:

No project

9. Computer/software Use:

Students typically use word in writing their reports.

10. Evaluation Methods:

- (Quiz (20 min), report, homeworks 40%, and half mid exam 10% one hour)
- Three hours final exam 50%

11. Contribution to Professional Component:

In this course, Mathematics II is designed for students pursuing degrees in engineering, physics, computer science, and related fields. This course delves into critical mathematical concepts,

including vector analysis, sequences and infinite series, partial derivatives, gradients, and the chain rule. The course also emphasizes communication skills, including report writing, and presentations. Effective communication is essential for conveying engineering concepts, designs, and results to colleagues, clients, and stakeholders.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes (1-7)):

For Mathematics II students will learn:

1. Identify, formulate, and solve engineering questions in mathematic problems by applying principles of engineering, science, and mathematics. Understanding how to calculate the angle between planes in three dimensional coordinates (1).

13. Prepared by:

Qasim Hadi Kareem 2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):

DTC125 – Digital Techniques (5.0, Required)

2. Catalog Description:

Digital Techniques

3. Prerequisite(s):

None

4. Textbook(s) and/or other required materials:

- Thomas L F Floyd " Digital Fundamentals "
- M. Morris Mano. "Digital Logic and Computer Design",
- M . Morris Mano, "Digital Design", Pearson Education Asia.

5. Course Objectives:

In this course, students will:

A1- Acquire basic knowledge of digital logic levels and apply them to understand digital electronics circuits.

A2- To understand and study the structure of different number systems for application in digital design

A3- Possess a comprehensive understanding of the basic concepts and techniques used in digital electronics.

A4- prepare students to perform analysis and design of various digital electronic devices.

6. Topics:

In this course, students will learn about:

- Introduction to digital systems
- Methods of conversion between digital systems
- Boolean algebra
- Logic circuits
- Karnaugh map
- The circuit of the logical adder, half and total, and the circuit of the total
- Encoding circuits
- Monthly exam
- Decoder circuits
- Digital comparator circuits
- Encryption systems
- multiplexer circuits
- Demultiplexer circuits
- Introduction on sequential digital circuits
- S-R Latch type bistable circuits and J-K FF bistable circuits
- Synchronous bistable circuits
- Asynchronous bistable circuits

- Applications of synchronous and asynchronous bistable circuits
- Asynchronous digital counters

7. Class/laboratory Schedule:

- Introduction to digital techniques. And The not gates
- AND and OR gates. And NAND gates.
- Half adder. And Full adder
- Half and full Subtractors.
- Basic combinational logic and gates with many inputs
- Multiplexers (data selectors).
- S-R Latch.
- Decoders. And Encoders.
- Flip flop. And J-K flip flop. And S-R flip flop.
- Synchronous counter

8. Design Project:

No project

9. Computer/software Use:

Students typically use word in writing their reports.

10. Evaluation Methods:

- (Quiz (10 min)10%, report 10%, homeworks 10%, Lab 10%,, and mid exam 10% one hour)
- Three hours final exam 50%

11. Contribution to Professional Component:

- Transferable general and qualifying skills (other skills related to employability and personal development).
- Possessing a qualified level to understand industrial digital controllers and methods of programming them.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For Digital Techniques course, students will learn:

1. The ability to analyze and design various digital systems and bistable sequential circuits. (3)
2. As well as, understand and study structure of digital storage circuit synchronous and asynchronous digital meters. Furthermore, possess a comprehensive understanding of the basic concepts and techniques used in digital electronics. (1)

13. Prepared by:

Khalid J. Kazim, 2025

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):

ARLA101, Arabic language (2.0, Required)

2. Catalog Description:

This course aims to develop the student's skills in the Arabic language by studying its fundamental aspects such as grammar, morphology, and spelling, in addition to enhancing reading, comprehension, and both written and oral expression skills. The course also includes selected literary texts from poetry and prose to enrich the student's linguistic appreciation and to connect the language with cultural identity.

3. Prerequisite(s):

None

4. Textbook(s) and/or other required materials:

- Al-Wajeez fi al-Lughah al-'Arabiyyah by Mohi Hilal Sarhan, Sharh Qatr al-Nada wa-Ball al-Sada by Ibn Hisham al-Ansari
- Al-Ajurrumiyyah by Abu Abdullah Muhammad al-Sanhaji, Al-Imla' wa al-Tarqeem fi al-Kitaba al-'Arabiyyah by Abdel Aleem Ibrahim
- Arabic Language for Non-Specialists by Mustafa Jatal and Salah Kazara

5. Course Objectives:

- .Developing students' language proficiency in the four core skills: listening, speaking, reading, and writing.
- Deepening structural understanding of Arabic grammar, morphology, and spelling.
- Enhancing the ability to express ideas clearly and accurately in both spoken and written Arabic.
- connecting the Arabic language to Arab-Islamic cultural identity and fostering a sense of linguistic belonging
- Enabling students to analyze texts and understand their linguistic and semantic meanings.
- Preparing learners to use Arabic effectively in academic and professional contexts.

6. Topics:

- The student will learn the topic of punctuation marks, which assist in writing and reading by indicating where to pause and continue, as well as guiding changes in pronunciation.
- The student learns to distinguish between the hamzat al-wasl and hamzat al-qat'.
- One of the important topics the student will learn is the subject of writing complements and rules, which includes the types of tanween, shadda, and madda.
- The student will learn the topic of numbers, how to write them, and the topic of defining and identifying numbers.
- The student will also learn about the history of Arabic calligraphy, its stages of development, and the different types of scripts.

- The student will complete their Arabic language curriculum after studying the topic of the Mu'allaqat, learning about the seven Mu'allaqat and their poets.

7. Class/laboratory Schedule:
2 hours / week

8. Design Project:
None.

9. Computer/software Use:
None

10. Evaluation Methods:
Exams (2 hours mid exam 10%, 2 hours final exam 50%)
Reports, Assignments, Quizzes, Oral Discussions, 40%

11. Contribution to Professional Component:

Contributing to the professional component of the Arabic language subject involves improving teachers' skills in teaching Arabic, offering modern strategies and methods in education, and working on developing educational curricula that align with students' needs in the job market or in various professional contexts. This contribution can also include teacher training, organizing workshops, or developing educational materials that support the effective use of the Arabic language in professional fields.

12. Relationship to Student Outcomes:
Course Learning Objectives (related Student Outcomes 1-7):

1- Enabling graduates to communicate effectively with Arabic-speaking audiences across various sectors. It also supports cultural understanding and professional networking in Arabic-speaking regions. **(4)**

13. Prepared by:
Asmaa Falih Jassm, (2024-2025)

Course Syllabi

1. Course number and title

MAT201- Mathematics III (4.0, Required)

2. Catalog Description

Partial differentiation

Fourier series

3. Prerequisite(s):

None

4. Textbook(s) and/or other required materials:

Advanced Engineering Mathematics by Erwin Kreyszig, Willey Eastern Ltd. Mumbai.
Calculus by G. B. Thomas and R. L. Finney, Addison- Wesley, 1996.
Elements of Partial Differential Equations by I.N. Sneddon.

5. Course Objectives:

- To apply concepts of vector algebra to statics.
- To find the line of intersection of two planes (of a line and a plane)
- To study sequence and infinite series
- Partial derivatives help analyze surfaces for maximum and minimum points and give rise to partial differential equations in the next stage.
- To find the instantaneous rate of z change in any direction at a point by directional derivative.
- State the requirements for a series to converge to a limit

6. Topics:

Students will learn:

- To perform basic operations on vectors, including addition, subtraction, multiplication, and division.
- To evaluate partial derivatives and implement to estimate maxima and minima of multivariable function
- To understand the applications of partial differentiation
- Determine the equation of a plane tangent to a given surface at a point
- To impart the knowledge of sequences and summation of series
- Able to differentiate power series to obtain new ways to represent functions
- To find the Fourier series representation of a function of one variable or more.

7. Class/laboratory Schedule:

No lab

8. Design Project:
No project.
9. Computer/software Use:
Students typically use words when writing their reports.

10. Evaluation Methods:

- (Quiz (20 min), report, homework 20%, (hour and a half mid-exam 20%)
- Three hours' final exam 60%

11. Contribution to Professional Component:
For Mathematics III, the students will be able to Solve Differentiated vector functions, solve first- and second-order linear and non-linear partial differential equations, and answer any questions about the Fourier Transform method.

12. Relationship to Student Outcomes:
Course Learning Objectives (related Student Outcomes 1-7):
For Mathematics III in Engineering, students will learn:
1. Understanding the qualitative aspects of solutions to differential equations , Applying Laplace transforms to solve problems in engineering , and Comparing and analyzing different techniques of solving higher-order equations (1)

13. Prepared by:
Hala Kamal Abduljaleel, 2024

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):
ELE202 – Electronics-I (3.0, Required)

2. Catalog Description:

This course is designed to provide students with hands-on experience in the field of electronics, specifically focusing on the study and practical application of bipolar junction transistor (BJT) technology. Through a combination of theoretical instruction and laboratory exercises, students will gain a comprehensive understanding of BJT transistors and their various applications in electronic circuits. Introduction to BJT transistors: Students will learn about the basic principles, characteristics, and operation of BJT transistors. This includes understanding the different transistor configurations such as common emitter, common base, and common collector. Biasing techniques: Students will explore different biasing methods to ensure proper operation of BJT transistors in electronic circuits. This includes analyzing the DC biasing conditions and selecting appropriate resistor values for biasing networks. Small-signal analysis: Students will study the small-signal models of BJT transistors and learn how to analyze and design amplifier circuits using these models. They will investigate concepts such as voltage gain, current gain, input impedance, and output impedance. Amplifier circuits: Students will design and construct various amplifier circuits using BJT transistors. They will explore common emitter, common base, and common collector amplifier configurations and analyze their performance characteristics. BJT switch applications: Students will examine the application of BJT transistors as electronic switches.

3. Prerequisite(s): for Electronic-I
-Diode Characteristics and Applications lab
-Electrical circuit-lab

4.Textbook(s) and/or other required materials:

- Robert L. Boylested and Louis Nashelsky, Electronic Devices and Circuit Theory, Eighth Edition.
- Thomas L. Floyd, Electronic Devices, Sixth Edition.

5. Course Objectives:
For Electronic-I, students will learn:

- To introduce students to the basic principles and operation of BJT, devices
- To develop students' proficiency in analyzing and designing electronic circuits using these devices.
- To enhance students' understanding of biasing techniques and their impact on circuit performance.
- To provide hands-on experience in constructing and testing electronic circuits involving BJT device.
- To enable students to apply their knowledge in practical applications, such as analog amplifiers and digital logic circuits.

- To foster critical thinking and problem-solving skills in the context of electronic circuit analysis and design.

6. Topics:

Students will learn:

- Introduction to Electronic Devices: BJT, - principles and characteristics.
- Biasing Techniques: DC biasing, AC load lines, and stability analysis.
- Small-Signal Analysis: Hybrid-pi model, voltage and current amplification, frequency response.
- Amplifiers: Common-emitter, common-base, common-collector configurations.
- Differential Amplifiers: Differential and common-mode gain, CMRR, differential pair.
- Feedback in Amplifiers: Types of feedback, advantages, and stability considerations.
- BJT characteristics, biasing, amplifiers, and logic circuits.
- Analysis of multistage amplifier (current gain, voltage gain) types of amplifier.

7. Class/laboratory Schedule:

Electronic-I lab

8. Design Project:

In addition to two exams, there are three problems with learning.

9. Computer/Software Use:

Students typically use **Microsoft Word** to write their reports on problem-based learning.

10. Evaluation Methods:

Exams (hour and half mid-exam 10%, Report and Project 20%, Quiz 10%Lab 10%, three hours final exam 50%)

11. Contribution to Professional Component:

For Electronic-I, students will learn about BJT small Signal analysis.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1):

For Electronic-I, students will learn:

1. An ability to identify, formulate, and solve engineering problems in Electronics circuits by applying principles of electrical engineering, science, and mathematics.

13. Prepared by:

Marwah Malik Hassooni, 2025

2. Syllabus

1. Course Number & Title (ECTS Credits, Required or Elective):

NAS203 – Networks and Systems (3.0, Required)

2. Course Description:

This course is designed to give students a deep understanding of electrical networks and systems and its practical applications, preparing them for more specialized studies or professional work in Electrical Engineering.

The course begins with an in-depth exploration of two-port networks, covering impedance parameters, admittance parameters, hybrid parameters, and transmission parameters. Students will learn about the relationships between these parameters and how to analyze terminated and interconnected two-port networks.

3. Prerequisite(s): for energy efficiency

None

4. Textbook(s) and/or other required materials:

- Fundamentals of Electric Circuits, C.K. Alexander and M.N.O
- Sadiku, McGraw-Hill Education.
- Networks and Systems, D. Roy Choudhury.
- Electric Circuits, James W. Nilsson and Susan Riedel.

5. Course Objectives:

1. Understand Two-Port Networks:
2. Analyze Magnetically Coupled Circuits
3. Study Transfer Functions and System Analysis
4. Design and Classify Passive Filters
5. Examine Resonance in Electrical Circuits
6. Analyze Transient Circuits

6. Topics:

1. Two-Port Networks
2. Magnetically Coupled Circuits
3. Transfer Functions and System Analysis
4. Passive Filters
5. Resonance
6. Transient Circuits in the s-Domain

7. Class/laboratory Schedule:

Theoretical Classes: 2 hours per week, Laboratory Sessions: 2 hours per week

8. Evaluation Methods:

1. Formative Assessment

Formative assessments are ongoing evaluations designed to provide feedback and help students improve throughout the course. The formative assessment components include:
(a) Quizzes Time/Number: 2 quizzes./ Weight (Marks): 10% of the total marks (10 marks).
(b) Assignments Time/Number: 2 assignments./ Weight (Marks): 10% of the total marks (10 marks).
(c) Lab Weight (Marks): 10% of the total marks (10 marks).
(d) Report

- Time/Number: 1 report./ Weight (Marks): 10% of the total marks (10 marks)

2. Summative Assessment

(a) Midterm Exam Time: 2 hours./ Weight (Marks): 10% of the total marks (10 marks).
(b) Final Exam Time: 4 hours./ Weight (Marks): 50% of the total marks (50 marks).

9. Contribution to Professional Component:

This course significantly contributes to the **Professional Component** by equipping students with the technical knowledge, practical skills, and professional competencies needed to excel in the field of electronics and electrical engineering. It prepares students for both industry roles and advanced academic pursuits, while fostering critical thinking, problem-solving, and ethical responsibility.

10. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

1. Outcome 1: Problem Identification, Formulation, and Solving Using Engineering, Science, and Mathematics

Relevance to Course Material:

1. The course heavily emphasizes solving engineering problems using mathematical tools (e.g., transfer functions, poles/zeros, Bode plots, transient analysis. (1)
2. Topics like resonance, filters, and two-port networks require students to apply principles of science and mathematics to solve practical problems. (1)
3. Enabling students to conduct experiments on network configurations and analyze system performance data. It develops skills to interpret results for troubleshooting and optimization. (3)

11. Prepared by:

Firas Ali Jawad, 2025

2. Syllabus

1. **Course Number & Title (Credit Hours, Required or Elective):**

DCM204 – DC Machines and Transformers (5.0, Required)

2. **Catalog Description:** This course covers the principles, construction, types, and performance characteristics of DC machines and transformers. It includes the study of electromagnetism, DC generators, DC motors, single-phase and three-phase transformers, and practical performance analysis.

3. **Prerequisite(s):**

None

4. **Textbook(s) and/or other required materials:**
    - "Electrical Machines" by S. K. Sahdev
    - "Electrical Engineering: Principles and Applications" by B.L. Theraja and A.K. Theraja

5. **Course Objectives:**
    - Understand the fundamentals of magnetism and electromagnetism.
    - Analyze the construction and working principles of DC generators and motors.
    - Study different types of DC generators and motors, including their characteristics.
    - Examine armature windings, armature reaction, and commutation.
    - Explore transformer construction, operation, and equivalent circuits.
    - Understand transformer performance, voltage regulation, efficiency, and testing.
    - Investigate three-phase transformers and their configurations.

6. **Topics: Students will learn**:
    - Magnetism and Electromagnetism – Principles and effects on DC machines.
    - DC Generators – Construction, components (Yoke, Poles, Armature, Brushes), armature windings (Lap, Wave, Multiplex), armature reaction, commutation, types, and characteristics.
    - DC Motors – Principles of operation, types (Series, Shunt, and Compound), characteristics, torque and speed equations, starting methods, and speed control.
    - Problem-solving and revision sessions.
    - Single-phase Transformers – Construction, EMF equation, ideal and practical models, equivalent circuit, voltage drop, efficiency, and performance analysis.
    - Transformer Tests – Open circuit and short circuit tests, voltage regulation, losses, and conditions for maximum efficiency.
    - Three-phase Transformers – Construction, connections, parallel operation, and applications.

7. **Class/laboratory Schedule:** DC Machines and Transformers Lab.

8. **Design Project**: Yes

9. **Computer/software Use**: None

10. Evaluation Methods:
2 quizzes (10% each), homework (5%), in-class homework (5%), project report (10%), midterm exam (10%), final exam (50%).

11. Contribution to Professional Component:
Students will develop an understanding of DC machines, transformers, and electromagnetic principles — essential knowledge for electrical engineers working on power systems, electric machines, and modern energy technologies.

12. Relationship to Student Outcomes:
Course Learning Objectives (related Student Outcomes 1, 4, 7):
For DC Machines and Transformers, students will learn:
• Problem-Solving in Electromagnetic Systems: Analyze and solve problems involving DC machine components, armature windings, and transformer performance.
• Machine Characteristics and Performance: Apply principles of electromagnetism to evaluate DC motor and generator behavior under different conditions.
• Transformer Analysis: Develop and analyze equivalent circuits, voltage regulation, and efficiency in single-phase and three-phase transformers.
• Presentation Skills (Outcome 4): Prepare and deliver a technical presentation on a selected topic related to DC machines or transformers, demonstrating clear communication and subject mastery.
• Mini Projects (Outcome 7): Design and complete a small-scale project involving DC machines or transformers, applying theoretical knowledge to practical implementation and showcasing creativity in problem-solving.

13. Prepared by:
Ali K. Hantoosh, 2025

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):

EEC205 – Engineering Economics (2.0, Required)

2. Catalog Description:

The Engineering Economics course provides students with a comprehensive understanding of economic principles applied to engineering decision-making. The course covers key topics such as cost accounting, time value of money, cash flow analysis, and financial evaluation of engineering projects. Students will learn to apply economic analysis techniques, including break-even analysis, net present value (NPV), internal rate of return (IRR), and risk assessment. Additionally, the course explores case studies on electric vehicle adoption and distributed energy resources in electrical engineering, enhancing students' ability to make informed financial and engineering decisions.

3. Prerequisite(s):

None

4. Textbook(s) and/or other required materials:

- "Engineering Economy" by William G. Sullivan, Elin M. Wicks, and C. Patrick Koelling, 17th Edition –
- "Fundamentals of Engineering Economics" by Chan S. Park, 4th Edition

5. Course Objectives:

- Develop an understanding of fundamental economic principles, including supply and demand, cost analysis, and financial decision-making.
- Apply economic analysis techniques to engineering projects, assessing financial viability and investment alternatives.
- Evaluate stock and bond valuation, financial metrics (NPV, IRR, payback period), and break-even analysis.
- Analyze the economic integration of distributed energy resources (DERs) in electrical engineering.
- Understand the financial implications of taxation, inflation, and debt financing in engineering economics.
- Assess risks and uncertainties in economic analysis using tools like the Capital Asset Pricing Model (CAPM).
- Enhance communication skills by presenting economic analysis results through reports and case studies.

6. Topics:

- Introduction to Engineering Economy and Cost Accounting
- Time Value of Money and Cash Flow Equivalencies
- Cost Analysis for Product Development and Production

- Stock and Bond Valuation in Engineering Investments
- Investment Decision Metrics: NPV, IRR, and Payback Period - Break-Even Analysis and Retirement Planning
- Taxation, Debt Financing, and Inflation in Economic Studies
- Risk and Uncertainty in Engineering Economic Analysis
- Capital Asset Pricing Model (CAPM) and Entrepreneurial Case Studies
- Economic Analysis of Electric Vehicle Adoption and Distributed Energy Resources (DERs)

7. Class/laboratory Schedule:

The course includes structured lectures, case studies where economic analysis techniques applied to real-world engineering scenarios.

8. Design Project:

Students are required to complete a economics project as part of the course curriculum.

9. Computer/software Use:

None.

10. Evaluation Methods:

- Quiz 10% , HomeWorks 10% ,Assignment 10%, Team Project 10% , Midterm Exam 10% ,Final Exam 50% Total: 100%.

11. Contribution to Professional Component:

- Apply economic principles to engineering decision-making.
- Conduct financial feasibility studies for engineering projects.
- Use quantitative methods for investment appraisal and risk analysis.
- Develop proficiency in financial modeling tools.
- Enhance teamwork and communication skills through project-based learning.
- Integrate ethical and professional considerations in economic analysis.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

1. Applying economic analysis enhances engineering problem-solving skills (Outcome 1).
2. Teaching students to consider ethical implications in financial decision-making and resource allocation. It promotes integrity and responsibility in evaluating economic impacts on society and the environment. (5)

13. Prepared by:

Wassan Saad Hayale, 2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):

CBRI104, Crimes of the Baath Regime in Iraq (**2**.0, Required)

2. Catalog Description:

During its rule, the Baath regime in Iraq committed a large number of different crimes, and their diversity requires clarifying concepts and definitions for the student so that he is aware of and knowledgeable about what he is going through in relation to the curriculum material, such as the concept of crime and its divisions, and the international crimes for which the leaders and henchmen of the Baath regime were sentenced according to the law of the Iraqi Supreme Criminal Court. This curriculum included what came as cognitive keys in the hands of the university student to strengthen with every trick that the hands of the Baath and its fake media wove a false narrative, and sold their consciences that see themselves as remaining until now humiliated, captive, and a subservient tail.

3. Prerequisite(s):

None

4. Textbook(s) and/or other required materials:

Curriculum of the Crimes of the Former Baath Regime 2023, Ministry of Higher Education and Scientific Research, Department of Studies, Planning and Follow-up, 2023

5. Course Objectives:

Spreading awareness among our students and informing them of the crimes committed during the Baath regime in Iraq.

6. Topics:

1. Crimes of the Ba'ath regime according to the Iraqi Supreme Criminal Court Law of 2005
2. The concept of crimes and their types
3. Crimes of the Ba'ath regime according to the documentation of the Iraqi Supreme Criminal Court Law of 2005
4. Psychological and social crimes and their effects, and the most prominent violations of the Ba'ath regime in Iraq
5. Psychological Crimes
6. Social Crimes
7. Draining the Marshes
8. Environmental Crimes of the Ba'ath Regime in Iraq
9. War and Radioactive Pollution and Mine Explosions
10. Destruction of Cities and Villages (Scorched Earth Policy)
11. Bulldozing Palm Groves, Trees, and Crops
12. Mass Grave Crimes
13. Events of the Genocide Graves Committed by the Ba'ath Regime in Iraq
14. Chronological classification of genocide graves for the period 1963-2003

7. Class/laboratory Schedule:

None

8. Design Project:

No project

9. Computer/software Use:

Students typically use word in writing their reports.

10. Evaluation Methods:

- (Quiz (10 min), report, homeworks, 40%, and half mid exam (10% one hour)
- Three hours final exam 50%

11. Contribution to Professional Component:

The documentation of Baath regime crimes contributes to the professional component by fostering ethical awareness and responsibility among professionals. It emphasizes the role of truth, justice, and historical accountability in professional practice.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes (1-7)):

1. Highlighting the importance of justice, human rights, and professional integrity. It encourages students to uphold ethical standards in confronting past injustices. (5)

13. Prepared by:

Abdulrahman Mohammed, 2025

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):

PNS221 – Probability and Statistics (3.0, Required)

2. Catalog Description:

The Probability and Statistics course is designed to complement theoretical knowledge with hands-on experience, reinforcing students' understanding of probability models, statistical inference, and data analysis techniques. In this course, students will explore probability distributions, hypothesis testing, regression models, and variance analysis, gaining practical experience in applying statistical methods to real-world problems. The course will also include exercises using Microsoft Excel and statistical software to analyze and interpret data effectively. By developing a strong foundation in probability and statistics, students will acquire essential analytical skills for applications in engineering, science, and business.

3. Prerequisite(s):

None

4. Textbook(s) and/or other required materials:

- "Probability and Statistics for Engineering and the Sciences" by Jay Devore, 8th Edition
- "Probability and Statistics: The Science of Uncertainty" by Michael J. Evans and Jeffrey S. Rosenthal, 2nd Edition.

5. Course Objectives:

- Understand and apply fundamental probability concepts, including sample spaces, events, and probability laws.
- Identify and analyze discrete and continuous probability distributions.
- Calculate and interpret expected values and variances.
- Demonstrate proficiency in point estimation and interval estimation techniques.
- Conduct hypothesis tests for single and multiple samples.
- Apply Analysis of Variance (ANOVA) techniques to compare multiple groups.
- Develop simple and multiple linear regression models for data analysis.
- Perform Goodness-of-Fit Tests and analyze categorical data.

6. Topics:

- Introduction to Probability Models
- Discrete and Continuous Probability Distributions
- Joint Probability Distributions
- Point Estimation and Interval Estimation
- Hypothesis Testing for One and Two Samples
- Analysis of Variance (ANOVA) and Multifactor ANOVA

- Simple and Multiple Linear Regression
- Nonlinear Regression and Model Adequacy Assessment
- Goodness-of-Fit Tests and Categorical Data

7. Class/laboratory Schedule:
The course includes scheduled class only.

8. Design Project:
None.

9. Computer/software Use:
None.

10. Evaluation Methods:
- Quiz (20 min) 10% , homeworks 10% ,Assignment 10%, Seminar 10%, half mid exam one hour 10%, and Three hours final exam 50%

11. Contribution to Professional Component:
- Apply probability and statistical methods to solve real-world problems.
- Develop critical thinking and problem-solving skills.
- Understand ethical and professional responsibilities in data-driven decision-making.

12. Relationship to Student Outcomes:
Course Learning Objectives (related Student Outcomes 1-7):
1. Mastery of probability and statistics enhances problem-solving abilities (Outcome 1).
2. The Probability and Statistics course supports Outcome 5 by promoting ethical data handling, ensuring accuracy, honesty, and integrity in data analysis. It also teaches responsible interpretation and reporting to avoid misleading conclusions.(5)

13. Prepared by:
Wassan Saad Hayale, 2025

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):
INC222- Induction machine LAB (2.0, Required)

2. Catalog description:

This laboratory course provides students with practical experience and experimental understanding of the fundamental principles governing DC machines and transformers. It focuses on the construction, operation, testing, and performance analysis of DC motors, DC generators, and both single-phase and three-phase transformers. Through structured hands-on experiments, students will explore key topics such as excitation methods, torque-speed characteristics, speed control techniques, and efficiency determination for various DC machine types. In the transformer section, students will perform open-circuit and short-circuit tests, study voltage regulation, analyze efficiency under load, and examine transformer connections and parallel operation. The course reinforces theoretical knowledge through real-world application, enhancing students' skills in measurement, analysis, troubleshooting, and safe operation of electrical machines.

3. Prerequisite(s):
None

4. Textbook(s) and/or other required materials:
BL Theraja. Electrical technology. Vol- II: S Chand & co

5. Lab Objectives:

The primary objective of the Induction Machines Laboratory is to provide students with a practical foundation in the operation, performance analysis, and application of both single-phase and three-phase induction machines. This laboratory aims to bridge the gap between theoretical understanding and real-world implementation through structured experimentation and analysis. Specifically, the laboratory is intended to:

- Reinforce theoretical knowledge related to the construction, working principles, and classifications of induction motors through hands-on experience.
- Enable students to perform standard tests—including no-load, blocked-rotor, and load tests—for the determination of equivalent circuit parameters and machine characteristics.
- Facilitate the analysis of torque-speed behaviour, power factor variation, starting techniques, and efficiency under varying load conditions.
- Develop students' competence in electrical measurement, instrumentation handling, and data interpretation.
- Cultivate awareness of safety protocols and foster adherence to proper laboratory procedures when working with rotating electrical machines.
- Equip students with practical skills relevant to industrial applications and advanced coursework in electrical machines and motor drive systems.

6. Experiments:

- Introduction

- Safety
- Insulation test and continuity
- Running and Reversing of Three Phase Induction Motor
- No-Load Test performed in a Three Phase Induction Motor
- Block Rotor Test performed in a Three Phase Induction Motor
- Measurement of Slip in a Three Phase Induction Motor
- Speed-Torque characteristics in a Three Phase Induction Motor
- Study main components of motor starters
- Study Direct Online Motor Starter (DOL)
- Study Star-delta motor starter

7. Class/laboratory Schedule:

- 15 weeks of 30 hours lab, one time a week

8. Design Project:

None

9. Computer/software Use:

None

10. Evaluation Methods

- 15 min quiz (3%), Reports (7%).

11. Contribution to Professional Component:

The Induction Machines Laboratory course supports the professional development of students by providing practical experience in testing and analyzing induction motors, which are widely used in industry. It helps students apply theoretical knowledge to real machines and understand how they perform under different conditions. The course improves technical skills such as taking measurements, analyzing data, and using electrical instruments.

In addition, students learn how to follow safety procedures and proper testing methods, which are essential in professional engineering work. This lab prepares students for future roles in electrical engineering by giving them hands-on experience with equipment commonly used in power systems and motor control applications.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For the Dc machine Lab, students will learn:

1. Enables students to identify and analyze engineering problems related to electric machines and apply principles of electromagnetism and circuit theory to solve them. (1)
2. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. (3)

13. Prepared by:

Hadeel Safaa and Ahmed Naji Zaidan, 2025

2. Syllabus

Course Number & Title (Credit Hours, Required or Elective):

CPR223– Computer Programming (4.0, Required)

1. Catalog Description:

This course aims to introduce the student to the second stage in the Department of Electrical Engineering with:

1. Understanding the MATLAB environment
2. Performing basic calculations in MATLAB
3. Conducting basic numerical computations and analyses using MATLAB
4. Navigating the MATLAB Graphical User Interface (GUI)
5. Designing simple problem-solving algorithms
6. Writing basic MATLAB programs
7. Utilizing MATLAB help resources

2. Prerequisite(s): for computer programming

None

3. Textbook(s) and/or other required materials:

- + MATLAB for Electrical and Computer engineering. Students and Professionals with Simulink, Roland Priemer.
- + MATLAB numerical computing, tutorials point.
- BASICS O F and Beyond MATLAB, Andrew Knight, year: 2000.
- https://www.mathworks.com

4. Course Objectives:

- MATLAB Environment & GUI – Understand the key features of MATLAB and effectively navigate its graphical interface.
- Basic Calculations & Numerical Analysis – Perform mathematical operations and simple numerical computations using MATLAB.
- Algorithm Design & Programming – Develop simple algorithms and write basic MATLAB programs for problem-solving.
- Resource Utilization – Learn how to access MATLAB support and resources for troubleshooting and learning.

5. Topics:

- Syntax & Data Types: Simple MATLAB syntax with support for various data types.
- Mathematical Functions: Built-in functions for matrix operations, calculus, and statistics.
- Graphics & Visualization: Tools for 2D/3D plotting, animations, and image processing.
- File I/O & Toolboxes: Read/write various file formats and use specialized toolboxes.
- Simulink & Applications: Graphical modeling and broad applications in science and engineering.

6. Class/laboratory Schedule:

Week 1: Topic: MATLAB Introduction and M.File
Week 2: Topic: Variables, Numbers, and Functions
Week 3: Topic: Arithmetic and Logic Operations
Week 4 &5: Topic: Vectors and Matrices and Matrix Operations in MATLAB
Week 6: Topic: If – Statement
Week 7: Topic: Mid-term Exam; Switch-Case Statement
Week 8: Topic: For Loop Statement
Week 9: Topic: While Loop Statement
Week 10: Topic: Continue and Break Statement
Week 11: Topic: Plot Graphics 2D; Introduction to 2D Plotting and Visualization in MATLAB
Week 12: Topic: Plot Graphics 3D; Extending Plotting Capabilities to 3D Visualizations
Week 13: Topic: Introduction to Simulink for System Modeling and Simulation in MATLAB
Week 14: Topic: Electrical Engineering Application with MATLAB

7. Design Project:

Students learn MATLAB syntax, data types, and mathematical functions for computations. They explore loops, conditionals, and functions to develop coding skills.

8. Computer/software Use:

Students use MATLAB for programming, data analysis, and visualization while utilizing Microsoft Office for documenting reports and findings.

9. Evaluation Methods:

Exams (hour and half mid-exam 10 %, two hours final exam 50%) Problem-Based Learning projects 10%

Two Quizes 10%, Reports 10% and LAB 10%

10. Contribution to Professional Component:

These topics enhance students' programming, data analysis, and problem-solving abilities, preparing them for real-world applications in engineering, science, and technology.

11. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For computer programming I students will learn:

1. Students learn MATLAB programming, problem-solving, and data analysis through hands-on tasks.(1)
2. Encouraging continuous skill development and adaptation to evolving technologies. It instills problem-solving habits essential for ongoing self-directed learning.(6)

12. Prepared by:

Rasha Subhi Ali, 2025

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):
APH224 – Applied Physics (4.0, Required)

2. Catalog Description:
Applied Physics This course have 2 problems will solve by problem based learning method.

3. Prerequisite(s):
Mathematics II (MAT121)

4. Textbook(s) and/or other required materials:
- "Engineering Electromagnetics" by William H. Hayt Jr. and John A. Buck

5. Course Objectives:
- **Electric Field Basics:** Understand electric field, flux, and displacement.
- **Vector Analysis:** Apply vector analysis to solve electric field problems.
- **Maxwell's Equations:** Analyze Maxwell's equations.
- **Field-Matter Interaction:** Study how electric fields interact with matter.
- **Capacitors**: Explore electric fields' effects on capacitors and their types.
- **Magnetism Basics:** Understand magnetism and magnetic fields.
- **Magnetic Field Generation:** Learn how to generate magnetic fields using current (Biot-Savart, Ampere's laws).
- **Magnetic Forces:** Study magnetic flux, forces, and moments from moving charges.

6. Topics:
Students will learn:
- **Electric Fields:** Basics of electric field, flux, and displacement.
- **Vector Analysis:** Applying vectors to solve electric field problems.
- **Maxwell's Equations:** Understanding and analyzing key equations.
- **Electric Field Interaction:** How electric fields interact with matter.
- **Capacitors:** Types of capacitors and electric field effects on them.
- **Magnetism:** Basics of magnetic fields and types of magnets.
- **Magnetic Field Generation:** Creating magnetic fields using current (Biot-Savart, Ampere's laws).
- **Magnetic Forces:** Magnetic flux, forces, and moments from moving charges.

7. Class/laboratory Schedule:
No lab

8. Design Project:
None

9. Computer/software Use:
Students typically use word in writing their reports of problem based learning.

10. Evaluation Methods:

2 quizzes (10% each), homework (5%), in-class homework (5%), project report (10%), midterm exam (10%), final exam (50%).

11. Contribution to Professional Component:

Students will develop an understanding of electric and magnetic fields, Maxwell's equations, and electromagnetic interactions — essential knowledge for electrical engineers working on power systems, electromagnetic devices, and advanced technologies.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For Applied Physics, students will learn:

- Problem-Solving in Electric Fields: Apply vector analysis to solve electric field and flux problems. (1)
- Maxwell's Equations Application: Use Maxwell's equations to analyze and solve electromagnetic field scenarios. (1)
- Magnetic Field Challenges: Solve problems related to magnetic field generation, magnetic flux, and forces using Biot-Savart and Ampere's laws. (1)

13. Prepared by:

Ali K. Hantoosh, 2025

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):

ELE225 – Electronics II (3.0 Credit Hours, Required)

2. Catalog Description:

This course provides an in-depth understanding of Field Effect Transistors (FETs), including JFETs and MOSFETs. It covers the construction, characteristics, and operation of FETs in both DC and AC modes. The course includes analysis and design of FET amplifiers, biasing techniques, small-signal models, and multistage amplifier configurations. It also introduces frequency response and Bode plot analysis relevant to real-world electronic systems.

3. Prerequisite(s):

Successful completion of ELE202 – Electronics I or equivalent foundational course in basic semiconductor devices and BJT operation.

4. Textbook(s) and/or other required materials:

- Sedra & Smith, Microelectronic Circuits, 7th Edition, Oxford University Press
- Boylestad & Nashelsky, Electronic Devices and Circuit Theory, 11th Edition, Pearson
- Electronic References:
- https://www.electronics-tutorials.ws
- https://www.allaboutcircuits.com
- https://www.analog.com/en/education.html

5. Course Objectives:

Students will:

1. Understand the internal structure and characteristics of JFETs and MOSFETs.
2. Analyze DC and AC operation of FET-based amplifier circuits.
3. Apply various biasing techniques and understand their impact on stability.
4. Use small-signal models for detailed frequency response analysis.
5. Design and evaluate multistage amplifier systems.
6. Utilize Bode plots to assess amplifier performance in frequency domain.

6. Topics:

a. JFET & MOSFET construction and transfer characteristics
b. Operation and biasing of JFETs and MOSFETs
c. DC characteristics and parameter extraction
d. Self-bias and voltage-divider biasing methods
e. AC small-signal models (CS, CD, CG)
f. Amplifier configurations and frequency response
g. Multistage amplifier design and Bode plots

7. Class/laboratory Schedule:

- 3 hours per week/ 2 hours per week lab.

8. Design Project:

No formal design project is included in this course.

9. Computer/software Use:

No specific software required; however, optional use of simulation tools such as LT spice or Multisim is encouraged for circuit analysis and verification.

10. Evaluation Methods:

- Midterm Exam: 15%
- Final Exam: 70%
- Homework & Assignments: 15%

11. Contribution to Professional Component:

This course provides the analytical and practical foundation for understanding modern analog electronic systems using FETs. It builds essential skills for design and analysis in communication, control, and embedded systems.

12. Relationship to Student Outcomes (1-7):

Students will be able to:

1. Analyze and interpret the characteristics and operation of JFETs and MOSFETs (1)
2. Write a comprehensive technical report summarizing course concepts and applications (4)
3. Develop a project teamwork concepts in electronics. (7)

13. Prepared by:

Hala Kamal Abduljleel, 2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):

ENLA202 –English Language II (2.0, Required)

2. Catalog Description:

This course provides a comprehensive introduction to English Language II within the field of electrical engineering. Designed in alignment with the updated curriculum framework, it ensures a learner-centered approach that enhances students' communication skills, technical vocabulary, and language proficiency for academic and professional success. The course integrates fundamental linguistic concepts with specialized electrical engineering terminology, preparing students to confidently engage in discussions, presentations, and written communication within their discipline

3. Prerequisite(s):

English Language I.

4. Textbook(s) and/or other required materials:

- Textbook: New Headway Plus Intermediate, by Soars, L., & Soars, J.
- Technical References: Basic Electrical Engineering Handbooks, IEEE Glossary
- Online Tools: Electrical Engineering Glossary

5. Course Objectives:

1. To Communicate effectively using basic English grammar and vocabulary.
2. To use fundamental electrical engineering terminology.
3. To comprehend passages to improve reading skills.
4. To design and deliver effective Power Point presentation on electrical engineering topics

6. Topics:

Students will learn:

- Basic greetings, self-introduction, and foundational grammar.
- Past simple tense, past continuous tense, passive voice, and active voice in technical contexts.
- Essential electrical engineering vocabulary related to circuits, power electronics devices, and systems.
- Numbers, dates, fractions, and decimals in professional settings.
- Structuring a technical presentation: introduction, main content, visual data, and conclusion.

7. Class/laboratory Schedule:

No lab

8. Design Project:

Non

9. Computer/software Use:

Students typically use PowerPoint presentation to write their assignments of problem based learning.

10. Evaluation Methods:

- Final Exam (Three Hours) – 40%

- Midterm Exam (One Hour) – 10%

- Quizzes (2) – 10%

- Seminar – 20%

- Attendance & Participation – 10%

- Homework – 10%

11. Contribution to Professional Component:

For English in engineering, students will develop proficiency in professional communication and technical language relevant to their field. The course focuses on enhancing skills in writing, presenting, and engaging in discussions on engineering topics. Key areas include delivering effective presentations, and mastering terminology related to electrical engineering. These skills contribute to students' ability to collaborate in diverse professional environments and meet the communication standards expected of engineers.

12. Relationship to Student Outcomes:

1. Enhances students' ability to communicate effectively by teaching report writing, audience engagement, and presentation skills. (4)

13. Prepared by:

Sarah Mahmoud Al-Nua'emi, 2025

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):
EE3101– Mathematical Analysis I (4 hours, required)

2. Catalog Description:
Numerical Analysis
This course has problems will be solved using principles of mathematics.

3. Prerequisite(s):
Mathematics

4. Textbook(s) and/or other required materials:
Advance Engineering Mathematics, Textbook by Erwin Kreyszig, Tenth Edition
An introduction to numerical analysis, second Edition
Thomas Calculus thirteen Edition

5. Course Objectives:

- The student acquires a general definition of Engineering and Numerical Analysis of applying it in other sciences, scientifically and humanly
- Studying the methods and methods used in solving questionnaires and analyzing problems about principles of counting.
- Enable the student to understand the content of probability and how it overlaps with the rest of the sciences
- Identify the odd and common marginal functions
- Understanding the types of probability and how to differentiate between it.
- Identifying the discontinuous and continuous variables and how to deal with each of them.
- Studying the numerical measures, relation between them and how we applicate it with respect to real problems
- Studying the statistical distributions with respect to types of variables and applicate the measures on it.
- Studying the relation between x & y according to correlation coefficient of joint probability distribution.

6. Topics:
Students will learn:

- Introduction and principles of Engineering Analysis and its applications, definition of sample, population and sample space.
- Counting principles, permutations and combinations.
- Probabilistic functions, types of probability variables.
- Measures of central tendency and measures of dispersion.
- Elementary Numerical and conditional probability.
- Probability distributions of discrete and continuous variables.
- Joint Probability Functions, Joint expectation, covariance, and correlation coefficient.

7. Class/laboratory Schedule:
None

8. Design Project:

None.

9. Computer/software Use:

Some times.

10. Evaluation Methods:

Exams (2 hours mid exam 20%, three hours final exam 60%)
Reports, Assignments, Quizzes, Oral Discussions, 20%

11. Contribution to Professional Component:

For Engineering and Numerical Analysis, students will know the definition and use of the principles of Engineering Analysis and study all cases that are treated through the article. The focus will be on studying another aspect of mathematics in an analytical and probabilistic manner that is easy to use in other courses and sciences. Students will learn some probability and statistical techniques and identifying the discontinuous and continuous variables and how to deal with each of them, the relation between the variables according to the correlation coefficient.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For Engineering Analysis, students will learn:

1. Applying the mathematical and engineering principles efficiently and analytic the data (1)

13. Prepared by:

Farqad Talib Najim, (2024-2025)

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):
EE3102 – Electronic Circuits I (2.0, Required)

2. Course Description:
This course provides an in-depth study of the frequency response characteristics of electronic circuits, focusing on the analysis and design of amplifiers, feedback systems, and operational amplifiers (Op-Amps). Topics include low-frequency and high-frequency response of BJT and FET amplifiers, multistage amplifier effects, feedback amplifier principles, and practical applications of Op-Amps. Students will gain hands-on experience through simulations and projects, designing circuits such as integrators, differentiators, comparators, and precision converters. The course emphasizes problem-solving, analytical thinking, and the application of professional standards in electronics design.

3. Prerequisite(s): for energy efficiency
None

4. Textbook(s) and/or other required materials:
- Electronic Devices: Conventional Current Version by Floyd
- Electronic Circuits: Discrete and Integrated by Schilling Belone
- Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education

5. Course Objectives:

1. Understand Frequency Response Characteristics
2. Analyze Low-Frequency and High-Frequency Response of Amplifiers
3. Understand Multistage Amplifier Frequency Effects
4. Master Feedback Amplifier Concepts
5. Design and Analyze Practical Feedback Circuits
6. Understand Operational Amplifiers (Op-Amps)
7. Apply Op-Amps in Various Configurations
8. Explore Op-Amp Applications
9. Understand Signal Processing Circuits
10. Develop Practical Skills Through Simulations and Projects
11. Enhance Problem-Solving and Analytical Skills

6. Topics:
1. Frequency Response Characteristics
2. Low Frequency Analysis.
3. Low Frequency Response of FET Amplifiers
4. Miller Effect Capacitance and High Frequency Response
5. High Frequency Response of BJT and FET Amplifiers
6. Multistage Frequency Effects

7. Feedback Amplifiers.
8. Gain, Input, and Output Impedances
9. Practical Feedback Circuits
10. Operational Amplifiers (Op-Amps)
11. Ideal and Practical Op-Amps
12. Op-Amps with Negative Feedback
13. Op-Amp Applications
14. Integrators and Differentiators.
15. Precision Converters and Active Circuits

7. Class/laboratory Schedule:

No lab

8. Evaluation Methods:

Exams (hour and half mid exam 20%, three hours final exam 60%)
Quizes 15%, Student Engagement during Lectures (5%)

9. Contribution to Professional Component:

This course significantly contributes to the **Professional Component** by equipping students with the technical knowledge, practical skills, and professional competencies needed to excel in the field of electronics and electrical engineering. It prepares students for both industry roles and advanced academic pursuits, while fostering critical thinking, problem-solving, and ethical responsibility.

10. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcome 1):

By the end of the course, students will be able to:

1. Analyze and design amplifiers with consideration for frequency response and feedback. (1)
2. Apply Op-Amps in various configurations for signal processing and conditioning. (1)
3. Simulate and test electronic circuits using software tools. (1)
4. Communicate technical concepts effectively through reports and presentations. (1)
5. Demonstrate professional and ethical responsibility in circuit design. (1)

11. Prepared by:

Firas Ali Jawad, 2025

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):

EE3103 – Electrical Power I (2.0, Required)

2. Catalog Description:

The course will solve the knowledge of the composition of the Electrical Power System and its basic components briefly, starting with introduction of Electrical Power System , Bulk electric power, traditional conversion generating stations and there elements , Power Economics, Generation and Distribution Factor load, Mechanical Design of Overhead Transmission Line, Overhead Transmission Line Insulator, Underground Cable.

3. Prerequisite(s): for energy efficiency

None

4. Textbook(s) and/or other required materials:

- Principles of Power Systems V.K Mehta

5. Course Objectives:

- The composition of the Electrical Power System its basic components briefly.
- Knowledge of traditional Electrical power Generating, Power Economics, the behaver of load.
- Studies of the components of Overhead Transmission Lines and Underground Cable Technologies
- Learning to study the faults that occur in high-voltage Electrical Power System how to fix them.

6. Topics:

Students will learn:

- Introduction to Power System analysis.
- Source of Electrical Energy
  Structure of power system and elements, steam, hydro, gas, turbines power station, nuclear power station.
- Generation and Distribution Factors
  Load and duration curves, installed capacity, load factor, plant capacity factor, plant use factor, utilization and diversity factors.
- Economic Dispatch
  Cost of evaluation of power system projects, selection of generation units, saving in cost.
- Mechanical Design of Overhead Transmission Line
  Calculate of Sag.
- Overhead Transmission Line Insulator
  Design of suspension insulator, voltage distribution and efficiency of string insulators.
- Underground Cable
  Advantages and disadvantages, types of cables, insulating resistance and capacitance electrical stress, grading of cable, types of faults cable and fault location.

7. Class/laboratory Schedule:

No lab

8. Evaluation Methods:

Exams (hour and half mid exam 20%, three hours final exam 60%)
Quiz 15%, Student Engagement during Lectures 5%

9. Contribution to Professional Component:

For electrical power I in engineering, students will learn about professionalism and codes of electrical power, understanding the principle of power systems, Electrical power generating techniques, distribution factors, economics, mechanical design of overhead transmission line and insulators, underground cables.

10. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1):

For Electrical Power I students will learn:

1. Understanding the principles of Power System, Conventional Electrical Power Generating , Loads factors, Republic of Iraq National Electrical Network (1)
2. Understanding the Mechanical Design of Overhead Transmission Line, National Electrical Power Network and Dealing with Power Economics, studying the problems
3. The need of insolation, the insulators in the National grid Network (1)

11. Prepared by:

Jasim Mohmed Jasim, 2025

2. Syllabus

1. **Course Number & Title (Credit Hours, Required or Elective):**
   EE 3104 – Electrical machines III (2.0, Required)

2. Catalog Description:
Electrical machines III
This course have 4 problems will solve by problem based learning method.

3. Prerequisite(s): The Induction machines characteristics

4. Textbook(s) and/or other required materials:
Textbook: "Electric Machinery Fundamentals" by Stephen J. Chapman

5. Course Objectives:
For Electrical machines III students will learn:

1. Prepare the students to engage theoretically and practically in induction electrical machines profession in public and private sectors including, but not limited to, relevant governmental sectors, consulting firms, contracting companies, marketing and real estate investments.
2. Prepare the students to engage in ongoing professional development activities by pursuing graduate studies and/or other learning opportunities to respond to the arising challenges.
3. Advance in responsibility and leadership in their careers and compete with their peers according to the profession ethics.
4. Promote students with the necessary scientific and practical skills in the discipline for solving engineering problems and treating them logically and scientifically.
5. Promote students with the necessary skills administration, time management, team-work, communication and language skills, soft computing and programming skills.
6. learn the students the basic components in Electrical Machines, Induction machines, Motors or Generators induction machines, the motors induction machines, 3phase Induction motors or single phase constructions, Definition and Types of Induction Motors, Basic Principles: Electromagnetic Induction and Rotating Magnetic Field.

6. Topics:
Students will learn:

- Induction machines, Introduction of induction motors and construction of it.
- Types of Induction Motors.
- Working Principle of induction motor for two types.
- The impact of speed and slip on induction motor.
- Equivalent circuits of induction motors
- Torque-Speed Characteristics of induction motor.
- Efficiency, Power Factor output power and input on no-load or loaded induction motor

7. Class/laboratory Schedule:
No lab

8. Design Project:

In addition to two exams, there is three problems based learning.

9. Computer/software Use:

Students typically use word in writing their reports of problem based learning.

10. Evaluation Methods:

Exams (hour and half mid exam 20%, three hours final exam 60%)
Problem Based Learning projects (3 problems) 10%
Reports and Homework 10%

11. Contribution to Professional Component:

For in Electrical Machines, students will learn the basic components ,Induction machines ,Motors or Generators induction machines, The motors induction machines, 3phase Induction motors or single phase constructions, Definition and Types of Induction Motors ,Basic Principles: Electromagnetic Induction and Rotating Magnetic Field, Key Parameters: Voltage, Frequency, Slip, Torque, Power Factor, Squirrel-Cage Induction Motors: Construction, Operation, and Advantages.
Wound-Rotor Induction Motors: Construction, Operation, and Advantages, Torque-Speed Characteristics: Starting, Running, and Maximum Torque, Efficiency and Power Factor of Induction Motors, Load Characteristics, Starting Methods and Control of Induction motors

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For Electrical machines III students will learn:

1. Understanding Induction motor problems and be able to find and know the characteristics of motor. (1)

13. Prepared by:

Ayad T. Abdulhafedh, 2025

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):
EE3105- Communication I Course (3.0, Required)

2. Catalog description:

The module of Communication I, provides a comprehensive understanding of the fundamental principles and concepts underlying Analog communication systems, including signal transmission, modulation and demodulation. Students will able to understand the concepts of the signals representation and transmission to Analog communication system. The module describes different types of linear modulation, including DSBSC, DSB with carrier, SSB and angle modulations such as frequency and phase modulations techniques. It identifies the components of Analog communication system and explains different concepts such as noise, distortion, bandwidth, modulation and demodulation. The curriculum integrates hands-on experience through laboratory work, utilizing software tools like MATLAB for practical simulations. Emphasis is placed on problem-solving, critical thinking, and real-world applications, ensuring students grasp the theoretical foundations while developing practical skills. Assessments include exams, assignments, and projects, promoting a holistic understanding of signals and systems. Overall, the course aims to equip students with a strong theoretical foundation and practical skills essential for success in various engineering disciplines.

3. Prerequisite(s):
EE3101 – Engineering Analysis I

4. Textbook(s) and/or other required materials:

- Introduction to Communication Systems, Ferrel G. Stremler, 3rd Edition, Addison Wesley, 1990.
- Communication Systems, Simon Haykin , 4th edition, Wiley 2001.

5. Course Objectives:
In this course, the student will learn the basic and applied concepts of Analog communication system with the following fundamentals:

- Understand the fundamentals of signals and systems.
- Express the concepts of signals and systems and their different types which can be used in a wide variety of disciplines in engineering.
- Demonstrate a comprehensive understanding of the fundamental principles and concepts underlying Analog communication systems, including signal transmission, modulation and demodulation.
- Describe different types of linear modulation, including DSBSC, DSB with carrier, and SSB techniques.
- Identify the components of Analog communication system and explain different concepts such as noise, distortion, bandwidth, modulation and demodulation.

6. Topics:

- Fundamental Concepts of Signals & Systems – Introduction, Signals and Their Classification
- Operations on Signals
- Systems and Classification of Systems - Interconnections of Systems
- The Fourier Transform - Introduction
- Analogue modulation : AM, DSBSC, VSB
- Single sideband (SSB), FM, narrow band FM
- PLL demodulation, FLL loops
- Principles of noise: random variables, white noise, shot
- Thermal and flicker noise, noise in cascade amplifiers.

7. Class/laboratory Schedule:

- 15 weeks of 30 hours lab, one time a week

8. Design Project:

Teamwork Project: Choose a suitable research project related to the design and implementation of communication system, and then define the research problem, present with the aid of diagrams the software and hardware design and implementation of the system, illustrate the key results of the project and discuss on the use of the particular system to solve the problem.

9. Computer/software Use:

Students typically use Mat Lab software to build system diagrams, to write code and develop their proposed system, and word to write their reports.

10. Evaluation Methods

- 20 min quiz (10%), teamwork project (10%), homework (8%), one-hour midterm exam (12%), and three hours final exam (60%).

11. Contribution to Professional Component:

The course offers resources and opportunities for students to enhance their professional skills related to analog communication. This could include workshops on communication protocols, or industry certifications that are relevant to the field.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For the Communication I course, students will learn:

1. Identify, formulate, and solve engineering problems in Analog communication system. (1) Analyze and evaluate the frequency domain and Bandwidth efficiency for modulation and demodulation techniques such as linear and Angle demodulations to recover the original information from modulating signals.(1)

13. Prepared by:

Ali Jasim Mohammed, 2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):

EE 3106 – Microprocessors I (2.0, Required)

2. Catalog Description:

- Microprocessor architecture
- Pin diagram
- Programming of MPU and addressing mode
- Data transfer group
- Arithmetic instruction
- Logical instruction
- Control instruction
- Branch instruction
- Simple programs
- Conditional programs
- Advance programs
- Equation programs
- Subroutine programs

3. Prerequisite(s):

None

4. Textbook(s) and/or other required materials:

- Barry B. Brey, The Intel Microprocessors: Architecture, Programming & Interfacing, PHI, 6th Edition, 2003.
- A.K.Ray and K.M. Bhurchandi, Advanced Microprocessor and Peripherals, Tata McGraw Hill.
- Neamen, Microelectronics - Circuit Analysis and Design, McGraw-Hill, 2010.
- Uffenback, The 8086 Family Design, PHI, 2nd Edition.
- Lice & Gibson, Microcomputer System 8086 / 8088, PHI, 2nd Edition.

5. Course Objectives:

The microprocessor programming curriculum aims to teach the student the basic principles of the 8086 microprocessor and how to program it. Starting from the arithmetic and logic unit and the control unit, then the small storage units and instructions and how to implement them inside the microprocessor, and then the input and output units. Then how to program using assembly language and using the instructions for the 8086 processor and how to use them and write integrated programs by using the processor board and using an emulation program (emu8086) installed on the computer. The curriculum aims to teach the student how to program the microprocessor, its components, and how to benefit from it.

6. Topics:

In this course, students will learn about:

- During the academic year, the student learns the components and characteristics of the microprocessor
- The student learns to program the microprocessor by writing programs in the assembly language and in the machine language
- The student learns the uses of the 8086 microprocessor in various applications.

7. Class/laboratory Schedule:

Yes

8. Design Project:

No project

9. Computer/software Use:

EMU8086

10. Evaluation Methods:

- (Quiz (20 min), report, homeworks , and half mid exam % one hour)
- Three hours final exam 60%

11. Contribution to Professional Component:

- During the academic year, the student learns the components and characteristics of the microprocessor.
- The student learns to program the microprocessor by writing programs in the assembly language and in the machine language.
- The student learns the uses of the 8086 microprocessor in various applications.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For Microprocessor students will learn:

1. Ability to distinguish, identify, define, formulate, and solve engineering problems by applying principles of engineering, science and mathematics.(1)
2. Ability to perceive the continual necessity for professional knowledge growth and how to find, assess, assemble and apply it properly. (6)

13. Prepared by:

Raghda Abd Ul Rab 2024-2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):

EE 3107 – Antenna and Propagation I (2.0, Required)

2. Catalog Description:

This course provides a comprehensive study of antennas and the propagation of electromagnetic waves. Students will learn about various types of antennas, their design principles, and practical applications in communication systems. By the end of the course, students will have a solid understanding of how antennas work, how electromagnetic waves propagate through different mediums, and how to analyze and design antenna systems for various communication purposes.

3. Prerequisite(s):

EE2105 – Applied physics I

4. Textbook(s) and/or other required materials:

- Huang, Y. (2021). Antennas: from theory to practice. John Wiley & Sons.
- Raju, G. S. N. (2006). Antennas and wave propagation. Pearson Education India.
- Fang, D. G. (2017). Antenna theory and microstrip antennas. CRC press.

5. Course Objectives:

The course objectives are as follows:

1. Introduce students to the fundamental concepts of antenna theory, including basic antenna types, principles of radiation, and antenna parameters.
2. Provide a solid foundation in understanding antenna behavior, such as radiation patterns, gain, and directivity.
3. Familiarize students with the key principles of antenna design and analysis, including impedance matching and bandwidth considerations.
4. Explore the practical applications of antennas in various communication systems, radar systems, and wireless networks.
5. Develop problem-solving skills in basic antenna theory through hands-on exercises and simulations.
6. Prepare students for further studies in advanced antenna theory and applications. By the end of the course, students will have a clear understanding of the basics of antenna theory and be able to apply this knowledge to practical antenna design and analysis tasks. **6. Topics:**

- Introduction to antenna and antenna basics
- antenna properties
- overview on antenna types
- Fundamental Parameters of Antennas
- Isotropic Antenna
- Hertzian dipole
- loop antenna
- half wave dipole
- helical antenna
- frequency-independent antenna

- Wire antennas
- Introduction to antenna array
- antenna array types
- Turnstile and super turnstile antenna
- Parabolic reflector antenna

7. Class/laboratory Schedule:

No lab.

8. Design Project:

Teamwork Project: Choose a suitable research project related to the Antenna and Wave propagation, then define the research problem, present with the aid of diagrams the software, illustrate the key results of the project and discuss on the use of the particular approach to solve the problem.

9. Computer/software Use:

Students typically use in their reports CST Studio Suite to build system diagrams and word to write their reports.

10. Evaluation Methods:

- 20 min quiz (10%), teamwork project (10%), homework (8%), one-hour midterm exam (12%), and three hours final exam (60%).

11. Contribution to Professional Component:

This course makes a significant contribution to the professional component by providing students with essential knowledge and skills that are directly applicable to careers in the field of electrical engineering and telecommunications. By mastering the fundamental concepts of antenna theory, students will be equipped to design, analyze, and optimize antennas for various applications in communication systems, radar systems, and wireless networks.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For the embedded system course, students will learn:

1. Identify, formulate, and solve engineering problems in Antenna systems. (1)

13. Prepared by:

Anas Fouad Ahmed, 2024-2025

Course Syllabi:

1. Course number and title

EE3108, English Language III , (2.0, Required)

2. Catalog Description

English Language III

3. Prerequisite(s):

None

4. Textbook(s) and/or other required materials:
New Headway Oxford Elementary, Intermediate

5. Course Objectives:

1. To enable the learner to communicate effectively and appropriately in real-life situations.
2. To use English effectively for study purposes across the curriculum.
3. To develop and integrate the use of the four language skills, i.e., listening, speaking, writing and reading.
4. To develop interest in and appreciation of literature.
5. To revise and reinforce structures already learnt.
6. To basically translate from English to Arabic and vice versa.

6. Topics:

Students should be able to: -

1. Anticipate and predict what will come next in a text.
2. Deduce the meaning of unfamiliar lexical items in a given context.
3. Consult a dictionary to obtain information on the meaning and use of lexical items.
4. Compare and contrast ideas and arrive at conclusions.
5. Present an argument, supporting it with appropriate examples.
6. Use an appropriate style and format to write an essay.
7. Distinguish main points from supporting details, and relevant from irrelevant information.
8. Understand and interpret messages conveyed in person or by telephone.
9. Participate in spontaneous spoken discourse in familiar social situations

7. Class/laboratory Schedule:
No lab
8. Design Project:
No project.

9. Computer/software Use:

Students typically use Microsoft Word in writing their reports.

10. Evaluation Methods:

- (Quiz (20 min), report, homework 20%, and half mid-exam 20% (one hour)
- Three hours final exam 60%

11. Contribution to Professional Component:

In Academic English III, students will develop their language skills through a variety of topics and activities. The course aims to enhance their proficiency in grammar, vocabulary, everyday English usage, and communication in technical contexts. Additionally, students will also focus on improving their reading, listening, speaking, and translation abilities.

The course will cover several grammar topics to strengthen students' understanding and usage of English tenses and sentence structures. They will learn about naming tenses, auxiliary verbs, forming questions and negatives, providing short answers, present tenses (simple and continuous), state verbs, passive voice, frequency adverbs, past tenses (simple and continuous), past perfect, and the expression "used to." Moreover, students will explore future forms such as "will," "going to," and present continuous, as well as future possibilities using "may," "might," and "could."

Vocabulary development is another essential component of the course. Students will expand their knowledge of positive and negative adjectives and adverbs, enabling them to describe people, things, and situations more effectively. They will also learn about phrasal verbs, word formation using suffixes and prefixes, and changing word stress to enhance their vocabulary skills.

In terms of everyday English usage, students will practice engaging in various situations, including making small talk, giving opinions, making polite requests and offers, arranging to meet, and shopping in a department store.

The course will further focus on developing students' speaking abilities by providing opportunities to deliver technical reports and seminars. Students will learn how to present information clearly, improving their public speaking and presentation skills.

By the end of Academic English III, students will have improved their language proficiency in various areas, enabling them to communicate effectively in academic and technical contexts, as well as in everyday situations.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

1. Ability to skillfully communicate orally with gathering of people and in writing with various managerial levels. (4)

13. Prepared by:

Hussain Jumaa Jabir, 2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):

EE3109 – Electronic Circuits I LAB (1.0, Required)

2. Catalog Description:

Explore the principles and applications of operational amplifiers and transistors in this hands-on electronic circuit lab. Students will delve into the frequency response for the transistors amplifier circuits. Through a combination of theoretical study and practical experimentation, participants will gain a comprehensive understanding of op-amp behavior, characteristics, and limitations. Emphasis will be placed on circuit analysis techniques, design considerations, and troubleshooting methods. By the end of the course, students will have acquired the skills to design and implement various transistors circuits for a wide range of applications.

3. Prerequisite(s):

EE3102 Electronics Circuits I

4. Textbook(s) and/or other required materials:

Electronic Devices and Circuit Theory Author: Thomas L. Floyd, Author: Robert L. Boylestad , Publisher: Pearson Education, Publishing year: 2009

5. Course Objectives:

The overall objective of the course would be to provide students with a comprehensive understanding of operation amplifier, Specific objectives are listed below:

- Analytical Thinking: Students should be able to break down complex electronic systems into their constituent components and analyze their behavior.
- Synthesis: They should be able to integrate knowledge from various domains within electronics to design and develop innovative solutions to engineering problems.
- Evaluation: Students should be capable of critically evaluating electronic circuits and systems to determine their efficiency, reliability, and suitability for specific applications.
- Application of Theory: They should be able to apply theoretical principles of electronics to practical design and implementation tasks.
- Experimental Design: Students should be able to design experiments to validate hypotheses, test circuit performance, and explore new concepts in electronics.
- Problem-Solving Skills: They should develop proficiency in identifying, diagnosing, and resolving issues that arise during the design, construction, and testing of electronic systems.
- Experimental Techniques: They should gain proficiency in using advanced laboratory equipment and techniques for electronic measurement, testing, and characterization.

6. Topics:

Introduction to lab measurements devices.

- Introduction to Bode plot
- Single stage BJT Amplifiers
- Two stages BJT Amplifiers
- Current series feedback

- voltage shunt feedback
- Inverting Op-amp
- Non-Inverting Op-amp
- comparator Op-amp
- Summing Op-amp
- Subtractor-Op-amp

7. Design Project:

Teamwork Project: the students will be devided into groups in order to design and implmnted the selected experiment and measures the obtained results.

9. Computer/software Use:

Many simulation software can be used to simulate the selected design such as Eagle, Altuim and Multisum.

10. Evaluation Methods:

- 20 min quiz (15%), teamwork project (25%), 40 minutes midterm exam (20%), and final exam (40%).

11. Contribution to Professional Component:

The electronic circuit lab focusing on operational amplifiers and transistors experiments makes significant contributions to several aspects of the professional component in engineering education, echnical Competence: Through hands-on experimentation and analysis, students develop a deep understanding of operational amplifier circuits, honing their technical skills in circuit design, analysis, and troubleshooting. This competence is crucial for engineers working in fields where operational amplifiers are extensively used, such as analog electronics, signal processing, and control systems.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For the embedded system course, students will learn:

1. Ability to design a system, component, or process to meet desired needs – Students design, construct, and test circuits that meet specific objectives.using op-amp 741 and transister 2N2222 (Outcome 3)

13. Prepared by:

Mohammed Khalid Ibraheem, 2025

Course Syllabi

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):
EE3109- Communication I LAB (1.0, Required)

2. Catalog description:

The Communication I Lab provides a comprehensive understanding of the fundamental principles and concepts underlying Analog communication systems, including signal transmission, modulation and demodulation by using Matlab Simulink. Students will able to understand the concepts of the signals representation and transmission to Analog communication system. The Lab describes different types of linear modulation, including DSBSC, DSB with carrier, SSB and angle modulations such as frequency and phase modulations techniques. It identifies the components of Analog communication system and explains different concepts such as noise, distortion, bandwidth, modulation and demodulation. The curriculum integrates hands-on experience through laboratory work, utilizing software tools like MATLAB for practical simulations. The course aims to equip students with strong practical skills essential for success in various engineering disciplines.

3. Prerequisite(s):
None

4. Textbook(s) and/or other required materials:

- Introduction to Communication Systems, Ferrel G. Stremler, 3rd Edition, Addison Wesley, 1990.

5. Lab Objectives:
In this Lab, the student will learn the basic and applied concepts of Analog communication system by using Mat Lab Simulink with the following fundamentals:

- Demonstrate a comprehensive understanding of the fundamental principles and concepts underlying Analog communication systems, including signal transmission, modulation and demodulation.
- Understand and resolve the analog time signals in frequency domain using Fourier series and Fourier transforms.
- Design different types of linear modulation and demodulation, including DSBSC, DSB with carrier, and SSB techniques.
- Identify the components of Analog communication system and explain different concepts such as noise, distortion, bandwidth, modulation and demodulation.
- Recognize the basics of angle (exponential) (frequency and phase) modulation and important concepts such as instantaneous frequency to learn the angle (Frequency and phase) modulation.

6. Experiments:

- Introduction to Analog communication and Signal Representation Using Matlab Simulink Operations on Signals.
- Transform Time-Domain Data into Frequency Domain.
- Amplitude Modulation (AM) and Demodulation.
- Linear Double Sideband-Suppressed Carrier (DSB-SC) Modulation and Demodulation.
- Linear Single Side-Band (SSB) Modulation and Demodulation.
- Angle Modulation, Frequency Modulation (FM) and Demodulation.
- Angle Modulation, Phase Modulation (PM) and Demodulation.
- Spectral Characteristics of AM & FM.

7. Class/laboratory Schedule:

- 15 weeks of 30 hours lab, one time a week

8. Design Project:

Teamwork Project: Choose a suitable research project related to the design and implementation of communication system, and then define the research problem, present with the aid of diagrams the software and hardware design and implementation of the system, illustrate the key results of the project and discuss on the use of the particular system to solve the problem.

9. Computer/software Use:

Students typically use Matlab software to build system diagrams, to write code and develop their proposed system, and word to write their reports.

10. Evaluation Methods

- 20 min quiz & reports (20%), teamwork project (10%), midterm exam (30%), and two hours final exam (40%).

11. Contribution to Professional Component:

Integrate simulation software tools such as Matlab that allow students to simulate and analyze analog communication systems. This provides students with a practical environment to experiment with different parameters and understand the impact on system performance.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For the Communication I Lab, students will learn:

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

13. Prepared by:

Ali Jasim Mohammed, 2025

Course Syllabi:

1. Course number and title
EE3109, Electrical Machine Lab. III (1.0, Required)

2. Catalog Description
Principles of Electrical machine in laboratory.

3. Prerequisite(s):
None

4. Textbook(s) and/or other required materials:
Lecture booklet for the practical machinery laboratory

5. Course Objectives:
- Prepare the students to engage theoretically and practically in Electrical Machine lab. Profession in public and private sectors including, but not limited to, relevant governmental sectors, consulting firms, contracting companies, marketing and real estate investments.
- Advance in responsibility and leadership in their careers and compete with their peers according to the profession ethics.
- Promote students with the necessary scientific and practical skills in the discipline for solving engineering problems and treating them logically and scientifically.
- Promote students with the necessary skills administration, time management, team-work, communication and language skills, soft computing and programming skills.

6. Topics:
Students will learn:
Induction motors and Synchronous generators and closed loop synchronous generators

7. Class/laboratory Schedule:
Electrical machine lab 2 hours per week

8. Design Project:
No project.

9. Computer/software Use:
Students typically use simulik by Matlab.

10. Evaluation Methods:
Quiz (20 min), report, homeworks 40%, half mid exam 20% one hour. 3h final exam 40%

11. Contribution to Professional Component:

The Electrical Machines Lab significantly contributes to the professional component of the Electrical Engineering curriculum by providing hands-on experience with fundamental machine types such as transformers, induction motors, and synchronous machines. Through practical experiments, students gain a deeper understanding of machine operation, performance characteristics, and control techniques. This direct exposure enhances their ability to analyze, troubleshoot, and apply theoretical concepts in real-world scenarios, thereby bridging the gap between classroom instruction and professional engineering practice. Additionally, the lab fosters critical thinking, teamwork, and technical reporting skills, all of which are essential for a successful engineering career.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

1. 1. Requiring students to write technical reports on experiments and present their findings orally, improving both written and verbal communication skills.

13. Prepared by:

Ayad Tahseen 2024

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):
EE3201 – Mathematical analysis II (4.0, required)

2. Catalog Description:
This course has problems will be solved using principles of mathematics and engineering.

3. Prerequisite(s): for Numerical Analysis
None

4. Textbook(s) and/or other required materials:
- Advanced engineering mathematics by Erwin Krizge.

5. Course Objectives:
- Use and develop numerical methods, algorithms, and computational techniques for solving mathematical problems.
- Understand the source of errors, how to minimize them, and how to estimate the error in a given solution.
- Understanding the principle of real root to equation and how to find it.
- Understanding of various techniques for interpolation and approximation of functions.
- Solve structural or electrical engineering systems, which would be difficult or impossible to solve analytically using matrices systems.
- Finding an optimum solution, such as minimizing costs or maximizing efficiency.
- Understanding of various techniques for differentiation and integration of functions.

6. Topics:

Students will learn:
- Introduction and principles in numerical analysis, types and most common errors, types of functions
- Find the roots of linear equations
- solving systems of linear equations.
- approximating the shape of a function using interpolation methods
- Numerical derivation and integration
- Methods for solving elementary value problems

7. Class/laboratory Schedule:
None

8. Design Project:
None.

9. Computer/software Use:
None.

10. Evaluation Methods:

Exams (2 hours mid exam 20%, three hours final exam 60%)
Reports, Assignments, Quizzes, Oral Discussions, 20%

11. Contribution to Professional Component:

For Numerical Analysis, students will know the tools and knowledge they need to apply mathematical principles effectively in their work, to develop and use numerical methods, and to interpret the results correctly and meaningfully and to use these principles in the other subjects.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For Numerical Analysis students will learn:

1. Applying the mathematical and engineering principles efficiently (1)

13. Prepared by:

Farqad Talib Najim, (2024-2025)

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):
EE3202 – Electronic Circuits II (2.0, Required)

2. Course Description:
This course builds on foundational concepts of electronic circuits and focuses on advanced topics in analog circuit design. It covers active filters, oscillators, power amplifiers, integrated circuit design, and monolithic circuit technology. Students will gain theoretical knowledge and practical skills through lectures and laboratory experiments.

3. Prerequisite(s): for energy efficiency
None

4. Textbook(s) and/or other required materials:

- Electronic Devices: Conventional Current Version by Thomas L. Floyd
- Electronic Circuits: Discrete and Integrated by Schilling Belone
- Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education

5. Course Objectives:

1. Understand the Principles of Active Filters:
2. Study Oscillators and Their Applications:
3. Explore Power Amplifiers and Efficiency:
4. Learn Integrated Circuit Design Fundamentals:
5. Master Digital Circuit Design:
6. Gain Knowledge of IC Fabrication and Technology:
7. Develop Skills in Monolithic Circuit Layout:
8. Apply Theoretical Concepts to Practical Scenarios:
9. Foster Critical Thinking and Innovation:

6. Topics:

1. Active filters, low pass, high pass, band pass and band stop filters.
2. Sallen-key low and high pass filters, cascaded filters.
3. Active filter design.
4. Oscillators, conditions for oscillations, Wien-bridge oscillator.
5. Phase shift oscillator, twin T-oscillator, Colpitts, Clapp, Hartley and Armstrong oscillators.
6. Crystal-controlled oscillator, relaxation oscillator.
7. Power amplifiers, class A, power gain and efficiency.
8. Class B and AB amplifier, efficiency.
9. Class C amplifier.

10. Integrated circuit design, biasing in BJT integrated circuit, current mirror, current source, current-steering circuit.
11. MOS digital circuits, NMOS and CMOS.
12. BJT digital circuits, RTL, DTL, TTL and ECL.
13. Integrated circuit technology, IC fabrication, basic monolithic integrated circuit.
14. Transistors for monolithic circuits, monolithic diodes, integrated resistors, integrated capacitors.
15. Monolithic circuit layout.

7. Class/laboratory Schedule:

No lab

8. Evaluation Methods:

Exams (hour and half mid exam 20%, three hours final exam 60%)
Quizes 15%, Student Engagement during Lectures (5%)

9. Contribution to Professional Component:

- Problem-Solving: Designing filters, oscillators, amplifiers, and ICs involves solving complex problems, fostering critical thinking and analytical skills.
- Interdisciplinary Knowledge: The course integrates analog and digital electronics, preparing students for multidisciplinary projects common in industry.
- Industry-Relevant Topics: All topics covered (filters, oscillators, amplifiers, digital circuits, IC design) are directly applicable to industries such as telecommunications, automotive, aerospace, consumer electronics, and semiconductor manufacturing.

10. Relationship to Student Outcomes:

By the end of the course, students will be able to:

1. Apply Knowledge of Mathematics, Science, and Engineering (1)

- Mathematics: Students apply mathematical concepts such as transfer functions, frequency response. (1)
- Science: Understanding physical phenomena like resonance in oscillators and thermal effects in power amplifiers involves scientific principles. (1)
- Engineering: Designing filters, oscillators, and amplifiers requires applying engineering principles to solve real-world problems. (1)

11. Prepared by:

Firas Ali Jawad, 2025

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):

EE3203 – Electrical Power II (2.0, Required)

2. Catalog Description:

Electrical Power II

The course will solve the knowledge of the composition of the Electrical Power System and its basic components briefly, starting with introduction of Electrical Power System , Bulk electric power, traditional conversion generating stations and there elements , Power Economics, Generation and Distribution Factor load, Mechanical Design of Overhead Transmission Line, Overhead Transmission Line Insulator, Underground Cable.

3. Prerequisite(s): for energy efficiency

None

4. Textbook(s) and/or other required materials:

- Principles of Power Systems V.K Mehta

5. Course Objectives:

- The composition of the Electrical Power System its basic components briefly.
- Knowledge of traditional Electrical power Generating, Power Economics, the behaver of load.
- Studies of the components of Overhead Transmission Lines and Underground Cable Technologies
- Learning to study the faults that occur in high-voltage Electrical Power System how to fix them.

6. Topics:

Students will learn:

- Corona Effect. Phenomenon, disruptive critical voltage, visual critical voltage, corona losses, factor and conditions affecting corona losses.
- Transmission Line Parameters. R,L,C single phase conductor with multi-conductors building system, line inductance of three phase transmission system, single and three phase capacitance.
- Transmission Line Model and Performance using (ABCD) constants (short, medium and long transmission line, line voltage regulation and compensation, power circuit diagram.

- Introduction to the distribution system.
- DC distribution system (different types of distributors fed one, two ends).
- AC distribution system (different types of distributors fed one, two ends).
- Physics of solar cells, construction of solar cells, various types of PV cell, solar array parameters, constructing solar power CSP)

7. Class/laboratory Schedule:

No lab

8. Evaluation Methods:

Exams (hour and half mid exam 20%, three hours final exam 60%)

Quiz 15%, Student Engagement during Lectures 5%

9. Contribution to Professional Component:

For electrical power I in engineering, students will learn about professionalism and codes of electrical power, understanding the principle of power systems, Electrical power generating techniques, distribution factors, economics, mechanical design of overhead transmission line and insulators, underground cables.

10. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For Electrical Power I students will learn:

1. Understanding the principles of Power System, Conventional Electrical Power Generating, Loads factors. (1)
2. Dealing with Power Economics, studying the problems (1)

11. Prepared by:

Jasim Mohmed Jasim, 2025

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):

EE3204 – Electrical machines IV (2.0, Required)

2. Catalog Description:

Synchronous machines

This course have 4 problems will solve by problem based learning method.

3. Prerequisite(s): for Synchronous machines

Synchronous generators

4. Textbook(s) and/or other required materials:

A TEXTBOOK OF ELECTRICAL TECHNOLOGY Volume II , Author : B.L. THERAJA and A.K. THERAJA Publisher :- S. Chand , Publishing year: 2014

5. Course Objectives:

In this course, for synchronous generators students will learn:

1. To understand Construction of AC synchronous.
2. To identify Salient and non-salient pole types, EMF equation.
3. To identify winding distribution in Ac machines, chording, distribution factors, and armature reaction.
4. To analyze the Synchronous generator equivalent circuit and phasor diagram.
5. To demonstrate Power and torque.
6. To understand Synchronous generators operating alone.
7. To identify parallel operation of synchronous generators.
8. To identify performance of generator connected to infinite-bus.
9. To understand Synchronous motor: principle of operation and equivalent circuit and phasor diagram.
10. To identify the Steady state synchronous motor operation.
11. To identify Power-factor control.
12. To identify Torque-speed characteristics, effect of load changes, effect of field current changes.
13. To identify the synchronous capacitor, starting of synchronous motor.

6. Topics:

In this course, for Electrical machines students will learn:

- Understand the Construction of AC synchronous machines.
- Analyze EMF and explain Salient and non-salient pole types.
- Explain the winding distribution in Ac machines, chording , distribution factors, and armature reaction.
- Draw the Synchronous generator equivalent circuit and phasor diagram.
- Calculate Power and torque.
- Analyze Synchronous generators operating alone
- Analyze parallel operation of synchronous generators and investigate the performance of generator connected to infinite-bus.

- Understand Steady state synchronous motor operation.
- Explain Power-factor control.
- Analyze Torque-speed characteristics, effect of load changes, effect of field current changes.
- Explain starting of synchronous motor.
- Explain special machines: stepper motors, servo motors and tachometer

7. Class/laboratory Schedule:

No lab

8. Design Project:

In addition to two exams, there is four problems based learning

9. Computer/software Use:

Students typically use word in writing their reports of problem based learning.

10. Evaluation Methods:

Exams (hour and half mid exam 20%, three hours final exam 60%)
Problem Based Learning projects (4 problems) 20%

11. Contribution to Professional Component:

The Electrical Machines course significantly contributes to the professional component of the Electrical Engineering curriculum by providing students with in-depth knowledge of the principles, construction, operation, and performance characteristics of various types of electric machines, including transformers, induction motors, and synchronous machines. Through a combination of theoretical instruction and practical laboratory work, students develop critical analytical and problem-solving skills necessary for designing, selecting, and operating electrical machines in real-world applications. This course bridges the gap between core engineering fundamentals and practical electrical systems, preparing students for professional practice and advanced studies in power systems, industrial automation, and energy conversion technologies.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

In this course, for electrical machines students will learn:

Able to find and know the characteristics of all synchronous generator. (1)

13. Prepared by:

Ayad T. abdulhafedh, 2025

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):
EE3205- Communication II (3.0, Required)

2. Catalog Description:
The course introduces the basic concepts of digital communication, including sampling, quantization, source encoding, and modulation. Students will gain a solid foundation in understanding how digital data is encoded, transformed into signals suitable for transmission, and protected against channel impairments and noise. The curriculum integrates hands-on experience through laboratory work, utilizing software tools like MATLAB for practical simulations. Emphasis is placed on problem-solving, critical thinking, and real-world applications, ensuring students grasp the theoretical foundations while developing practical skills. Assessments include exams, assignments, and projects, promoting a holistic understanding of signals and systems. Overall, the course aims to equip students with a strong theoretical foundation and practical skills essential for success in various engineering disciplines.

3. Prerequisite(s):
EE3201 – Engineering Analysis II

4. Textbook(s) and/or other required materials:
- Introduction to Communication Systems, Ferrel G. Stremler, 3rd Edition, Addison Wesley, 1990.
- Communication Systems, Simon Haykin , 4th edition, Wiley 2001.

5. Course Objectives:
The student will learn the basic and applied concepts of Digital communication with the following fundamentals:
- Demonstrate a comprehensive understanding of the fundamental principles and concepts underlying digital communication systems, including signal encoding, modulation, transmission, reception, and decoding.
- Apply knowledge of signal representation and modulation techniques to design and analyze digital communication systems. Evaluate different modulation schemes, such as ASK, FSK, PSK, and QAM, and select appropriate modulation techniques based on system requirements.
- Analyze and evaluate the characteristics of communication channels and the impact of noise on signal transmission. Assess channel impairments, including attenuation, distortion, and interference, and propose appropriate mitigation techniques to ensure reliable communication.
- Demonstrate the ability to demodulate and recover digital signals in a communication system. Apply demodulation techniques to extract the original information from modulated signals, considering factors such as noise, channel effects, and synchronization.

6. Topics:

- Introduction to digital communication system.
- Nyquist sampling theorem and aliasing
- pulse modulation PAM. PWM, PPM
- pulse code modulation (PCM), noise in PCM
- Delta modulation (DM), noise in DM
- Frequency division multiplexing(FDM), Time division multiplexing (TDM)
- Sinusoidal digital modulation ASK, PSK, FSK.
- Noise in Digital Communications
- Error probabilities of baseband signals.

7. Class/laboratory Schedule:

- 15 weeks of 30 hours lab, one time a week

8. Design Project:

Teamwork Project: Design and implement practical projects that simulate real-world digital communication scenarios. This could involve designing digital modulation schemes, coding and decoding algorithms, or implementing communication protocols using software-defined radios or simulators.

9. Computer/software Use:

Students typically use Mat Lab software to build system diagrams, to write code and develop their proposed system, and word to write their reports.

10. Evaluation Methods

- 20 min quiz (10%), teamwork project (10%), homework (8%), one-hour midterm exam (12%), and three hours final exam (60%).

11. Contribution to Professional Component:

Integrate case studies from industry applications of digital communication systems. Analyze how digital communication technologies are used in sectors such as telecommunications, networking, IoT, and digital media to solve specific challenges and achieve objectives.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For the communication II course, students will learn:

1. Design and optimize digital communication systems to meet specific performance objectives. Analyze system requirements, select appropriate modulation schemes and parameters, and simulate system performance to validate the design. (2)

13. Prepared by:

Ali Jasim Mohammed, 2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):

EE3206 – Microprocessors II (2.0, Required)

2. Catalog Description:

- Interrupt
- Interfacing
- Delay programming and Timing
- Handshake application in MPU
- Support IC chips to MPU
- Digital to analog conversion using MPU
- Special purpose operation in MPU
- Principles of memory interfacing
- Memory design with MPU
- Solving advance problem

3. Prerequisite(s):

None

4. Textbook(s) and/or other required materials:

- Barry B. Brey, the Intel Microprocessors: Architecture, Programming & Interfacing, PHI, 6th Edition, 2003.
- A.K.Ray and K.M. Bhurchandi, Advanced Microprocessor and Peripherals, Tata McGraw Hill.
- Neamen, Microelectronics - Circuit Analysis and Design, McGraw-Hill, 2010.
- Uffenback, the 8086 Family Design, PHI, 2nd Edition.
- Lice & Gibson, Microcomputer System 8086 / 8088, PHI, 2nd Edition.

5. Course Objectives:

The microprocessor programming curriculum aims to teach the student the basic principles of the 8086 microprocessor and how to program it. Starting from the arithmetic and logic unit and the control unit, then the small storage units and instructions and how to implement them inside the microprocessor, and then the input and output units. Then how to program using assembly language and using the instructions for the 8086 processor and how to use them and write integrated programs by using the processor board and using an emulation program (emu8086) installed on the computer. The curriculum aims to teach the student how to program the microprocessor, its components, and how to benefit from it.

6. Topics:

In this course, students will learn about:

- During the academic year, the student learns the components and characteristics of the microprocessor
- The student learns to program the microprocessor by writing programs in the assembly language and in the machine language

- The student learns the uses of the 8086 microprocessor in various applications.

7. Class/laboratory Schedule:

Yes

8. Design Project:

- Led
- Motor
- Switch

9. Computer/software Use:

EMU8086 and Trainer Kit

10. Evaluation Methods:

- (Quiz (20 min), report, homeworks , and half mid exam % one hour)
- Three hours final exam 60%

11. Contribution to Professional Component:

- During the academic year, the student learns the components and characteristics of the microprocessor.
- The student learns to program the microprocessor by writing programs in the assembly language and in the machine language.
- The student learns the uses of the 8086 microprocessor in various applications.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

1. Ability to distinguish, identify, define, formulate, and solve engineering problems by applying principles of engineering, science and mathematics.(1)
2. Ability to perceive the continual necessity for professional knowledge growth and how to find, assess, assemble and apply it properly. (6)

13. Prepared by:

Raghda Abd Ul Rab 2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):

EE3207 – Antenna and Propagation II (2.0, Required)

2. Catalog Description:

This course offers a comprehensive exploration of the principles and phenomena governing the behavior of electromagnetic waves in various mediums. Students will delve into the fundamental concepts of wave propagation, including wave equations, wave polarization, interference, diffraction, reflection, refraction, and scattering.

3. Prerequisite(s):

EE2105 – Applied physics I

4. Textbook(s) and/or other required materials:

- Yadava, R. L. (2022). Antennas and wave propagation. PHI Learning Pvt. Ltd....
- Raju, G. S. N. (2006). Antennas and wave propagation. Pearson Education India.
- Fang, D. G. (2017). Antenna theory and microstrip antennas. CRC press.

5. Course Objectives:

The course objectives are as follows:

1. Understand the fundamental principles governing the behavior of electromagnetic waves in various mediums.
2. Explore and analyze wave equations, wave polarization, interference, diffraction, reflection, refraction, and scattering.
3. Gain practical experience in predicting and analyzing wave propagation patterns in different mediums and scenarios.
4. Develop proficiency in designing and optimizing communication systems, radar systems, and wireless networks based on wave propagation principles.
5. Investigate advanced topics such as waveguides, antennas, and the impact of environmental factors on wave propagation.
6. Apply theoretical knowledge to real-world scenarios to solve problems related to wave propagation and communication systems.
7. Enhance critical thinking and analytical skills through hands-on experiments and projects related to wave propagation.
8. Collaborate with peers to discuss and present findings on wave propagation phenomena and their applications in various fields.

6. Topics:

- Aperture Antenna, waveguide, Principles of Wave Propagation
- electrical properties of the transmission medium
- Principles of Radio wave Propagation
- Electromagnetic Waves Spectrum
- Optical properties of electromagnetic waves
- Wave propagation in Good Dielectrics and Conductor
- Radio Wave Propagation modes (Line of sight (LOS),

- Virtual Height, Critical Frequency, Multi-path, Fading, Skip Distance, Maximum Usable Frequency (MUF)
- Optimum Working Frequency (OWF), Inter Symbol Interference, Skin Depth, Duct Propagation
- Major radiowave propagation factors in Space communications,
- Scintillation, bandwidth, Coherence, and other Propagation factors, Radio noise in satellite

7. Class/laboratory Schedule:

No lab.

8. Design Project:

Teamwork Project: Choose a suitable research project related to the Antenna and Wave propagation, then define the research problem, present with the aid of diagrams the software, illustrate the key results of the project and discuss on the use of the particular approach to solve the problem.

9. Computer/software Use:

Students typically use in their reports CST Studio Suite to build system diagrams and word to write their reports.

10. Evaluation Methods:

- 20 min quiz (10%), teamwork project (10%), homework (8%), one-hour midterm exam (12%), and three hours final exam (60%).

11. Contribution to Professional Component:

This course contributes to the professional component by providing students with the following skills and knowledge:

1. Enhanced understanding of electromagnetic wave behavior in different mediums, which is essential for professionals working in fields such as telecommunications, radar systems, and wireless networks.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For the embedded system course, students will learn:

1. Identify, formulate, and solve engineering problems in antenna and wave propagation. (1)

13. Prepared by:

Anas Fouad Ahmed, 2025

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):
EE3208- Communication II LAB (1.0, Required)

2. Catalog Description:
The Lab introduces the basic concepts of digital communication, including sampling, quantization, source encoding, and modulation by using MATLAB Simulink. Students will gain a solid foundation in understanding how digital data is encoded, transformed into signals suitable for transmission, and protected against channel impairments and noise. The curriculum integrates hands-on experience through laboratory work, utilizing software tools like MATLAB for practical simulations. Emphasis is placed on problem-solving, critical thinking, and real-world applications, ensuring students grasp the theoretical foundations while developing practical skills. Assessments include exams, assignments, and projects, promoting a holistic understanding of signals and systems. Overall, the course aims to equip students with strong practical skills essential for success in various engineering disciplines.

3. Prerequisite(s):
None

4. Textbook(s) and/or other required materials:
- Communication Systems, Simon Haykin , 4th edition, Wiley 2001.

5. Lab Objectives:
The student will learn the basic and applied concepts of Digital communication using MATLAB Simulink with the following fundamentals:

- Demonstrate a comprehensive understanding of the fundamental principles and concepts underlying digital communication systems, including signal encoding, modulation, transmission, reception, and decoding.
- Apply knowledge of signal representation and modulation techniques to design and analyze digital communication systems.
- Design and Evaluate different digital modulation schemes, such as ASK, FSK, PSK, and QAM, and select appropriate modulation techniques based on system requirements.
- Analyze and evaluate the characteristics of communication channels and the impact of noise on signal transmission. Assess channel impairments, including attenuation, distortion, and interference, and propose appropriate mitigation techniques to ensure reliable communication.
- Demonstrate the ability to demodulate and recover digital signals in a communication system. Apply demodulation techniques to extract the original information from modulated signals, considering factors such as noise, channel effects, and synchronization.
- Evaluate the performance of digital communication systems using relevant metrics, such as SNR, BER, and bandwidth efficiency.

6. Experiments:

- Sampling Theory and Aliasing
- Pulse Code Modulation (PCM)
- Delta Modulation (DM)
- Amplitude Shift Keying Generation (ASK)
- Frequency Shift Keying Generation (FSK)
- Phase Shift Keying Generation (PSK)
- Quaternary Phase Shift Keying Generation (QPSK)

8. Class/laboratory Schedule:

- 15 weeks of 30 hours lab, one time a week

9. Design Project:

Teamwork Project: Design and implement practical projects that simulate real-world digital communication scenarios. This could involve designing digital modulation schemes, coding and decoding algorithms, or implementing communication protocols using software-defined radios or simulators.

10. Computer/software Use:

Students typically use MATLAB software to build system diagrams, to write code and develop their proposed system, and word to write their reports.

11. Evaluation Methods

- 20 min quiz & reports (20%), teamwork project (10%), midterm exam (30%), and final exam (40%).

12. Contribution to Professional Component:

Develop lab experiments that allow students to experiment with digital communication equipment and software tools. This hands-on experience helps students understand concepts such as signal processing, error control coding, channel equalization, and system performance analysis. Incorporate industry-standard software tools used in digital communication system design and analysis. This could include simulation software like MATLAB/Simulink.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For the communication II Lab, students will learn:

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

13. Prepared by:

Ali Jasim Mohammed, 2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):
EE3208 – Electronic Circuits II LAB (1.0, Required)

2. Catalog Description:
Explore the principles and applications of operational amplifiers in this hands-on electronic circuit lab. Students will delve into the fundamentals of op-amp circuits, covering topics such as basic amplifier configurations, voltage followers, inverting and non-inverting amplifiers, summing amplifiers, difference amplifiers, integrators, differentiators, and active filters. Through a combination of theoretical study and practical experimentation, participants will gain a comprehensive understanding of op-amp behavior, characteristics, and limitations. Emphasis will be placed on circuit analysis techniques, design considerations, and troubleshooting methods. By the end of the course, students will have acquired the skills to design and implement various op-amp circuits for a wide range of applications.

3. Prerequisite(s):
EE3102 Electronics Circuits I

4. Textbook(s) and/or other required materials:
Electronic Devices and Circuit Theory Author: Thomas L. Floyd, Author: Robert L. Boylestad , Publisher: Pearson Education, Publishing year: 2009

5. Course Objectives:
The overall objective of the course would be to provide students with a comprehensive understanding of operation amplifier, Specific objectives are listed below:

- Analytical Thinking: Students should be able to break down complex electronic systems into their constituent components and analyze their behavior.
- Synthesis: They should be able to integrate knowledge from various domains within electronics to design and develop innovative solutions to engineering problems.
- Evaluation: Students should be capable of critically evaluating electronic circuits and systems to determine their efficiency, reliability, and suitability for specific applications.
- Application of Theory: They should be able to apply theoretical principles of electronics to practical design and implementation tasks.
- Experimental Design: Students should be able to design experiments to validate hypotheses, test circuit performance, and explore new concepts in electronics.
- Problem-Solving Skills: They should develop proficiency in identifying, diagnosing, and resolving issues that arise during the design, construction, and testing of electronic systems.
- Experimental Techniques: They should gain proficiency in using advanced laboratory equipment and techniques for electronic measurement, testing, and characterization.

6. Topics:

- Integration Op-amp.
- Differentiator Op-amp.

- Frequency response of Op-amp.
- First order lowpass filter Op-amp.
- Second order lowpass filter Op-amp.
- First order high pass filter Op-amp.
- Second order high pass filter Op-amp.
- Band pass Filter
- Active Notch Filter Circuit
- 555 timer

7. Design Project:

Teamwork Project: the students will be devided into groups in order to design and implmnted the selected experiment and measures the obtained results.

9. Computer/software Use:

Many simulation software can be used to simulate the selected design such as Eagle, Altuim and Multisum.

10. Evaluation Methods:

- 20 min quiz (15%), teamwork project (25%), 40 minutes midterm exam (20%), and final exam (40%).

11. Contribution to Professional Component:

The electronic circuit lab focusing on operational amplifiers and transistors experiments makes significant contributions to several aspects of the professional component in engineering education, echnical Competence: Through hands-on experimentation and analysis, students develop a deep understanding of operational amplifier circuits, honing their technical skills in circuit design, analysis, and troubleshooting. This competence is crucial for engineers working in fields where operational amplifiers are extensively used, such as analog electronics, signal processing, and control systems.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For the embedded system course, students will learn:

1. Ability to design a system, component, or process to meet desired needs – Students design, construct, and test circuits that meet specific objectives. Using op-amp 741 and transistor 2N2222 (Outcome 3)

13. Prepared by:

Mohammed Khalid Ibraheem, 2025

Course Syllabi:

1. Course number and title

EE3208, Electrical Machine Lab. IV (1.0, Required)

2. Catalog Description

Principles of Electrical machine in laboratory.

3. Prerequisite(s):

None

4. Textbook(s) and/or other required materials:

Lecture booklet for the practical machinery laboratory

5. Course Objectives:

- Prepare the students to engage theoretically and practically in Electrical Machine lab. Profession in public and private sectors including, but not limited to, relevant governmental sectors, consulting firms, contracting companies, marketing and real estate investments.
- Prepare the students to Engage in ongoing professional development activities by pursuing graduate studies and/or other learning opportunities to respond to the arising challenges.
- Advance in responsibility and leadership in their careers and compete with their peers according to the profession ethics.
- Promote students with the necessary scientific and practical skills in the discipline for solving engineering problems and treating them logically and scientifically.
- Promote students with the necessary skills administration, time management, team-work, communication and language skills, soft computing and programming skills.

To learn the students the basic components in Electrical Machine , The induction motor and Synchronous generators

6. Topics:

Students will learn:

- Complete the topic of synchronous generators
- Synchronous motors
- Method of starting of three phase motors
- Star-Delta staring of 3phase motors

7. Class/laboratory Schedule:

In lab

8. Design Project:

No project.

9. Computer/software Use:
Students typically use simulik by Matlab .

10. Evaluation Methods:

- (Quiz (20 min), report, homeworks 40%, and half mid exam 20% one hour)
- Three hours final exam 40%

11. Contribution to Professional Component:
For Electrical A.C machines in engineering, students will learn about the application of induction motors and generators in lab. The student deals with motors and generators, gaining knowledge how they work and the differences between them in lab.

12. Relationship to Student Outcomes:
Course Learning Objectives (related Student Outcomes 1-7):
For Electrical machine in lab. In Engineering students will learn:
1. Requiring students to write technical reports on experiments and present their findings orally, improving both written and verbal communication skills. (4)

13. Prepared by:
Ayad Tahseen 2025

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):
EE4101– Information Theory, Coding and Cryptography (3.0, Required)

2. Catalog Description:
Information Theory and Coding
This course covers fundamental information theory and coding concepts, focusing on data compression, error detection, and error correction techniques. Students will analyze coding schemes and their applications in communication systems using a problem-based learning approach.

3. Prerequisite(s):
Basic knowledge of linear algebra, and digital communication systems.

4. Textbook(s) and/or other required materials:
Saha, A., Manna, N., & Mandal, S. (2013). *Information Theory, Coding, and Cryptography*. Pearson Education India.

5. Course Objectives:

By the end of this course, students will be able to:

- Understand the fundamental principles of information theory and coding.
- Apply mathematical models to analyze information transmission and encoding processes.
- Develop coding techniques for error detection and correction in communication systems.
- Implement programming solutions for data compression and secure communication.
- Explore practical applications of information theory in modern communication technologies.

6. Topics:
Students will learn:

- Fundamentals of Information Theory – Entropy, mutual information, and channel capacity.
- Source Coding – Huffman coding, Shannon-Fano coding, and data compression techniques.
- Error Detection and Correction – Hamming, cyclic, and convolutional codes.
- Channel Coding – Shannon's theorem, noisy channels, and coding efficiency.
- Mathematical Foundations – Galois fields, generator matrices, and parity-check codes.

- Cryptographic Techniques – Encryption methods, hash functions, and digital signatures.
- Applications in Communication Systems – Wireless networks, data storage, and telecommunication.
- Implementation and Simulation – Programming solutions, encoding/decoding tools, and real-world case studies.

7. Class/laboratory Schedule:

Class

8. Design Project:

In addition to exam there be assignment and quizzes

9. Computer/software Use:

Students typically use word in writing their reports, Power point and MATLAB for project.

10. Evaluation Methods:

Exams (One and 30 minutes for Mid-Term exam 20%, three hours final exam 60%
30 minutes for quiz 10%, assignment 10%)

11. Contribution to Professional Component:

This course enhances students' technical expertise in information theory and coding, equipping them with essential skills for data transmission, error correction, and secure communication. It develops analytical and problem-solving abilities, enabling students to design and evaluate coding schemes for modern communication systems. Additionally, the course strengthens mathematical modeling and programming skills, preparing students for professional roles in digital communication, networking, and cybersecurity.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcome 1-7):

- Identify and analyze fundamental principles of information theory and coding, Apply mathematical models to evaluate information transmission and encoding techniques. (1)
- Develop and implement coding methods for error detection, correction, and data security, Use programming tools to design and simulate coding schemes for real-world applications. And Understand and explore the impact of information theory in modern communication systems. (1)

13. Prepared by:

Mohammed H. Ali, 2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):
EE 4102 – Electrical power systems I (3.0, Required)

2. Catalog Description:
Power System Analysis is an advanced course focusing on the analysis and modeling of electrical power systems. The course delves into power system behavior's theoretical and practical aspects under normal and abnormal conditions. Topics covered include representation of power systems, power flow analysis, and symmetrical fault analysis.

3. Prerequisite(s):
Electrical Power, Electrical Circuits.

4. Textbook(s) and/or other required materials:

- Power System Analysis and Design, B.R.Gupta.
- Power System Analysis and Design, Hadi Saddat.
- Research in research engines specialized in scientific research such as:
    1. Google Scholar
    2. Science direct

5. Course Objectives:
In this course, for power systems students will:

1. Understand the principles of power system analysis and modeling.
2. Perform power flow analysis to determine the steady-state operating conditions of a power system.
3. Analyze symmetrical faults in power systems and calculate fault currents.

6. Topics:
In this course, students will learn about:
- Principles of power system analysis.
- The one-line diagram.
- Reactance diagram.
- Per unit values.
- Network matrices.
- Data for load flow studies and Bus classifications.
- Power flow equations.
- Gauss, NR, Fast decoupled.
- Types of faults in power system
- Fault calculations by Thevenin’s theorem.
- Fault calculations using Z bus.

7. Class/laboratory Schedule:
No lab

8. Design Project:

No project

9. Computer/software Use:

Students typically use word and powerpoint in writing their reports and seminar.

10. Evaluation Methods:

- Quiz 10% (15 min), projects 10%, and mid-exam 20% (one hour)
- Three hours final exam 60%

11. Contribution to Professional Component:

The Power System Analysis course enriches students' professional component by imparting advanced technical skills in analyzing complex power systems. It fosters problem-solving, teamwork, and ethical awareness while emphasizing industry-relevant practices. Students gain practical competence, preparing them to contribute effectively to the evolving field of electrical engineering.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For Electrical power students will learn:

1. Ability to distinguish, identify, define, formulate, and solve engineering problems by applying principles of engineering, science and mathematics (1).
2. Ability to skillfully communicate orally with a gathering of people and in writing with various managerial levels (4).
3. Ability to work adequately on teams and to set up objectives, plan activities, meet due dates and manage risk and uncertainty (7).

13. Prepared by:

Hiba Hadi Kurdi 2024

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):

EE4103 – Control engineering I (3.0, Required)

2. Catalog Description:

This module provides students with a comprehensive understanding of control systems engineering principles and techniques. The module introduces students to the fundamental concepts, analysis methods, and design principles related to control systems. This module also covers time-domain analysis, focusing on the time response of control systems. They explore methods for analyzing and improving system performance through the adjustment of control parameters. Stability analysis is another significant aspect of the module. Students learn techniques such as the Routh-Hurwitz stability criterion and root locus analysis to evaluate system stability. They understand the effects of system parameters on stability and learn how to design stable control systems.

3. Prerequisite(s):

None

4. Textbook(s) and/or other required materials:

- Nise, Norman S. Control systems engineering. John Wiley & Sons, 2020.
- Ogata, Katsuhiko, and Yanjuan Yang. Modern control engineering. Vol. 5. India: Prentice hall, 2002.

5. Course Objectives:

The overall objective of the course would be to provide students with a comprehensive understanding of control engineering modeling, as well as skills for analysis systems with various methods. Specific objectives are listed below:

- Describe the basic concepts and principles of control systems engineering, including the differences between open-loop and closed-loop control systems.
- Apply mathematical modeling techniques to represent dynamic systems using differential equations, transfer functions, and state-space models.
- Analyze the time-domain response of control systems, including the ability to calculate performance metrics such as rise time, settling time, overshoot, and steady-state error.
- Evaluate the stability of linear control systems using the Routh-Hurwitz stability criterion and root locus analysis.
- Apply critical thinking and problem-solving skills to analyze, design, and evaluate control systems for a variety of applications.
- Communicate effectively about control systems engineering concepts, both orally and in written form, using appropriate technical terminology and notation.

- Work effectively as part of a team to solve control systems engineering problems and collaborate on control system design projects.

6. Topics:

- Introduction to Control Systems.
- Mathematical Modeling of Dynamic Systems.
- System representation.
- Time-Domain Analysis.
- Root Locus Analysis.

7. Class/laboratory Schedule:

Designing lab exercises that allow students to implement control algorithms using software tools like MATLAB, Simulink, or Python. These exercises can include tasks such as designing PID controllers, implementing state-space control, or simulating feedback systems.

8. Design Project:

Assigning projects that require students to design, implement, and test control systems for specific applications or tasks. Projects can range from designing a self-balancing robot to controlling the temperature of a chemical reactor.

9. Computer/software Use:

Providing training on specialized control software tools commonly used in this field like MATLAB, Simulink, or Python.

10. Evaluation Methods:

- 30 min quiz (10%), teamwork project (10%), homework (5%), one-hour midterm exam (15%), and three hours final exam (60%).

11. Contribution to Professional Component:

It typically involves imparting practical skills and knowledge relevant to the field of control systems. Introducing students to real-world applications of control engineering in various industries such as aerospace, automotive, robotics, and manufacturing. Analyzing case studies helps students understand the practical challenges and solutions in control system design.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For the control engineering I course:

For Control Systems I students will learn to understand, model, analyze, and evaluate control systems while effectively communicating concepts and collaborating on engineering solutions (1)

13. Prepared by:

Ayad Mahmood Kwad, 2024

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):
EE4104 - Power Electronic and Machines I (3.0, Required)

2. Catalog Description:
Power Electronic and Machines I
This course discusses the fundamental concepts and introduces the essentials of analyses, design, and simulation of power electronic circuits. Topics include power electronics devices, switching losses, analyses and design of single-phase ac-dc converters, simulation of single-phase ac-dc converters, analyses and design of three-phase ac-dc converters, simulation of three-phase ac-dc converters, analyses and design of dc-dc converters, simulation of dc-dc converters, analyses and design of ac-ac converters, analyses and design of single- and three-phase dc-ac converters, simulation of single dc-ac converters, analyses and design of Maximum Power Point Tracking controller for photovoltaic system, Study Speed control of DC and AC motors.

3. Prerequisite(s):
Electronics I, Electronics II, Electronics Circuits I, and Electronic Circuits II.

4. Textbook(s) and/or other required materials:
Power Electronics by Daniel W. Hart
Power Electronics and Drives by Mohammed T. Lazim Al-Zuhairi

5. Course Objectives:

1. To Identify the types of power semiconductor switches.
2. To Analysis electrical properties of different types of DC-DC converters
3. To Identify the types and characteristics of the Inverters.
4. To Design and implement Maximum Power Point Tracking system of PV
System based on P&O and INC algorithms.

6. Topics:
Students will learn:

- Power Semiconductor Switches
- AC-DC Rectifiers
- DC-DC Converters
- DC-AC Inverters
- Renewables Energy

7. Class/laboratory Schedule:
No lab

8. Design Project:
Non

9. Computer/software Use:
Students typically use word in writing their reports of problem based learning.

10. Evaluation Methods:

Exams (hour and half mid exam 15%, three hours' final exam 60%)
3 Quizzes 15%, Seminar 10%

11. Contribution to Professional Component:

For Power Electronics and Machines I, students will learn about professionalism and codes of power electronics switches, understanding design problems, practical problem solving techniques.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

Power Electronics and Machines apply Outcome 2 by enabling the design of efficient, safe, and sustainable electrical systems for industrial, transportation, and renewable energy applications. These systems are engineered considering public welfare, environmental impact, and socio-economic needs. (2)

13. Prepared by:

Bashar Sakeen Farhan, 2024

2. Syllabus

A-1. Course Number & Title (Credit Hours, Required or Elective):

EE4106- Digital Electronics I, (3.0, Required)

A-2. Catalog Description:

Electronics in Electrical Engineering

This course describes Digital Electronic techniques in Electrical Engineering, the tasks that engineering or students must perform to successfully complete an Electronic System Design

A-3. Prerequisite(s): for electrical engineering

None

A-4. Textbook(s) and/or other required materials:

Shiv Shankar, "Digital Circuits and Systems II", 2009

A-5. Course Objectives:

The course objectives are:-

a) To study the principles and techniques of digital electronics

b) To study the digital circuits analysis schemes and how they can they effect the circuit design

c) To study the influencing parameters that must be taken under consideration while finishing the circuit design

d) Calculating the optimal values for the circuit components to guarantee optimal solutions

e) Designing and updating different types of digital circuits solutions depending upon the environmental - practical and applicable realistic conditions

f) Updating analysis methods for the inputs in order to make the outputs more compatible with the system environmental needs

g) To evaluated the best ways for memory expansion designs depending on the available RAM size and design approaches

A-6. Topics:

Students will learn:

a) The principals of digital electronics

b) The techniques, ways, and properties of Digital designs

c) Study methods for problem formulation and analyzing to reach feasible solutions

d) Multiple methods for digital circuits design and implementation according to the type of the digital input signal

e) Identifying the strength and weak points in the circuit design using the available digital electronic circuit design software's like electronic work bench

f) Updating and upgrading the main circuit designs to obtain new circuit applications depending on the market demands

A-7. Class/laboratory Schedule:

No lab

A-8. Design Project:

None

A-9. Computer/software Use:

None

A-10. Evaluation Methods:

Exams (2-hours mid exam 20%, three hours final exam 60%)
Problem Based Learning quiz (2 quizzes) 20%

A-11. Contribution to Professional Component:

For Digital Electronics Engineering, students will learn about professionalism and code design of digital devices, understanding digital problems, electronic problem solving techniques, Risk, safety and potential hazard and the right responsible reaction in engineering.

A-12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For Digital Electronics I, students will learn:

1. Understanding problems(1)
2. Analyzing system components(1)
3. Professionalism and code formulation in designing (1)

13. Prepared by:

Mohammed Nasser Hussain Al-Turfi, 2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):

EE4107 – Embedded Systems (2.0, Required)

2. Catalog Description:

This course provides a base to understand the basic knowledge and concepts of embedded systems hardware and software and their interaction as well as case studies that are in line with industrial requirements and apply that knowledge to design and implement embedded solutions.

3. Prerequisite(s):

EE2206 - Digital Techniques II

4. Textbook(s) and/or other required materials:

- Shibu Kizhakke Vellathai, Introduction to Embedded Systems.2nd Edition, McGraw Hill Education, 2017.
- Alexander Barkalov, Larysa Titarenko, and Małgorzata Mazurkiewicz, Foundations of Embedded Systems: Studies in Systems, Decision and Control. Springer Nature Swizerland, 2019.
- Tianhong Pan Yi Zhu, Designing Embedded Systems with Arduino: A Fundamental Technology for Makers.1st Edition, Springer, 2018.

5. Course Objectives:

The overall objective of the course would be to provide students with a comprehensive understanding of embedded systems design and implementation, as well as practical skills for developing embedded systems for a variety of applications. Specific objectives are listed below:

- Understanding the domains and application requirements for embedded systems, such as consumer electronics and industrial automation.
- Learning design methodologies for developing efficient and reliable embedded systems, including requirements analysis, system design, implementation, and testing.
- Exploring the architecture and components of embedded systems, including microcontrollers, microprocessors, peripherals, and communication interfaces.
- Studying different memory types and their design considerations for embedded systems, and researching the common sensors and actuators used for control and data collecting.
- Understanding the principles of embedded hardware and software design, including circuit design and software testing.
- Developing hands-on experience with Arduino microcontrollers to design and prototype embedded systems projects.
- Analyzing real-world case studies of successful embedded systems projects to understand best practices and lessons learned in the field.

6. Topics:

- Introduction to Embedded Systems.
- Major Application Domains and Needs for Embedded Systems.
- Design Methodologies
- Architecture and Components of Embedded Systems.

- Embedded Firmware
- Memory Types and Memory Design
- Sensors and Actuators
- Communication Interface
- Embedded Hardware and Software Design
- Developing Embedded Systems with Arduino
- Case Studies

7. Class/laboratory Schedule:

No lab.

8. Design Project:

Teamwork Project: Choose a suitable research project related to the design and implementation of an embedded solution, then define the research problem, present with the aid of diagrams the software and hardware design and implementation of the system, illustrate the key results of the project and discuss on the use of the particular system to solve the problem.

9. Computer/software Use:

Students typically use Fritzing software to build system diagrams, Arduino IDE or any other IDEs to write code and develop their proposed system, and word to write their reports.

10. Evaluation Methods:

- 20 min quiz (10%), teamwork project (10%), homework (8%), one-hour midterm exam (12%), and three hours final exam (60%).

11. Contribution to Professional Component:

The field of embedded systems plays a key role in various major application domains, meeting specific needs across industries. EE4107 is designed to produce several distinct outcomes required by the accrediting body and to contribute to the PEOs of the program.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For the embedded system course, students will learn:

1. Identify, formulate, and solve engineering problems in embedded systems. (1)
2. Design and implement embedded systems that meet desired needs. (2)
3. Presenting projects and communicating orally with a gathering of people and in writing with various managerial levels. (4)
4. Ability to work adequately on teams and to set up objectives and plan activities through teamwork projects. (7)

13. Prepared by:

Baraa Munqith Albaker, 2024-2025

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):
4109 – Power Electronics and Machine Lab I (1.0, Required)

2. Catalog Description:
The Power Electronics and Machine Lab provides hands-on experience in the design, analysis, and testing of power electronic converters and electric machines.

3. Prerequisite(s): for Power Electronics and Machine Lab I
None

4. Textbook(s) and/or other required materials:
- Simulation of Power Electronics Circuits with MATLAB®/Simulink®: Design, Analyze, and Prototype Power Electronics (Maker Innovations Series)

5. Course Objectives:

- Understand Rectification Principles:
  Gain a comprehensive understanding of single-phase half-wave and full-wave uncontrolled rectifiers, including their operation, waveforms, and applications.
- Analyze Rectifier Circuits:
  Analyze the performance characteristics of single-phase and three-phase rectifiers, focusing on output voltage, current, and ripple factors.
- Examine Three-Phase Rectification:
  Explore the principles and advantages of three-phase rectifiers, including their efficiency and suitability for industrial applications.
- Conduct Practical Experiments:
  Perform hands-on experiments to construct and test single-phase and three-phase rectifier circuits, reinforcing theoretical knowledge through practical application.
- Evaluate Performance Metrics:
  Measure and evaluate key performance metrics of rectifiers, such as efficiency, load regulation, and harmonic distortion.
- Implement Safety Protocols:
  Apply appropriate safety measures when working with power electronics equipment, ensuring a safe laboratory environment.
- Develop Simulation Skills:
  Utilize simulation software to model rectifier circuits, predict performance outcomes, and analyze system behavior under varying conditions.
- Prepare for Advanced Topics:
  Lay the groundwork for more advanced studies in power electronics, including controlled rectifiers and power conversion technologies.

6. Topics:
- Single phase half wave Uncontrolled rectifier with R, RL, and RL load with freewheeling diode
- Single phase full wave Uncontrolled rectifier with R, RL, and RL load with freewheeling diode

- Single phase-controlled rectifier
- Three phase half wave Uncontrolled rectifier with R, RL, and RL load with freewheeling diode
- Three phase full wave Uncontrolled rectifier with R, RL, and RL load with freewheeling diode

7. Class/laboratory Schedule:
3h/week

8. Design Project:
No project.

9. Computer/software Use:
MATLAB.

10. Evaluation Methods:
- (Quiz (20 min), report, homework 30%, and mid-exam 30% (one hour)
- Three hours final exam 40%

11. Contribution to Professional Component:
The Power Electronics and Machine Lab enhances professional development by:
- Hands-On Experience: Offers practical skills in designing and testing power electronic circuits.
- Skill Development: Builds technical proficiency in circuit analysis and troubleshooting.
- Industry-Relevant Knowledge: Aligns education with current technologies and industry standards.
- Research and Innovation: Promotes involvement in innovative research projects.
- Interdisciplinary Learning: Integrates concepts across electrical and mechanical engineering.
- Ethics and Safety: Emphasizes safety practices and professional responsibility.
- Collaboration: Encourages teamwork and collaborative project work.

12. Relationship to Student Outcomes:
Course Learning Objectives (related Student Outcomes 1-7):
For the Power Electronics and Machines I Lab, students will learn:
1. Identify areas where further learning is needed in power electronics and machine technologies. **outcome (6)**
2. Gain proficiency in computer-based tools for simulation, analysis, and data evaluation, enhancing their learning and problem-solving capabilities. **outcome (6)**
3. Develop a mindset geared towards continuous professional development and adaptation to technological advancements. **outcome (6)**

13. Prepared by:
Alaa Hussein Abdulaal, 2024-2025

2.Syllabus

B-1. Course Number & Title (Credit Hours, Required or Elective):

EE4201-Digital Signal Processing (DSP) (3.0, Required)

B-2. Catalog Description:

Signal Processing in Electrical Engineering

This course describes Digital Signal Processing techniques and approaches in Electrical Engineering, the tasks that engineering or students must perform to successfully complete the System Analysis Design and signal type and properties identification.

B-3. Prerequisite(s): for electrical engineering

None

B-4. Textbook(s) and/or other required materials:

Lonnie C. Ludeman, "Fundamentals of Digital Signal Processing" 5th edition, 2013

B-5. Course Objectives:

The course objectives are:-

a) To study the principles and techniques of digital Signal Processing

b) To study the digital circuits and networks analysis schemes and how they can effect the circuit design To study the digital circuits analysis schemes and how they can they effect the circuit design

c) To study the influencing parameters that must be taken under consideration while making digital transforms

d) Calculating the optimal values for different transforms to guarantee optimal solutions

e) Designing and updating different types of digital circuit and filter solutions depending upon the environmental - practical and applicable realistic conditions

f) Updating analysis methods for the inputs in order to make the outputs more compatible with the system environmental needs

g) To evaluated the best ways for system expansion designs depending on the available reduction approaches and calculation size and design strategies

B-6. Topics:

Students will learn:

a) 1-D & 2-D Convolution and Correlation

b) Continuous Frequency Analysis for periodic & non-periodic signals

c) Filter Analysis and design for H.P.F, L.P.F, B.P.F, B.S.F

d) Discrete Frequency Analysis for Discrete Fourier Transform & Fast Fourier Transform

e) State Space Representation and Matrix Manipulation

f) Multi-Resolution Analysis for Wavelet Transform & Wavelet Packet Transform

g) Channel occupation and Utilization

B-7. Class/laboratory Schedule:

No lab

B-8. Design Project:

None

B-9. Computer/software Use:

None

B-10. Evaluation Methods:

Exams (2-hours mid exam 20%, three hours final exam 60%)

Problem Based Learning quiz (2 quizzes) 20%

B-11. Contribution to Professional Component:

For Digital Signal Processing , students will learn about professionalism and code design of digital devices and signal response, understanding digital problems, analyzing problem solving techniques, Risk, safety and potential hazard and the right responsible reaction in signal processing.

B-12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For Digital Signal Processing, students will learn:

1. Understanding problems (1)
2. Analyzing system signals (1)
3. Professionalism and code formulation in designing & System analysis (1)
4. Enabling students to design and analyze digital filters and signal systems. It fosters skills in creating efficient signal processing solutions using mathematical and engineering principles.

13. Prepared by:

Mohammed Nasser Hussain Al-Turfi, 2025

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):

EE 4202 – Electrical power systems II (3.0, Required)

2. Catalog Description:

Power System Analysis is an advanced course focusing on analyzing and modeling electrical power systems. The course delves into power system behavior's theoretical and practical aspects under normal and abnormal conditions. Topics covered include symmetrical components, unbalanced fault analysis, transient stability analysis, and economic dispatch.

3. Prerequisite(s):

Electrical Power, Electrical Circuits.

4. Textbook(s) and/or other required materials:

- POWER SYSTEM ANALYSIS AND DESIGN, B.R.GUPTA.
- POWER SYSTEM ANALYSIS AND DESIGN, HADI SADDAT.
- Research in research engines specialized in scientific research such as:
    3. Google Scholar
    4. Science direct

5. Course Objectives:

In this course, for power systems students will:

4. Understand the principles of symmetrical components.
5. Analyze various types of faults in power systems and calculate fault currents.
6. Assess the transient stability of power systems under dynamic conditions.
7. Apply economic dispatch techniques to optimize power generation and minimize operating costs.

6. Topics:

In this course, students will learn about:

- Symmetrical components.
- Types of Symmetrical components.
- Sequence impedances of synchronous machine, T.L and transformers.
- Unsymmetrical faults.
- SLG, LL and LLG fault.
- Fault through impedance
- Power system stability.
- The stability problem.
- Power angle curve and Swing equation.
- Inertia constant.
- Steady-state stability.
- Equal area criterion.
- minimize operating costs.

7. Class/laboratory Schedule:
No lab

8. Design Project:
No project

9. Computer/software Use:
Students typically use word and powerpoint in writing their reports and seminars.

10. Evaluation Methods:

- Quiz 10% (15 min), seminars 10%, and mid-exam 20% (one hour)
- Three hours final exam 60%

11. Contribution to Professional Component:
The Power System Analysis course enriches students' professional component by imparting advanced technical skills in analyzing complex power systems. It fosters problem-solving, teamwork, and ethical awareness while emphasizing industry-relevant practices. Students gain practical competence, preparing them to contribute effectively to the evolving field of electrical engineering.

12. Relationship to Student Outcomes:
Course Learning Objectives (related Student Outcomes 1-7):
For Electrical power students will learn:

1. Ability to distinguish, identify, define, formulate, and solve engineering problems by applying principles of engineering, science and mathematics (1).
2. Ability to skillfully communicate orally with a gathering of people and in writing with various managerial levels (4).
3. Ability to work adequately on teams and to set up objectives, plan activities, meet due dates and manage risk and uncertainty (7).

13. Prepared by:
Hiba Hadi Kurdi 2024

Course Syllabi

1. Course Number & Title (Credit Hours, Required or Elective):

EE4203 – Control engineering II (3.0, Required)

2. Catalog Description:

The Control II module teaches PID controller design and tuning, emphasizing root locus methods. Frequency-domain analysis, including Bode and Nyquist plots, evaluates system stability and performance metrics. State-space control concepts cover controllability, observability, and pole placement techniques for desired system behavior. Additionally, discrete-time systems and digital controller design techniques are introduced. Practical exercises and simulations throughout the module enhance critical thinking and problem-solving skills for real-world control applications.

3. Prerequisite(s):

EE4103 – Control engineering I

4. Textbook(s) and/or other required materials:

- Nise, Norman S. Control systems engineering. John Wiley & Sons, 2020.
- Ogata, Katsuhiko, and Yanjuan Yang. Modern control engineering. Vol. 5. India: Prentice hall, 2002.

5. Course Objectives:

The overall objective of the course would be to provide students with a comprehensive understanding of control engineering modeling design. Specific objectives are listed below:

- Design and tune Proportional-Integral-Derivative (PID) controllers using various methods and assess their performance in terms of stability and response characteristics.
- Utilize frequency-domain analysis techniques, such as Bode plots and gain/phase margins, to assess the stability and performance of control systems.
- Design compensators, including lead, lag, and lead-lag compensators, to shape the frequency response of control systems and achieve desired performance specifications.
- Understand the principles of state-space representation and apply state feedback control techniques to design controllers and achieve desired system behavior.
- Recognize the challenges and considerations in implementing control systems in a digital environment and apply discrete-time control techniques using the z-transform.
- Apply critical thinking and problem-solving skills to analyze, design, and evaluate control systems for a variety of applications.
- Communicate effectively about control systems engineering concepts, both orally and in written form, using appropriate technical terminology and notation
- Work effectively as part of a team to solve control systems engineering problems and collaborate on control system design projects.

6. Topics:

- Frequency-Domain Analysis.
- Controller Design.
- Introduction to State-Space Control.

- Digital Control Systems.

7. Class/laboratory Schedule:

Designing lab exercises that allow students to implement control algorithms using software tools like MATLAB, Simulink, or Python. These exercises can include tasks such as designing PID controllers, implementing state-space control, or simulating feedback systems.

8. Design Project:

Assigning projects that require students to design, implement, and test control systems for specific applications or tasks. Projects can range from designing a self-balancing robot to controlling the temperature of a chemical reactor.

9. Computer/software Use:

Providing training on specialized control software tools commonly used in this field like MATLAB, Simulink, or Python.

10. Evaluation Methods:

- 30 min quiz (10%), teamwork project (10%), homework (5%), one-hour midterm exam (15%), and three hours final exam (60%).

11. Contribution to Professional Component:

It typically involves imparting practical skills and knowledge relevant to the field of control systems. Introducing students to real-world applications of control engineering in various industries such as aerospace, automotive, robotics, and manufacturing. Design a controller for specific case studies helps students understand the practical challenges and solutions in control system design.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

For the control engineering II course:

1. The student gain proficiency to understand real-world control problems and design a proper controller to achieve the required transient and steady state criterion. (2)

13. Prepared by:

Ayad Mahmood Kwad, 2024

2. Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):
EE4204 - Power Electronic and Machines II (3.0, Required)

2. Catalog Description:
Power Electronic and Machines II
This course discusses the fundamental concepts and introduces the essentials of analyses of Single phase motor and other special machines. Topics include Analysis of single-phase IM using double revolving field theory and finding motor parameters using blocked rotor test and no load motor test, also include speed control methods of single phase IM. The course will include explanation of operating principles of different motors like commutator type single phase motors, steeper motor, servo motors, and tachometers

3. Prerequisite(s):
Electrical Machines I, Electrical Machines II, Electrical Machines III, and Electrical Machines IV

4. Textbook(s) and/or other required materials:
- Electrical machines by S. K. Bhattacharya
- Electric machines Ashfag Hussain

5. Course Objectives:
1- Identify the types of single-phase motors and methods of starting and speed control
2- Identify the types of servo motor types and how it works
3- Identify the working principle of the stepping motor and how to control it

6. Topics:
Students will learn:
- Single-Phase Induction Motor
- Two-Phase Servo Motor
- Shaded Pole Motors
- Universal and Single-Phase AC Series Motor
- Single Phase Repulsion Motors
- Stepper Motor (SM)

7. Class/laboratory Schedule:
No lab

8. Design Project:
In addition to two exams, there is three problems based learning.

9. Computer/software Use:
Students typically use word in writing their reports of problem based learning.

10. Evaluation Methods:
Exams (hour and half mid exam 15%, three hours' final exam 70%)
Problem Based Learning projects (3 problems) 15%

11. Contribution to Professional Component:

Understanding single-Phase induction motors, Servomotors, and Stepper Motor types, starting methods, and speed control techniques is crucial for selecting and implementing them correctly.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1-7):

Enabling graduates to analyze electrical systems through core engineering principles. They use mathematical models and scientific concepts to solve real-world challenges in energy conversion and control. (1)

13. Prepared by:

Bashar Sakeen Farhan, 2025

2. Syllabus

1. Course Number & Title (ECTS Credits, Required or Elective):
EE4206 – Digital Electronics II (3.0, Required)

2. Course Description:
This course is designed to provide students with a comprehensive understanding of digital electronics, analog-to-digital (A/D) and digital-to-analog (D/A) conversion techniques, logic circuit families, semiconductor memory technologies, and the fundamentals of hardware design using microcomputers and microprocessors. The course aims to equip students with the theoretical knowledge and practical skills necessary for designing and analyzing digital systems.

3. Prerequisite(s): for energy efficiency
None

4. Textbook(s) and/or other required materials:

- Digital Fundamentals, by Thomas L. Floyd
- Electronic Devices: Conventional Current Version by Thomas L. Floyd
- Electronic Circuits: Discrete and Integrated by Schilling Belone
- Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education

5. Course Objectives:

- Understand the principles and applications of analog-to-digital and digital-to-analog conversion.
- Analyze and design basic circuits involving sample-and-hold circuits and multiplexers.
- Gain proficiency in working with different logic families and their interfaces.
- Study and compare various semiconductor memory technologies.
- Learn the basics of hardware design and the role of microcomputers and microprocessors in modern digital systems.

6. Topics:

1. Digital to Analogue and Analogue to Digital Converters
2. Types of A/D Converters (voltage to frequency, voltage to time)
3. Sample and hold circuit, multiplexer, error
4. Logic Families - General characteristics
5. Logic Families - TTL and CMOS characteristics and interface
6. Semiconductor Memories (ROM, EPROM, EEPROM, RAM)
7. Programmable Logic Array and other array circuits
8. Hardware design using microcomputer/microprocessor

8. Evaluation Methods:

Exams (hour and half mid exam 20%, three hours final exam 60% Quizzes 15%, Student Engagement during Lectures (5%)

9. Contribution to Professional Component:

1. Engineering Science:

- Digital Electronics: The course introduces fundamental concepts of digital electronics, such as analog-to-digital (A/D) and digital-to-analog (D/A) conversion, logic families, and memory technologies. These topics build a strong theoretical foundation in electrical and computer engineering.

2. Engineering Design:

- Practical Applications: Students will apply theoretical knowledge to practical problems, such as designing circuits with specific functionalities (e.g., sample-and-hold circuits, multiplexers) and understanding error handling in A/D and D/A converters.
- System Integration: The course likely includes projects or labs where students integrate various components like logic gates, memory units, and microprocessors into complete systems, mimicking real-world engineering tasks.
- Trade-offs in Design: Learning about different logic families (TTL, CMOS) and their interface considerations teaches students about making design trade-offs based on performance, power consumption, and cost.

10. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcomes 1, 2):

1. The course involves understanding and applying fundamental principles of digital electronics, such as A/D and D/A conversion, logic families, and memory technologies. These topics require students to use engineering, science, and mathematics to solve problems related to circuit design, signal processing, and error analysis. (1)

2. The course emphasizes the design and implementation of digital systems, including hardware design using microcomputers/microprocessors and the integration of various components like logic gates, multiplexers, and memory units. (2)

11. Prepared by:

Firas Ali Jawad, 2025

Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):

EE4207– Computer Networks (2.0, Elective)

2. Catalog Description:

Computer Networks

This course covers fundamental concepts of computer networks, including network architectures, protocols, data communication, and security. Students will explore networking models, TCP/IP, routing, switching, and wireless communication through a problem-based learning approach.

3. Prerequisite(s):

Basic knowledge of computer systems and programming

4. Textbook(s) and/or other required materials:

Computer Networking: A Top-Down Approach" by James F. Kurose and Keith W. Ross, Pearson

5. Course Objectives:

By the end of this course, students will be able to:

- Understand the fundamental concepts and principles of computer networking.
- Analyze and evaluate different networking protocols and technologies for efficient communication.
- Design, configure, and troubleshoot computer networks to ensure optimal performance.
- Apply security measures to protect network infrastructure and data from threats.
- Explore emerging trends and technologies in modern computer networking.
-

6. Topics:

- Fundamentals of Computer Networking – Network types, topologies, and architectures.
- Networking Models and Protocols – OSI vs. TCP/IP models, data encapsulation, and communication protocols.
- Network Addressing and Routing – IP addressing, subnetting, routing algorithms, and VLANs.
- Wired and Wireless Communication – Ethernet, Wi-Fi, Bluetooth, and cellular networks.
- Network Security – Firewalls, encryption, authentication, and intrusion detection.
- Network Configuration and Troubleshooting – Tools, diagnostics, and performance optimization.

- Cloud Computing and Virtual Networks – SDN, virtualization, and cloud-based networking.
- Emerging Technologies in Networking – IoT, 5G, edge computing, and future trends.

7. Class/laboratory Schedule:

No lab

8. Design Project:

In addition to exam there be assignment and quizzes

9. Computer/software Use:

Students typically use word in writing their reports, Power point and MATLAB.

10. Evaluation Methods:

Exams (One and 30 minutes for Mid-Term exam 20%, three hours final exam 60%
30 minutes for quiz 10%, assignment 10%)

11. Contribution to Professional Component:

This course enhances students' technical expertise in computer networking, equipping them with the knowledge and skills to design, configure, and troubleshoot networks. It develops problem-solving abilities for analyzing network protocols, security threats, and performance optimization. Additionally, the course fosters critical thinking and adaptability, preparing students for professional roles in network administration, cybersecurity, and modern IT infrastructure.

12. Relationship to Student Outcomes:

Course Learning Objectives (related Student Outcome 1-7):

- Identify and explain fundamental concepts and principles of computer networking, analyze and evaluate different networking protocols and technologies. (1)
- Apply security measures to protect network infrastructure and data and explore and assess emerging trends and technologies in modern networking. (1)

13. Prepared by:

Mohammed H. Ali, 2025

Syllabus

1. Course Number & Title (Credit Hours, Required or Elective):
4208 – Power Electronics and Machine Lab II (1.0, Required)

2. Catalog Description:
The Power Electronics and Machines Lab is an essential component of the curriculum for electrical engineering students. This hands-on laboratory course focuses on the principles and applications of power electronic devices and circuits. Through a series of practical experiments and projects, students gain a deep understanding of power electronic systems, including converters, inverters, and motor drives. They learn to design, analyze, and troubleshoot power electronic circuits, exploring topics such as switching devices, pulse-width modulation, and control techniques. The lab also emphasizes safety practices and measurement techniques specific to power electronics. Students develop practical skills, critical thinking, and problem-solving abilities necessary for successful careers in the field.

3. Prerequisite(s): for Power electronics and machine Lab II
4109 - Power electronics and machine Lab I

4. Textbook(s) and/or other required materials:
- Simulation of Power Electronics Circuits with MATLAB®/Simulink®: Design, Analyze, and Prototype Power Electronics (Maker Innovations Series)

5. Course Objectives:
- Understand the fundamental principles and concepts of power electronics and machine systems.
- Gain practical hands-on experience in designing, building, and testing power electronics circuits and machine control systems.
- Develop skills in using simulation software, such as MATLAB Simulink, to model and analyze power electronics circuits and machine control systems.
- Apply theoretical knowledge to solve practical problems related to power electronics and machine systems.
- Acquire proficiency in using laboratory equipment, tools, and instruments specific to power electronics and machines.
- Analyze and interpret experimental data to evaluate the performance and behavior of power electronics circuits and machine control systems.
- Develop critical thinking and problem-solving skills by troubleshooting and resolving issues encountered during lab experiments.
- Enhance teamwork and collaboration skills through group discussions, projects, and presentations.

6. Topics:
- Single phase half wave controlled rectifier with R, RL, and RL load with freewheeling diode load
- Single phase full wave controlled rectifier with R, RL, and RL load with freewheeling diode load

- DC-DC Buck converter
- DC-DC boost converter
- DC-DC Buck-Boost converter
- Inverter

7. Class/laboratory Schedule:
3h/week

8. Design Project:
No project.

9. Computer/software Use:
MATLAB.

10. Evaluation Methods:
- (Quiz (20 min), report, homework 30%, and mid-exam 30% (one hour)
- Three hours final exam 40%

11. Contribution to Professional Component:
Contributions to the Professional Component of a Power Electronics Lab play a vital role in enhancing the overall learning experience. Individuals who actively participate in lab activities demonstrate their strong foundation in theoretical knowledge and practical skills. They contribute by assisting their peers with troubleshooting issues and optimizing the performance of circuits. Their innovative ideas and suggestions for improving experimental setups bring fresh perspectives to the lab. Through thorough data analysis, they provide valuable insights that aid in understanding complex power electronics concepts. Moreover, their collaboration with instructors in developing new lab exercises ensures a well-rounded education. Their dedication and expertise significantly contribute to the success of the lab and prepare students for real-world challenges in the field of power electronics.

12. Relationship to Student Outcomes:
Course Learning Objectives (related Student Outcomes 1-7):
For the Power Electronics and Machines II Lab, students will learn:
1. Choose effective methods for acquiring new knowledge, such as online courses, workshops, and self-study. **outcome (6)**
2. Gain proficiency in computer-based tools for simulation, analysis, and data evaluation, enhancing their learning and problem-solving capabilities. **outcome (6)**
3. Develop a mindset geared towards continuous professional development and adaptation to technological advancements. **outcome (6)**

13. Prepared by:
Alaa Hussein Abdulaal, 2024-2025