University Name: University of Diyala

Faculty/Institute: College of Engineering

Scientific Department: Department of Electrical Power and Machines Engineering

Academic or Professional Program Name: Bachelor

Final Certificate Name: Bachelor of science in Electrical Power and Machines Engineering

Description Preparation Date: 17/8/2026

Completion Date: 17/8/2026

Signature:

Head of Department Name:
Assit. Prof. Balasim M. Hussein

Date: 17/8/2026

Signature:

Scientific Associate Name:

Prof. Dr. Jabbar Gottmah

Date:17/8/2026

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date: 17/8/2026

Signature:

Approval of the Dean

Prof. Dr. Anees A. Khadom

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Electromagnetics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**EPE208**			☒ **Lecture**	
ECTS Credits	**6**			☐ **Lab**	
SWL (hr/sem)	**150**			☒ **Tutorial**	
				☒ **Practical**	
				☐ **Seminar**	
Module Level	2	**Semester of Delivery**	3		
Administering Department	Type Dept. Code	**College**	Type College Code		
Module Leader	Name: Yasir Ghazi Rashid	**e-mail**	E-mail: yasserghazee_enge@uodiyala.edu.iq		
Module Leader's Acad. Title	Asst. Lect.	**Module Leader's Qualification**	M.Sc.		
Module Tutor	Name (if available)	**e-mail**	E-mail		
Peer Reviewer Name	Name	**e-mail**	E-mail		
Scientific Committee Approval Date	01/01/2024	**Version Number**	1.0		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	• The main goal of studying the electromagnetic theory course is to identify the basic principles of this theory, as follows

	• Study vectors in general in systems of perpendicular, cylindrical and spherical axes. And also, a study of field dispersion, Chaos's theorem, field rotation, Stock's theorem, and finally Crane's theorem. • Studying the stable electric field in vacuum and treating the Laplace and Poisin equations and their solutions in Cartesian, cylindrical and spherical coordinate systems. Also, a study of the electric dipole and electric quadrupole, the single solution theorem, and the method of electrical images. • Study the stable electric field in insulating materials and understand the phenomenon of polarization in these materials. In addition to calculating electrical displacement, electrical influence, and dielectric constant, as well as studying the Laplace and Poise equations in insulating materials. • The objective of the subject of electromagnetic theory in the second course is to introduce the student to the concept of voltage and the potential difference on a charge or system of charges and the potential field, as well as the relationship between voltage and the electric field and ways to extract them mathematically, in addition to getting to know the concepts of the electric duo and electric flux and knowing their laws and ways to extract them. In this course, the student also learns about the types of materials such as conductors, insulators, and semiconductors, as well as the types of currents and their densities that pass through the three types of materials. The student also learns about the concept of electrical polarization. The student also learns about the concept of insulators and their direct relationship to the electrical capacity and energy stored in them, the operation of capacitors and methods of connecting them. Finally, the concept of magnetic flux and how it arises is learned, and the laws of Biot-Svart & We then discuss the magnetic field, how to measure it on a strip of electric current, and magnetic flux density and its relationship to the magnetic field. The student also learns how to extract these concepts mathematically.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**On completion of the course the students should be able:** • To have detailed knowledge of the physical background and terminology of the electromagnetic field theory for electrical engineering problems • To understand the electromagnetic field behaviour. • To select and use appropriate theoretical models for analysis, problem solving and finding solutions related to the electrostatic, electrodynamics and electromagnetic fields.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A - Basic Concepts</u>** Introduction, Systems of Units, Charge and Current, Voltage, Power and Energy, Circuit Elements [18 hrs]

	Part B - Basic Laws Ohm's Law, Nodes, Branches, and Loops, Kirchhoff's Laws, Series Resistors and Voltage Division, Parallel Resistors and Current Division, Wye-Delta Transformations. [15 hrs] **Part C - Methods of Analysis** Nodal Analysis, Nodal Analysis with Voltage Sources, Mesh Analysis, Mesh Analysis with Current Sources [12 hrs] **Part D - Circuit Theorems** Superposition, Source Transformation, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer [24 hrs] Revision problem classes [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**1. Behavior management** Behavior management strategies foster an atmosphere of mutual respect, reduce disruptive behavior and ensure students have an equal opportunity to fulfill their potential in the classroom. It's crucial to provide them with both a positive and productive learning environment. Examples include establishing a reward system with an interactive chart where students move up or down depending on their performance and behavior in class. **2. Blended learning** With a blended learning teaching strategy, technology is incorporated with traditional learning. This allows students to work at their own pace, research their ideas and become more physically engaged during lessons. Examples include providing interactive tablets or whiteboards with engaging activities and posting classwork online for easier access. **3. Cooperative learning** Group work is a cooperative learning strategy that allows students with various learning levels to work together. By encouraging them to express their own ideas and listen to others' ideas as a group, you help students develop communication and critical thinking skills. Examples include solving math puzzles together, performing skits as a team or working on group presentations. **4. Formative assessment** A formative assessment is used periodically to monitor student learning incrementally. This can more effectively measure the process of learning as opposed to end-of-unit tests and can help you to improve your teaching methods throughout the year. Examples

	of this teaching strategy include self-evaluation exercises and summarizing a topic in multiple ways. **5. Student-led teaching** The student-led teaching strategy lets students become the teacher. In a classroom with learners at different levels, you can better engage those learning faster by showing them how to teach and give feedback to their peers.They may team-teach or work in groups to teach a new topic. Examples include letting a student teach an entire lesson or having advanced writers lead a peer-editing session as well as provide constructive criticism.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 12	LO #1, #4 and #8, #11
	Assignments	2	10% (10)	3 and 13	LO #3, #4 and #10, #14
	Projects	1	10% (10)	Continuous	All
	Report	1	10% (10)	14	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	8	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Electromagnetics Overview** *What is electromagnetics?; Why study electromagnetics?; Course topics*
Week 2	**Vector Algebra:** *Scalars and Vectors; Unit Vector; Vector Addition and Subtraction; Position and Distance Vectors; Vector Multiplication; Components of a Vector*
Week 3	**Coordinate Systems and Transformation:** *Cartesian Coordinates (x, y, z); Circular Cylindrical Coordinates (ρ, φ, z); Spherical Coordinates (r, ∅, φ); Constant-Coordinate Surfaces, the transformation between coordinate system.* **Vector Calculus:** *Differential Length, Area, and Volume; Line, Surface, and Volume Integrals Del Operator; Gradient of a Scalar; Divergence of a Vector and Divergence Theorem.*
Week 4	**Coulomb's Law and Electric Field Intensity:** *The experimental law of Coulomb, Electric field intensity; Field of n point charges; Electric fields due to continuous charge distributions (line charge, surface charge and volume charge distributions), Steam line and sketches of fields; Electric flux density.*
Week 5	**Gauss's Law-Electric Flux Density:** *Gauss's law; Some symmetrical charge distribution, Application of gauss's law; Maxwell's first equation (for electrostatics); The vector operator and the divergence theorem.*
Week 6	**Electrostatic Fields** *Coulomb's Law and Field Intensity; Electric Flux Density, and Gauss's Law; Applications of Gauss's Law; Energy and Potential.*
Week 7	**Energy and Potential:** *Energy and potential-energy expended in moving a point charge in an electric field; The line integrals; Potential difference and potential, The potential field of a point charge; The*

	potential field of a system of charges; Conservative property; Potential gradient; The dipole energy density in the electrostatic field.
Week 8	**Mid-term Exam**
Week 9	**Electric Fields in Material Space:** *Properties of Materials; Convection and Conduction Currents; Conductor properties and boundary conditions; The method of mages; Semiconductors; The nature of dielectric materials; Boundary conditions for perfect dielectric materials.*
Week 10	**Capacitance:** *Capacitance; Capacitance of some useful configuration; Capacitance of a two-wire line; Poisson's and Laplace's equations-Poisson's and Laplace equations; Uniqueness theorem; Solution of Laplace's equation in certain situation; Solution of Poisson's equation in certain situation; Product solution of Laplace's equation.*
Week 11	**Magnetostatic Fields:** *The steady of magnetic field; Biot- savart law; the curl; Stocke's theorem*
Week 12	**Magnetostatic Fields:** *Ampere's circuit law; Application of ampere's law; Magnetic flux and magnetic flux density; The scalar and vector magnetic potential; Derivation of steady magnetic field laws.*
Week 13	**Magnetostatic Fields:** *Magnetic forces; Materials and inductance-force on a moving charge; Force on a differential current element; Force between differential current elements.*
Week 14	**Magnetostatic Fields:** *Force and torque on a closed circuit; The nature of magnetic materials; Magnetization and permeability; Magnetic boundary conditions, The magnetic circuit, Potential energy and forces on magnetic materials; Inductance and mutual inductance; Time varying fields.*
Week 15	**Maxwell's Equations:** *Maxwell's equations-faraday's law; displacement current; Maxwell's equations in point form; Maxwell's equations integral form; the retarded potentials.*
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Matthew, N. O. "**Sadiku Elements of Electromagnetics**." (2018).. • Electromagnetics By Joseph Edminister (Schaum's Outline Series): Joseph Edminister, Vishnu Priye Mc Graw Hill Education	Yes
Recommended Texts	• Hayt, William Hart. **Engineering Electromagnetics**. McGraw-Hill Companies, Sixth Edition, 2001.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electronics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**EPE201**			☒ **Lecture**	
ECTS Credits	**5**			☒ **Lab**	
SWL (hr/sem)	**125**			☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Level	2		**Semester of Delivery**	3	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Name: mohammed hasan ali		**e-mail**	E-mail: mohammedhasanali@uodiyala.edu.iq	
Module Leader's Acad. Title	Lect.		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. This course deals with the basic concept of electronic circuits. 2. This is the basic subject for all electronic circuits. 3. Promote students with the necessary scientific and practical skills in the discipline for solving engineering problems and treating them logically and scientifically. 4. 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. 5. To understand Semiconductor Materials and PN Junction. 6. To perform Bipolar Junction Transistors. 7. To understand Junction field effect transistor
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electronic circuits works. 2. During the school year, the student learns the basics of electronics.. 3. Familiarity with the basic concepts of the types of conductive, semiconductor, and insulator materials. 4. Learn how to think about how a diode works and its applications 5. The student learns other types of diodes and applications of zener diodes 6. Explain the Bipolar Junction Transistors 7. Explain the Operational Amplifiers. 8. Identify the Junction field effect transistor
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A - Basic Concepts</u>** Semiconductor Materials and PN Junction: Forward biased, reverse biased, and I-V relationship, Diodes: models and circuit analysis. Diode applications (rectifiers and

	others). Transistors: Bipolar Junction Transistors(BJTs),. DC Biasing Circuits of BJTs [18 hrs] **Part B - Methods of Analysis** BJT modeling and AC, Junction field effect transistor, and metal-oxide-semiconductor field effect transistor (JFET & MOSFET). DC and small signal AC analysis. Electronic circuits applications (at least five Samples in details). Operational Amplifiers, Amplifier configurations. Multistage amplifiers. [15 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**1. Behavior management** Behavior management strategies foster an atmosphere of mutual respect, reduce disruptive behavior and ensure students have an equal opportunity to fulfill their potential in the classroom. It's crucial to provide them with both a positive and productive learning environment. Examples include establishing a reward system with an interactive chart where students move up or down depending on their performance and behavior in class. **2. Blended learning** With a blended learning teaching strategy, technology is incorporated with traditional learning. This allows students to work at their own pace, research their ideas and become more physically engaged during lessons. Examples include providing interactive tablets or whiteboards with engaging activities and posting classwork online for easier access. **3. Cooperative learning** Group work is a cooperative learning strategy that allows students with various learning levels to work together. By encouraging them to express their own ideas and listen to others' ideas as a group, you help students develop communication and critical thinking skills. Examples include solving math puzzles together, performing skits as a team or working on group presentations. **4. Formative assessment** A formative assessment is used periodically to monitor student learning incrementally. This can more effectively measure the process of learning as opposed to end-of-unit tests and can help you to improve your teaching methods throughout the year. Examples of this teaching strategy include self-evaluation exercises and summarizing a topic in multiple ways. **5. Student-led teaching** The student-led teaching strategy lets students become the teacher. In a classroom with learners at different levels, you can better engage those learning faster by showing them how to teach and give feedback to their peers.They may team-teach or work in groups to teach a new topic. Examples include letting a student teach an entire lesson or having advanced writers lead a peer-editing session as well as provide constructive criticism.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 12	LO #1, #4 and #6, #8
	Assignments	2	10% (10)	3 and 13	LO #3, # 5and #7, #8
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	14	LO #5, # 6and #8
Summative assessment	**Midterm Exam**	2hr	10% (10)	8	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	• Semiconductor Materials ,PN Junction • Forward biased, reverse biased
Week 2	• I-V relationship • Diodes: models • circuit analysis
Week 3	• Diode Applications:
Week 4	rectifiers and others) Zener Diode
Week 5	Bipolar Junction Transistors(BJTs)
Week 6	DC Biasing Circuits of BJTs
Week 7	BJT modeling and AC, Junction,
Week 8	**Mid-term Exam**
Week 9	field effect transistor
Week 10	metal-oxide-semiconductor field effect transistor (JFET & MOSFET).
Week 11	DC and small signal AC analysis.
Week 12	Electronic circuits applications (at least five Samples in details)
Week 13	Operational Amplifiers
Week 14	Amplifier configurations
Week 15	Multistage amplifiers.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Lab. Equipment's
Week 2	Lab 2: Automatic Lamp Dimming circuit

Week 3	Lab 3: Diode characteristics
Week 4	Lab 4: Rectifier circuits
Week 5	Lab 5: Filter circuits
Week 6	Lab 6: Zener Diode characteristics
Week 7	Lab 7: CLIPPERS and CLAMPERS circuits
Week 8	Lab 8: LED characteristics
Week 9	Lab 9: Transistor characteristics
Week 10	Lab 10: FET \ MOSFET characteristics
Week 11	Lab 11: Power supply circuits
Week 12	Lab 12: PUT characteristics
Week 13	Lab 13: SCR rectifier circuits
Week 14	Lab 14: Diac and Triac characteristics
Week 15	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	• Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 7th or 10th or 11th Edition.	Yes
Recommended Texts	• electronic devices and circuit theory; By Robert L.Boylestad • electronic circuit; By By Dr. R.S. Sedha	No
Websites	Any other materials available on the web.	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**APPLIED MATHEMATICS I**			**Module Delivery**	
Module Type	BASIC			**Theory** **Lecture** **Tutorial**	
Module Code	E201				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	2		**Semester (s) offered**	3	
Administering Department			**College**	Engineering	
Module	Mounir Thamer Ismaiel		**e-mail**	moneerthameerenge@uodiyala.edu.iq	

Leader			
Module Leader's Acad. Title	Assist. Lect.	**Module Leader's Qualification**	MSC in Electrical Power
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Review Committee Approval	01/06/2023	**Version Number**	1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**MATHEMATICS II**	**Semester**	2
Co-requisites module	None	**Semester**	-
Module Aims, Learning Outcomes, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر			
Module Aims أهداف المادة الدراسية	This module aims After completing Math I in first year the student will study Math II which is more elaborate in calculus subjects including differential equations of first and second order, partial differential equation, studying series including Maclaurin and Taylor series, and studying also Laplace transformations and their use in solving differential equations.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1.The module learning outcomes of Applied Mathematics I typically encompass a range of mathematical concepts and skills relevant to various fields such as engineering, physics, economics, and other quantitative disciplines. Here are some common learning outcomes for Applied Mathematics I: 2.Understanding Mathematical Concepts: Students should develop a solid understanding of fundamental mathematical concepts such as algebra, calculus, trigonometry, and geometry. 3.Problem-Solving Skills: Students should be able to apply mathematical techniques to solve problems encountered in real-world situations. This includes interpreting problems, selecting appropriate mathematical methods, and analyzing solutions. 4. Computational Proficiency: Students should gain proficiency in using mathematical software tools or programming languages to perform calculations, analyze data, and visualize mathematical concepts. 5. Analytical Thinking: The module should foster analytical thinking skills, enabling students to break down complex problems into simpler components and apply mathematical reasoning to develop solutions. 6.Numerical Methods: Students should learn numerical methods for approximating solutions to mathematical problems, including root-finding, interpolation, and numerical integration.		

	1. Graphical Representation: Students should be able to represent mathematical functions graphically and interpret the graphical representations to gain insights into the behavior of functions and relationships between variables. 2. Understanding Mathematical Models: Students should understand how mathematical models are used to describe and analyze real-world phenomena, including physical systems, economic processes, and population dynamics.
Indicative Contents المحتويات الإرشادية	The topics listed under the indicative content below are the underpinning areas of knowledge and understanding that will be obtained from successful completion of the module. The mathematical topics are illustrated in the context of relevant engineering scenarios. • **First Order:** Variable Separable and • **Homogenous** Differential equations • **Linear, Bernoulli**, and Exact Differential Equations • **Applications of first order** differential equations in electrical circuits • **Second Order**: Homogeneous and non Homogeneous Differential Equations • Variation of parameters, undetermined coefficients • Higher Order Differential equations • **Partial Differentiation:** Function of Two or More Variables and the Chain Rule • Directional Derivatives and Gradient Vectors • Tangent planes and normal Lines • **Maximum, Minimum**, and Saddle Points • **Laplace Transform**: Definition, Properties, Gamma and Unit Step Functions • Laplace Transform methods • **Inverse Laplace Transform:** Properties and Partial Fractions • Solution of Differential Equations Using Laplace Transform • **Applications:** Solution of Electric Circuits Using Laplace Transform
Course Description	This course lays the foundation for a robust understanding of mathematical concepts that underpin the various disciplines within engineering. It covers an introductory course designed to provide students with a foundational understanding of fundamental mathematical concepts and their applications in various fields. The course emphasizes the development of problem-solving skills and mathematical reasoning through practical examples and exercises.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	solve different mathematical problems and gain the ability to analyze them and aim to facilitate students' understanding of mathematical concepts, develop problem-solving skills, and promote active engagement with the material. By employing these learning and teaching strategies, instructors can create an engaging and effective learning environment that promotes understanding, critical thinking, and application of mathematical concepts in Applied Mathematics I.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** **53** **In class tests** **10** **Tutorial** **15**	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Assignment** **20** **Preparation for tests** **20** **Homework** **32**	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	3,5, 10, 12, 14	LO #1, 2, 3, 4 ,5, 7and 8
	Assignments	6	20% (20)	4, 8, 12	LO #2,4, 6, and 8
Summative assessment	**Midterm Exam**	2	20% (20)	7	LO # 1,2,3,4,5,6,7
	Final Exam	3	50% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	First Order: Variable Separable and Homogenous Differential equations
Week 2	Linear, Bernoulli, and Exact Differential Equations
Week 3	Applications of first order differential equations in electrical circuits
Week 4	Second Order: Homogeneous and non Homogeneous Differential Equations
Week 5	Variation of parameters, undetermined coefficients
Week 6	Higher Order Differential equations
Week 7	Partial Differentiation: Function of Two or More Variables and the Chain Rule
Week 8	Directional Derivatives and Gradient Vectors
Week 9	Tangent planes and normal Lines
Week 10	Maximum, Minimum, and Saddle Points
Week 11	Laplace Transform: Definition, Properties, Gamma and Unit Step Functions
Week 12	Laplace Transform methods
Week 13	Inverse Laplace Transform: Properties and Partial Fractions
Week 14	Solution of Differential Equations Using Laplace Transform
Week 15	Applications: Solution of Electric Circuits Using Laplace Transform
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	

Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Calculus and Analytic Geometry by Thomas. Calculus, Early Transcendentals by Stewart.	Yes
Recommended Texts	Advanced Engineering Mathematics, Erwin Kryszig.	Yes
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**APPLIED MATHEMATICS II**			**Module Delivery**	
Module Type	BASIC			**Theory** **Lecture** **Tutorial**	
Module Code	**(E202)**				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	2		**Semester (s) offered**	4	
Administering Department			**College**	Engineering	
Module Leader	Mounir Thamer Ismaiel		**e-mail**	moneerthameerenge@uodiyala.edu.iq	
Module Leader's Acad. Title	Assist. Lect.		**Module Leader's Qualification**	MSC in Electrical Power	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Review Committee Approval	01/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**APPLIED MATHEMATICS I**	**Semester**	3
Co-requisites module	None	**Semester**	-
Module Aims, Learning Outcomes, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر			
Module Aims أهداف المادة الدراسية	To study sequence, series and infinity series. Application of power series. Matrices, Eigen values and Eigen vectors. Vectors Fourier Series. A1- acquiring the essential knowledge in calculus and ability to use this knowledge in other engineering courses in electrical engineering. A2- The ability to solve different mathematical problems and gain the		

	ability to analyze them. B1 - Teaching students the skills, to elaborate their mathematical tools to solve different engineering problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The module learning outcomes of Applied Mathematics I typically encompass a range of mathematical concepts and skills relevant to various fields such as engineering, physics, economics, and other quantitative disciplines. Here are some common learning outcomes for Applied Mathematics I: 2. Problem-Solving Skills: Students should be able to apply mathematical techniques to solve problems encountered in real-world situations. This includes interpreting problems, selecting appropriate mathematical methods, and analyzing solutions. 3.Computational Proficiency: Students should gain proficiency in using mathematical software tools or programming languages to perform calculations, analyze data, and visualize mathematical concepts. 4.Analytical Thinking: The module should foster analytical thinking skills, enabling students to break down complex problems into simpler components and apply mathematical reasoning to develop solutions. 5.Numerical Methods: Students should learn numerical methods for approximating solutions to mathematical problems, including root-finding, interpolation, and numerical integration.
Indicative Contents المحتويات الإرشادية	Understand the basic concepts of different tests such as simple sequence test, ratio test, and root test. The ability to determine when a sequence converges and when it diverges. Determine the convergence of a given series using function integration. If the function is positive, decreasing, volatile (decreasing variable), and convergent, then the sequence is convergent. Understand the concept of strong series and its mathematical representation. Ability to analyze robust series properties such as convergence point and convergence range. The ability to understand how functions are represented using power series. Identify the famous functions that can be represented using power series, such as algebraic, Understand the concept of cross-section between two triangular spaces. Ability to calculate the cross-section between two triangular spaces and interpret its meaning Understand the concept of speed and acceleration as physical quantities. The ability to calculate speed and acceleration using vector functions and interpret their meaning. Understand the concept of curvature as a measure of the change in direction of a curve at a specific point on the curve. Ability to calculate curvature using the first and second derivatives of the representative function of the curve.
Course Description	This course lays the foundation for a robust understanding of mathematical concepts that underpin the various disciplines within engineering. It covers an introductory course designed to provide students with a foundational understanding of fundamental mathematical concepts and their applications in various fields. The course emphasizes the development of problem-solving skills and mathematical reasoning through practical examples and exercises.
Learning and Teaching Strategies	

استراتيجيات التعلم والتعليم	
Strategies	solve different mathematical problems and gain the ability to analyze them

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** **53** **In class tests** **10** **Tutorial** **15**	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Assignment** **20** **Preparation for tests** **20** **Homework** **32**	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	3,5, 10, 12, 14	LO #1, 2, 3, 4 ,5
	Assignments	6	20% (20)	4, 8, 12	LO # 1, 2, 3, 4, 5
Summative assessment	**Midterm Exam**	2	20% (20)	7	LO # 1,4
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Sequence and Series: Convergence and Divergence Test, Geometric Series and Partial Sum. Understand the basic concepts of different tests such as simple sequence test, ratio test, and root test. The ability to determine when a sequence converges and when it diverges.

Week 2	Integral, Comparison, Ratio and Root Tests, Alternating series
Week 3	Power Series, Taylor and Maclaurin Series
Week 4	Applications of Power Series
Week 5	• Vectors: Dot and Cross Product, Equations of Lines and Planes
Week 6	• Vector Function, Velocity and Acceleration
Week 7	Curvature and the Unit Normal Vectors Understand the concept of curvature as a measure of the change in direction of a curve at a specific point on the curve. Ability to calculate curvature using the first and second derivatives of the representative function of the curve.
Week 8	Matrices: Eigen Values and Eigen Vectors
Week 9	• Gauss Elimination
Week 10	Rank of Matrix. Understand the concept of the method and its importance in solving systems of linear equations. The ability to implement an algorithm to solve a system of linear equations.
Week 11	Applications of Matrices in Electric Circuits
Week 12	Multiple Integral: Double and Triple Integral, Area and Volume
Week 13	Double Integral in Polar Form
Week 14	Triple Integrals in Rectangular Coordinates
Week 15	Surface Integrals
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Calculus and Analytic Geometry by Thomas. Calculus, Early Transcendentals by Stewart.	Yes
Recommended Texts	Advanced Engineering Mathematics, Erwin Kryszig.	Yes
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**

Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	**Electrical Machines**		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**EPE206**			
ECTS Credits	**8**			
SWL (hr/sem)	**200**			
Module Level	3	**Semester of Delivery**	2	
Administering Department	Type Dept. Code	**College**	Type College Code	

Module Leader	Name: Mayyadah Sahib Ibrahim	**e-mail**	E-mail: mayyadah.sahib@uodiyala.edu.iq
Module Leader's Acad. Title	Asst. Lect.	**Module Leader's Qualification**	M.Sc.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	• Study the basic principles of DC machines • Qualifying students to be able to become familiar with the theoretical and scientific aspects of direct current machines • Study the types of direct current machines, their types, working principles, properties and applications, and explain the importance of their uses in practical life. • Urging students to benefit from the course in their field of work as engineers in the field of electrical power engineering in the future
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learn about the basic concepts of electrical machines 2. Learn about construction of DC machines and methods of winding them. 3. Know the types of electric generators 4. Knowing the voltage equations in electric generators. 5. Study the characteristics of electric generators. 6. Know the conditions for operating generators in parallel. 7. identify electric motors, their types, torques, and their equations. 8. Study the characteristics of electric motors and types of losses. 9. Learn to operate electric motors and control their speed. 10. Study of electrical transformers and their types. 11. Knowledge of ideal transformers and how to calculate losses. 12. Study of tests of electrical transformers. 13. Identify three-phase transformers and automatic transformers.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: **Part A - D.C. GENERATORS** Introduction, Generator-principle of rotating electrical machines and calculation of induced e.m.f., energy, power and torque in D.C. machines , Construction of D.C.

	machines and function of commutator, Armature Windings, Types of Generators, Calculation of e.m.f. per pole., Iron Loss in Armature, Total Loss in a D.C. Generator, Armature Reaction, Parallel Operation of DC Generators, Characteristics of D.C. Generators [18 hrs.] **Part B - D.C. MOTOR** Introduction, Principle of Operation of a D.C. Motor, Calculation of speed, torque, Direction of Rotation of Motor, Significance of Back E.M.F, Types of D.C. Motors, Power Equation of a D.C. Shunt Motor, Torque Equation of a D.C. Motor, starting of D.C. motors characteristic (shunt, series, compound, separately),Losses and Efficiency, Power Stages. [15 hrs.] **Part C – SINGLE -PHASE TRASFORMERS** Introduction, Principle Working of transformers, Construction , Types of Windings, Types of Transformers , E.M.F. Equation of Transformer , Ratio of Transformer, Ideal transformer, Practical Transformer on No Load, Transformer on Load, Equivalent Circuit, Voltage Regulation, Transformer Tests, Losses in a Transformer, Efficiency of a Transformer, All-day Efficiency .[24 hrs] **Part D - THREE-PHASE TRANSFORMERS** Introduction, Three-Phase Transformer Connections, connection groups, applications, Advantages of Three-Phase Transformers, Three-Phase Transformation with Two Single-Phase Transformers, Scott Connection , auto transformer , Power Transfer in Autotransformer , Advantages and Disadvantages of Autotransformer , Applications of Autotransformer [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**1. Behavior management** Behavior management strategies foster an atmosphere of mutual respect, reduce disruptive behavior and ensure students have an equal opportunity to fulfill their potential in the classroom. It's crucial to provide them with both a positive and productive learning environment. Examples include establishing a reward system with an interactive chart where students move up or down depending on their performance and behavior in class. **2. Blended learning** With a blended learning teaching strategy, technology is incorporated with traditional learning. This allows students to work at their own pace, research their ideas and become more physically engaged during lessons. Examples include providing interactive tablets or whiteboards with engaging activities and posting classwork online for easier access. **3. Cooperative learning** Group work is a cooperative learning strategy that allows students with various learning levels to work together. By encouraging them to express their own ideas and listen to others' ideas as a group, you help students develop communication and critical thinking skills.

	Examples include solving math puzzles together, performing skits as a team or working on group presentations. **4. Formative assessment** A formative assessment is used periodically to monitor student learning incrementally. This can more effectively measure the process of learning as opposed to end-of-unit tests and can help you to improve your teaching methods throughout the year. Examples of this teaching strategy include self-evaluation exercises and summarizing a topic in multiple ways. **5. Student-led teaching** The student-led teaching strategy lets students become the teacher. In a classroom with learners at different levels, you can better engage those learning faster by showing them how to teach and give feedback to their peers. They may team-teach or work in groups to teach a new topic. Examples include letting a student teach an entire lesson or having advanced writers lead a peer-editing session as well as provide constructive criticism.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	109	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**200**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 12	LO #1, #4 and #8, #11
	Assignments	2	10% (10)	3 and 13	LO #3, #4 and #10, #14
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	14	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	• Introduction: Construction of D-C machines
Week 2	• E.m.f equation, electromagnetic torque, armature reaction, function of commutator, Armature Windings
Week 3	• Type of excitation of DC generators. • Characteristics of D.C. Generators.
Week 4	• Loss in a D.C. Generator and efficiency • Condition for Maximum Efficiency.
Week 5	• Parallel Operation of Shunt Generators. • Connecting Shunt Generators in Parallel.
Week 7	• Type of excitation of DC motors . D.C. motors characteristic (shunt, series, compound, separately • Losses and Efficiency maximum power. • condition for maximum efficiency.
Week 8	**Mid-term Exam**
Week 9	• Construction of transformers and type of transformers and type winding.
Week 10	• Principle working of transformers. • e.m.f equation of transformers.
Week 11	• Ideal transformers Ideal transformers on load and no load. Practical transformers on no load.
Week 12	• Losses in transformers. • Condition for maximum efficiency. • All day efficiency.
Week 13	• Three phase transformers and them connection . • Advantages of three transformers. • Three phase with two single phase transformers.
Week 14	• Auto transformers . • Power transformers Auto transformers .
Week 15	• Advantages and Disadvantages of Autotransformer . • Applications of Autotransformer
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1:. Introduction Measurement Instruments
Week 2	Lab 2: Parts of D.C electrical machines and their types.
Week 3	Lab 3: Load test on a self-excited D.C shunt generator.
Week 4	Lab 4: Load characteristics of separately excited D.C shunt generators.
Week 5	Lab 5: Load test on a D.C series generators.
Week 6	Lab 6: Load characteristics (Load test) of D.C shunt motor.
Week 7	Lab 7: Load characteristics (Load test) of D.C series motor.
Week 8	Lab 8: Load characteristics (Load test) of D.C compound motor.
Week 9	Lab 9: Load characteristics (Load test) of D.C compound motor.
Week 10	Lab 10: parts of transformers and their type & Reading of wattmeter.
Week 11	Lab 11: Polarity and turn ratio of a single-phase transformer
Week 13	Lab 13: short (S.C) tests on a single-phase transformer.
Week 14	Lab 14: Load test of a single-phase transformer.
Week 15	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Electrical Technology By B.L Theraja.	Yes
Recommended Texts	• Principle of Electrical Machines Machines V.K. MEHTA • Electrical Machines U.A. Bakshi V.U. klBakshi	No
Websites	• Peruse scientific websites for recent developments in the prescribed article	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition

Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	45-49	More work required but credit awarded
	F – Fail	راسب	0-44	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية					
Module Title	**Electric Circuits I**			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**EPE 203**			☒ **Lecture**	
ECTS Credits	**8**			☒ **Lab**	
SWL (hr/sem)	**200**			☒ **Tutorial**	
				☒ **Practical**	
				☐ **Seminar**	
Module Level	2	**Semester of Delivery**	3		
Administering Department	Type Dept. Code	**College**	Type College Code		
Module Leader	Name: Wisam Najm Al-Din Abed	**e-mail**	E-mail: wisam_alobaidee1@uodiyala.edu.iq		
Module Leader's Acad. Title	Asst. Prof.	**Module Leader's Qualification**	M.Sc.		
Module Tutor	Name (if available)	**e-mail**	E-mail		
Peer Reviewer Name	Name	**e-mail**	E-mail		
Scientific Committee Approval Date	19/09/2024	**Version Number**	1.0		

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	**Fundamental of electrical engineering I and Fundamental of electrical engineering II**	**Semester**	First and second
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. This course deals with the advance of electrical circuits. 2. To understand polyphase networks. 3. To learn analysis methods for three phase electric circuits. 4. To understand magnetically coupled circuits and its analysis methods. 5. To understand various types of electric transformers. 6. Understand two port networks analysis methods. 7. To study electric filters types.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Teaching students the principles of various electrical networks. 2. Enabling students to obtain knowledge and understanding in working and designing of electrical networks. 3. Teaching students the methods of analysis of electrical networks and its applications. 4. Enabling students to obtain knowledge and understanding of designing everything related to electrical networks and circuits. 5. Enabling students to obtain knowledge of electrical networks principles and theories.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A- Three-Phase Circuits** Balanced three-phase voltages, phase sequence, balanced wye-wye, wye-delta, delta-delta, and delta-wye connections. Power in a balanced system. Unbalanced three-phase systems. Three-phase power measurement. [20 hrs] **Part B_ Magnetically Coupled Circuits** The concept of mutual inductance, polarity and the dot convection, energy in a coupled circuit, linear transformers, ideal transformers, ideal autotransformers, conductively coupled equivalent circuits. [20 hrs] **Part C - Two – Port Network** Introduction. Impedance, admittance, hybrid, and transmission parameters. Relationships between parameters. Interconnection of networks. [15 hrs] **Part D - Electric Filters** Introduction, transfer function. Series resonance. Parallel resonance. Passive filters, lowpass filter, highpass filter, bandpass filter, and bandstop filter. Scaling, magnitude scaling, frequency scaling, magnitude and frequency scaling. [20 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**1. Behavior management** Behavior management strategies foster an atmosphere of mutual respect, reduce disruptive behavior and ensure students have an equal opportunity to fulfill their potential in the classroom. It's crucial to provide them with both a positive and productive learning environment. Examples include establishing a reward system with an interactive chart where students move up or down depending on their performance and behavior in class. **2. Blended learning** With a blended learning teaching strategy, technology is incorporated with traditional learning. This allows students to work at their own pace, research their ideas and become more physically engaged during lessons. Examples include providing interactive tablets or whiteboards with engaging activities and posting classwork online for easier access. **3. Cooperative learning** Group work is a cooperative learning strategy that allows students with various learning levels to work together. By encouraging them to express their own ideas and listen to others' ideas as a group, you help students develop communication and critical thinking skills. Examples include solving math puzzles together, performing skits as a team or working on group presentations. **4. Formative assessment** A formative assessment is used periodically to monitor student learning incrementally. This can more effectively measure the process of learning as opposed to end-of-unit tests and can help you to improve your teaching methods throughout the year. Examples of this teaching strategy include self-evaluation exercises and summarizing a topic in multiple ways. **5. Student-led teaching** The student-led teaching strategy lets students become the teacher. In a classroom with learners at different levels, you can better engage those learning faster by showing them how to teach and give feedback to their peers.They may team-teach or work in groups to teach a new topic. Examples include letting a student teach an entire lesson or having advanced writers lead a peer-editing session as well as provide constructive criticism.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	109	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**200**		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 12	LO #1, #4 and #8, #11
	Assignments	1	10% (10)	13	LO #3, #4 and #10, #14
	Projects / Lab.	1	5% (5)	Continuous	All
	Report	1	5% (5)	14	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	20% (20)	8	LO #1 - #7
	Final Exam	3hr	50% (50)		All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Balanced three-phase voltages, phase sequence.
Week 2	Balanced wye-wye, wye-delta, delta-delta, and delta-wye connections.

Week 3	Power in a balanced system. Unbalanced three-phase systems.
Week 4	Three-phase power measurement.
Week 5	The concept of mutual inductance, polarity and the dot convection.
Week 6	Circuits with Mutual inductance: polarity and the dot convection.
Week 7	Energy in a coupled circuit, linear, ideal, and ideal autotransformers. Conductively coupled equivalent circuits.
Week 8	**Mid-term Exam**
Week 9	Introduction. Impedance, admittance parameters.
Week 10	Hybrid, and transmission parameters.
Week 11	Relationships between parameters. Interconnection of networks.
Week 12	Introduction, transfer function.
Week 13	Series resonance and Parallel resonance.
Week 14	lowpass filter, highpass filter, bandpass filter, and bandstop filter.
Week 15	Scaling, magnitude scaling, frequency scaling, magnitude and frequency scaling.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• C.K. Alexander and M.N.O Sadiku, **Fundamentals of Electric Circuits**, McGraw-Hill Education, Fifth Edition, 2013	Yes
Recommended Texts	• Allan H. Robbins and Wilhelm C. Miller, **Circuit analysis: Theory and practice**, Cengage Learning, Fifth Edition, 2013. • Nilsson, James William, **Electric circuits**, Pearson Education India, 2008.	No
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors

	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	**F –** Fail	راسب	(0-44)	Considerable amount of work required

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electric Circuits II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	**EPE 204**			☒ **Lecture**	
ECTS Credits	**7**			☒ **Lab**	
SWL (hr/sem)	**175**			☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Level	2		**Semester of Delivery**	4	
Administering Department	Type Dept. Code		**College**	Type College Code	

Module Leader	Name: Wisam Najm Al-Din Abed	**e-mail**	E-mail: wisam_alobaidee1@uodiyala.edu.iq
Module Leader's Acad. Title	Asst. Prof.	**Module Leader's Qualification**	M.Sc.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	19/09/2024	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	**Electric Circuits I**	**Semester**	first
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. This course deals with the advance of electrical circuits. 2. To understand electric transients in various circuits. 3. To learn transient analysis methods in electric circuits. 4. To develop problem solving skills and understanding of circuit application in Laplace through the solving circuit. 5. Understand Non-sinusoidal waves. 6. To learn circuit analysis using Fourier method.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Teaching students the foundations of solving programming problems. 2. Preparing the student scientifically to work in the field of electrical engineering. 3. Build and prepare the student psychologically to play his role as a reliable engineer in this field.

	4. Building students capable of competing with other engineers for job opportunities and obtaining the required seats to complete postgraduate studies. 5. Urging the student to be creative and think about specialization projects and keep pace with developments in this field. 6. Providing students with scientific, practical and personal skills that enable them to solve practical problems and deal with them using scientific concepts.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – First-Order Circuits** Introduction to transient. The Source-Free RC, and RL Circuits. Singularity Functions. Step Response of an RC and an RL Circuits. [20 hrs] **Part B – Second-Order Circuits** Finding Initial and Final Values. The Source-Free Series RLC Circuit. The Source-Free Parallel RLC Circuit. Step Response of a Series RLC Circuit Step Response of a Parallel RLC Circuit. General Second-Order Circuits. [20 hrs] **Part C – Laplace applications** Circuit element models. Circuit analysis (Laplace Method): Applications of Laplace transformation in transient analysis, circuits elements in the S- domain, Laplace equivalent circuits, inverse transformation [20 hrs] **Part D- Non – Sinusoidal Waves** The Fourier series, Fourier coefficients, analysis of circuits with non – sinusoidal waves, illustrative applications, active power calculations with periodic functions, r.m.s value of periodic functions. [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**1. Behavior management** Behavior management strategies foster an atmosphere of mutual respect, reduce disruptive behavior and ensure students have an equal opportunity to fulfill their potential in the classroom. It's crucial to provide them with both a positive and productive learning environment. Examples include establishing a reward system with

	an interactive chart where students move up or down depending on their performance and behavior in class. **2. Blended learning** With a blended learning teaching strategy, technology is incorporated with traditional learning. This allows students to work at their own pace, research their ideas and become more physically engaged during lessons. Examples include providing interactive tablets or whiteboards with engaging activities and posting classwork online for easier access. **3. Cooperative learning** Group work is a cooperative learning strategy that allows students with various learning levels to work together. By encouraging them to express their own ideas and listen to others' ideas as a group, you help students develop communication and critical thinking skills. Examples include solving math puzzles together, performing skits as a team or working on group presentations. **4. Formative assessment** A formative assessment is used periodically to monitor student learning incrementally. This can more effectively measure the process of learning as opposed to end-of-unit tests and can help you to improve your teaching methods throughout the year. Examples of this teaching strategy include self-evaluation exercises and summarizing a topic in multiple ways. **5. Student-led teaching** The student-led teaching strategy lets students become the teacher. In a classroom with learners at different levels, you can better engage those learning faster by showing them how to teach and give feedback to their peers.They may team-teach or work in groups to teach a new topic. Examples include letting a student teach an entire lesson or having advanced writers lead a peer-editing session as well as provide constructive criticism.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	81	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**200**		

Module Evaluation

تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 12	LO #1, #4 and #8, #10
	Assignments	1	10% (10)	13	LO #3, #4 and #9, #10
	Projects / Lab.	1	5% (5)	Continuous	All
	Home work	1	5% (5)	14	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	20% (20)	9	LO #1 - #7
	Final Exam	3hr	50% (50)		All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction to transient. The Source-Free RC, and RL Circuits.
Week 2	Singularity Functions.
Week 3	Step Response of an RC Circuits.
Week 4	Step Response of an RL Circuits
Week 5	Finding Initial and Final Values.
Week 6	The Source-Free Series RLC Circuit. The Source-Free Parallel RLC Circuit.
Week 7	Step Response of a Series RLC Circuit Step Response of a Parallel RLC Circuit.
Week 8	General Second-Order Circuits.
Week 9	**Mid-term Exam**
Week 10	Circuit element models. Circuit analysis (Laplace Method)
Week 11	Applications of Laplace transformation in transient analysis, circuits elements in the S-domain.

Week 12	Laplace equivalent circuits, inverse transformation
Week 13	The Fourier series, Fourier coefficients.
Week 14	analysis of circuits with non – sinusoidal waves,
Week 15	illustrative applications, active power calculations with periodic functions, r.m.s value of periodic functions.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• C.K. Alexander and M.N.O Sadiku, **Fundamentals of Electric Circuits**, McGraw-Hill Education, Fifth Edition, 2013	Yes
Recommended Texts	• Allan H. Robbins and Wilhelm C. Miller, **Circuit analysis: Theory and practice**, Cengage Learning, Fifth Edition, 2013. • Nilsson, James William, **Electric circuits**, Pearson Education India, 2008.	No
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULEDESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلوماتالمادةالدراسية					
ModuleTitle	**Computer Programming**			**Module Delivery**	
ModuleType	**Basic**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
ModuleCode	**EPE205**				
ECTS Credits	5				
SWL(hr/sem)	125				
Module Level		4	**Semester of Delivery**		2
Administering Department		Science and Engineering	**College**	College of Engineering College of Science	
Module Leader	Hayder Salim Hameed		**e-mail**	haydersalim@uodiyala.edu,iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		1/09/2024	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

	Ministry of Higher Education and Scientific Research - Iraq University of Diyala College of Engineering Department of Engineering	

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Providing the student with basic information about the various well-known engineering programs. 2. Familiarity with the famous mathematical and engineering analysis program (MATLAB). 3. The student's knowledge of the programming statements of the MATLAB languag and how to benefit from them in writing programs to solve mathematical problems of the basics of electrical engineering for which there are no programs in ready-mad systems. 4. Obtain sufficient information about using the program in mathematical analysis, programming, and the use of matrices, as well as solving and drawing complex mathematical equations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A- Cognitive goals A1 - Teach the student to understand the principle of programming. A2- Teaching students to know the basics of programming in Matlab. A3- Teaching the student how to explain and express the programming problem using MATLAB. A4- Enable students to obtain knowledge and understanding of building any computer application using MATLAB. A 5- Students' knowledge of linking programs with external devices those are under its control. B - Skills objectives of the course. B1 - Translate the software problem into a computer program using Matlab. B2 - Apply various computer programs. B3 - Produce computer programs in Matlab according to the given problem. B 4- Computer skills in writing various programs.
Indicative Contents المحتوياتالإرشادية	**Indicative content includes the following.** • Course introduction(4hrs) • Starting with MATLAB • **Creating Arrays** • Built-In Functions For Analyzing Arrays • **Two-Dimensional Plots** • User-Defined Functions and Function • Introduction, What is Simulink? • MATLAB & Simulink Working Together • The Solver: Zero-Crossing Options • Creation of Mask & Subsystem

Description	Introduction to MATLAB. Algebra & trigonometric function. Boolean & Matrix Operation. Complex Number. Array Indexing. Graphing. The switch Construct. If construct. while statement loop. Introduction to Simulink. Algebra & Trigonometric function representation as a block diagram. Simulation of First order systems & check their response. Simulation of Second order systems & check their response. Import & export data from/to workspace. Import & export data from/to M-file. Creation of Mask & Subsystem.

Learning and Teaching Strategies
استراتيجيات التعلم و التعليم

Strategies	**In this course, students are guided by:** • Studying the theoretical and practical academic program for the specialt lessons • The theoretical program is taught using the smart board, whiteboard or dat show connected to the personal computer, discussing ideas and facts wit the students. • Adopting the study through virtual electronic classes as an aid to the rea classes. Assigning students to seminars and seminars that are displayed inside the classroon using the available technologies

Student Workload(SWL)
الحمل الدراسي للطالب محسوبة بال 15 اسبوع

Structured SWL(h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL(h/w)** الحمل الدراسي المنتظم للطالب اسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي اللامنتظم للطالب خلال الفصل	62	**Unstructured SWL(h/w)** الحمل الدراسي اللامنتظم للطالب خلال الفصل أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight(Marks)	Week Due	Relevant Learning Outcome
	Quizzes	**2**	**10%(10)**	**6 and 12**	A1, A2, A3, and A4

Formative assessment	Assignments	2	10%(10)	2 and 13	A1, A3 and A5
	Projects/ Lab.	1	10%(10)	Continuous	All
	Report	1	10%(10)	13	B1, B2,B3 and B4
Summative assessment	Midterm Exam	2hr	10%(10)	9	B4 and B5
	Final Exam	3hr	50%(50)	16	All
Total assessment			100%(100Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الأسبوعي النظري

	Material Covered
Week1	Introduction To MATLAB. Algebra & Trigonometric
Week2	Boolean & Matrix Operation
Week3	Complex Number, Array Indexing. Graphing
Week4	Relational And Logical Operators
Week5	If Construct. While Statement Loop
Week6	The Switch Construct
Week7	LOOPS(For-End Loops , While-End Loops , NESTED LOOPS AND NESTED CONDITIONAL STATEMENTS)
Week8	User-Defined Functions And Function
Week9	Introduction To Simulink
Week 10	Algebra & Trigonometric Function Representation As A Block Diagram
Week 11	Simulation Of First Order Systems & Check Their Response.
Week 12	Simulation Of Second Order Systems & Check Their Response
Week 13	Matlab & Simulink Working Together
Week 14	Import & Export Data From/To M-File
Week 15	Creation Of Mask & Subsystem
Week 16	Preparatory Week Before The Final Exam

Delivery Plan (Weekly-Lab Syllabus) المنهاج الأسبوعي للمختبر	
	Material Covered
Week1	**Introduction To MATLAB. Algebra & Trigonometric**
Week2	**Boolean & Matrix Operation**
Week3	**Complex Number, Array Indexing. Graphing**
Week4	**Relational And Logical Operators**
Week5	**If Construct. While Statement Loop**
Week6	**The Switch Construct**
Week7	**LOOPS(For-End Loops , While-End Loops , NESTED LOOPS AND NESTED CONDITIONAL STATEMENTS)**
Week8	**User-Defined Functions And Function**
Week9	**Introduction To Simulink**
Week 10	**Algebra & Trigonometric Function Representation As A Block Diagram**
Week 11	**Simulation Of First Order Systems & Check Their Response.**
Week 12	**Simulation Of Second Order Systems & Check Their Response**
Week 13	**Matlab & Simulink Working Together**
Week 14	**Import & Export Data From/To M-File**
Week 15	**Creation Of Mask & Subsystem**
Week 16	**Preparatory Week Before The Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• MATLAB Programming for Engineers • Modeling and simulation of systems using M**ATLAB**	No
Recommended Texts	• MATLAB An Introduction with Applications • ELECTRONICS and CIRCUIT ANALYSIS using MATLAB • Applied Mathematical Modelling of Engineering Problems • Introduction to Simulink®with Engineering Applications	No
Websites	**https://www.mathworks.com**	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks%	Definition
Success Group (50 - 100)	**A-** Excellent	امتياز	90-100	Outstanding Performance
	B-Very Good	جيدجدا	80-89	Above average with some errors
	C- Good	جيد	70-79	Sound work with notable errors
	D - Satisfactory	متوسط	60-69	Fair but with major shortcomings
	E - Sufficient	مقبول	50-59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –**Fail	راسب (قيدد المعالجة)	(45-49)	More work required but credit awarded
	F –Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULEDESCRIPTION FORM
وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**POWER PLANTS**			**Module Delivery**	
Module Type	BASIC			**Theory** **Lecture** **Tutorial**	
Module Code	**EPE 211**				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level			**Semester (s) offered**	3	
Administering Department	Power & Electrical Machines Eng.		**College**	Engineering	
Module Leader	Ibrahim I. Ibrahim		**e-mail**	Ibrahem_a@uodiyala.edu.iq	
Module Leader's Acad. Title	Assist. Lect.		**Module Leader's Qualification**	M.Sc. in Electrical & Electronic Eng.	
Module Tutor	Assist. Lect. Ibrahim I. Ibrahim		**e-mail**	Ibrahem_a@uodiyala.edu.iq	
Peer Reviewer Name			**e-mail**		
Review Committee Approval			**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**None**	**Semester**	-

Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	This module aims to provide students with a comprehensive understanding of the principles and applications of thermodynamics in power plant engineering. The course is designed to equip students with the knowledge of different types of power plants, their components, and the thermodynamic cycles they operate on. Students will also learn about the environmental and economic considerations of power generation, as well as recent technological advancements in the field.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand and apply the basic concepts of thermodynamics in the context of power plants. 2. Analyze the operation and efficiency of various thermodynamic cycles used in power plants. 3. Identify and explain the function of major power plant components. 4. Evaluate the performance of different types of power plants (steam, gas turbine, hydro) based on thermodynamic principles. 5. Assess the environmental and economic impacts of power plants and explore sustainable alternatives. 6. Understand recent advancements in power plant technologies and their implications for future power generation.
Indicative Contents المحتويات الإرشادية	The topics listed under the indicative content below are the underpinning areas of knowledge and understanding that will be obtained from successful completion of the module. The topics are illustrated in the context of relevant engineering scenarios. 1. **Introduction to Thermodynamics and Power Plants** 2. **Basic Thermodynamic Principles** 3. **The First Law of Thermodynamics** 4. **The Second Law of Thermodynamics and Entropy** 5. **Thermodynamic Cycles and Heat Engines** 6. **Ideal Gases and Real Fluids** 7. **Introduction to Power Plant Components** 8. **Steam Power Plants** 9. **Gas Turbine Power Plants** 10. **Hydro Power Plants** 11. **Thermodynamic Analysis of Power Plants** 12. **Environmental and Economic Considerations** 13. **Advances in Power Plant Technology** 14. **Case Studies and Practical Applications** 15. **Review and Examination Preparation**
Course Description	The "Power Plants" module is a 15-week course designed to provide students

	with an in-depth understanding of thermodynamic principles as they apply to power generation. The course covers the fundamentals of thermodynamics, the operation and efficiency of various power plant types, and the environmental and economic impacts of power plants. Through theoretical instruction and practical case studies, students will learn to analyze and evaluate the performance of power plant systems and explore recent technological advancements in the field.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• **Lectures:** To introduce and explain core concepts and theories related to thermodynamics and power plants. • **Tutorials:** For detailed problem-solving sessions and discussions on practical applications of theoretical principles. • **Case Studies:** To analyze real-world examples of power plants and understand the application of theoretical knowledge in practical scenarios. • **Group Projects:** To foster collaborative learning and application of course content to design and evaluate power plant systems. • **Quizzes and Assignments:** To reinforce learning and ensure continuous assessment throughout the course. • **Examination Preparation:** Review sessions and practice problems to prepare students for final assessments.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** **30** **In class tests** **10** **Tutorial** **12**	52	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Assignment** **20** **Preparation for tests** **20** **Homework** **8**	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	3,5, 10, 12, 14	LO #1, 2, 3, 4 ,5 and 6
	Assignments	6	20% (20)	4, 8, 12	LO # 1, 2, 3, 4, 5 and 6
Summative assessment	**Midterm Exam**	2	20% (20)	7	LO # 1,4
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	**Introduction to Thermodynamics and Power Plants** • Definitions and Basic Concepts: Dimensions, Units, Mass, Force, Work, Power, Energy. • Overview of Power Plants: Definition, Types, and Energy Sources.
Week 2	**Basic Thermodynamic Principles** • Properties of Substances: State, Path, Process, Cycle. • State Functions and Heat Transfer: Conduction, Convection, Radiation. • Thermal Equilibrium.
Week 3	**The First Law of Thermodynamics** • Energy Conservation: Internal Energy, Work, and Heat. • Steady Flow Energy Equation: Practical Applications (Nozzle, Throttling, etc.).
Week 4	**The Second Law of Thermodynamics and Entropy** • Concepts of Reversibility and Irreversibility. • Carnot Cycle and Entropy. • Entropy Changes in Various Processes.

Week 5	**Thermodynamic Cycles and Heat Engines** • Overview of Thermodynamic Cycles: Carnot, Ideal Rankine. • Heat Engines and Their Efficiency. • Practical Applications: Boilers, Compressors, Turbines.
Week 6	**Ideal Gases and Real Fluids** • Ideal Gas Laws: Boyle's Law, Charles's Law, Joule's Law. • Real Fluid Flow: Compressibility, Pascal's Law. • Continuity Equation and Bernoulli's Equation.
Week 7	**Introduction to Power Plant Components** • Major Components: Pump, Boiler, Turbine, Condenser. • Basic Operation and Function of Each Component. • Power Plant Layout and Working Principle.
Week 8	**Steam Power Plants** • Detailed Study of the Rankine Cycle. • Modifications for Efficiency: Superheating, Reheating, Regenerative Heating. • Mollier Chart and Steam Properties.
Week 9	**Gas Turbine Power Plants** • Working Principle and Basic Components. • Brayton Cycle: Efficiency and Performance. • Methods to Enhance Efficiency: Intercooling, Reheating, Regeneration.
Week 10	**Hydro Power Plants** • Basics of Hydropower: Components and Working. • Types of Hydro Turbines: Pelton, Francis, Kaplan. • Efficiency and Energy Conversion.
Week 11	**Thermodynamic Analysis of Power Plants** • Isentropic Efficiency and Work Ratio. • Thermal Efficiency of Different Power Cycles. • Energy Balance and Heat Exchangers.
Week 12	**Environmental and Economic Considerations** • Environmental Impact of Power Plants: Emissions, Thermal Pollution. • Renewable vs. Non-Renewable Sources. • Economic Analysis and Load Management.
Week 13	**Advances in Power Plant Technology** • Combined Cycle Power Plants. • Integration of Renewable Energy Sources. • Smart Grids and Future Trends in Power Generation.
Week 14	**Case Studies and Practical Applications** • Case Studies of Modern Power Plants.

	• Problem-Solving Sessions on Thermodynamic Cycles. • Real-Life Applications and Project Discussions.
Week 15	**Review and Examination Preparation** • Comprehensive Review of All Topics Covered. • Sample Problems and Solutions. • Examination Guidelines and Preparation Tips.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Yunus A Çengel, Michael A Boles, Mehmet Kanoğlu, "Thermodynamics: an engineering approach", McGraw Hill Education, 9th edition, 2019.	No
Recommended Texts	Michael J. Moran, Howard N. Shapiro, Bruce R. Munson, and David P. DeWitt, "Introduction to Thermal Systems Engineering: Thermodynamics, Fluid Mechanics, and Heat Transfer"	No

Websites	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	Ministry of Higher Education and Scientific Research - Iraq University of Diyala College of Engineering Department of Engineering	

MODULE DESCRIPTOR
وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Drawing (AutoCAD)**			**Module Delivery**	
Module Type	BASIC			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	E203				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	2		**Semester (s) offered**	3	
Administering Department	Electronics Engineering		**College**	Engineering	
Module Leader	Name: mohammed hasan ali		**e-mail**	E-mail: mohammedhasanali@uodiyala.edu.iq	
Module Leader's Acad. Title	Lect.		**Module Leader's Qualification**	M.Sc.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Review Committee Approval			**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	-
Co-requisites module	None	**Semester**	-

Module Aims, Learning Outcomes, Indicative Contents and Brief Description
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر

Module Aims أهداف المادة الدراسية	Engineering drawing is the principal method of communication for engineers, the objective is to introduce the students, to the techniques of constructing the various types of polygons, curves and scales. In addition to engineering drawing, students become familiar with the AutoCAD user interface. Understand the fundamental concepts and features of AutoCAD. Use the precision drafting tools in AutoCAD to develop accurate technical drawings—present drawings in a detailed and visually impressive manner.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of this course the students will be able to: 1- Get information about the important tools for engineering drawing. This will give student basic knowledge of technical drawings professions and means of communications to others. 2- Learning how to draw the shapes, angels and lines and others which is essential for engineer 3- Develop student's imagination and ability to represent the shape size and specifications of physical objects. 4- Understand the main idea of using dimension for engineering drawing 5- Familiarize with different drawing equipment, technical standards and procedures for construction of geometric figures. This will give students ability to draw three-dimension objects on the paper and to draw the pectoral drawings. 6- Explain the principle of projection and sectioning 7- Utilize the power and precision of AutoCAD as a drafting and design tool used in the mechanical design and manufacturing industries. 8- Apply basic CAD concepts to develop and construct accurate 2D geometry through creation of basic geometric constructions. 9- Create, manipulate and edit 2D drawings and figures. 10- Apply elements of mechanical drafting such as layers, dimensions, drawing formats, and 2D figures in projects.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Paper size, Lettering & title blocks • Orthographic projection • Isometric and oblique projection • Perspective drawing • Basic geometrical solids • Development of surfaces • **Creating Basic Drawings**

	• Manipulating Objects • Implementing Drawing Organization and Inquiry Commands • Altering Objects • Annotate a Drawing • Dimension Drawings • Hatching Objects • Creating Additional Drawing Objects and working on Projects • Plotting the Drawing Output
Course Description	This course introduces students to the introduction to the drawing tools and how to use them, lines drawing, Basic engineering processes, Composition of the engineering drawings, Letters, numbers, dimensions, Projection, Sectioning, Isometric drawing. Understand the fundamental concepts and features of AutoCAD. Use the precision drafting tools in AutoCAD to develop accurate technical drawings. Present drawings in a detailed and visually impressive manner. Develop a level of comfort and confidence with AutoCAD through hands-on experience.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Begin to establish a strong conceptual understanding of the principles of engineering drawing. Use the reality of work examples and measurements to help students relate abstract concepts to the planning. Encourage discussions and questions to clear up any misconceptions. In addition, provide students with the tool to deal with schematic problems. Encourage active participation and group discussions to enhance critical thinking and problem-solving skills. Guide students through the problem-solving process and provide constructive feedback.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures** **Lab** **Practical** **In class tests** **Final Exam**	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing** **Preparation for tests** **Homework**	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	15% (15)	5, 12	LO #1, 2, 3,7,8 and LO# 4,5,6,9,10
	Assignments	6	5% (5)	7, 12	LO # 7, 8 and LO# 9,10
	Homework	2	20% (20)	Continuous	
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO #1, 2, 3,4,7,8 and LO# 4,5,6,9,10
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	- Definition of tools and how to use them, - Introduction 1. Status Bar and Command Prompt 2. AutoCAD Commands 3. Dynamic Input 4. Menus, Ribbons, and Toolbars 5. Cursor and Colors 6. Undo and Redo
Week 2	- Initial principles of drawing, - Drawing Aids 1. Open Existing Drawings

	2. Creating a New Drawing 3. Saving Drawings **4.** Exiting AutoCAD
Week 3	- Letters and numbers, 5. SNAP Command 6. Grid Command 7. Running Object Snaps 8. Osnap Settings **9.** UNITS Command
Week 4	- Dimensions, - Draw Commands 1. Line Command 2. Cartesian Coordinate System 3. Orthogonal Lines **4.** Polar Tracking
Week 5	- Line drawing, - 5. Circles 6. Arc Command 7. Polyline Command **8.** Explode Command
Week 6	- Line drawing, 9. Rectangle 10. Ellipse
Week 7	- Engineering operations, - Edit Commands 1. The Move Command 2. The Copy Command 3. The Offset Command 4. The Extend Command **5.** Trim Command
Week 8	- Engineering operations, 6. The Erase Command 7. The Zoom Command 8. The Pan Command 9. The Mirror Command 10. The Rotate Command **11.** The Scale Command
Week 9	- Projection drawing, 12. The Break Command 13. The Stretch Command **14.** The Explode Command
Week 10	- Projection drawing, 15. The Fillet Command

	16. The Chamfer Command 17. The Array Command **18.** The Lengthen Command
Week 11	- Projection drawing, - Dimensions 1. Linear Dimensions
Week 12	- Drawing of sectional Views, 2. Aligned Dimensions **3.** Radial Dimensions
Week 13	- Drawing of sectional Views, 4. Angular Dimensions **5.** Continued and Baseline Dimensions
Week 14	- Isometric, 6. Modifying Dimensions
Week 15	- Isometric, 7. Dimension Styles * Creating
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Parkinson, A.C., 1961. A First Year Engineering Drawing 2. J Luzadder, W., 1965. Fundamentals of Engineering Drawing, by Warren J. Luzadder. Prentice-hall. 3. Text book 1: James A. Leach, "AutoCad 2002 companion", 2003. 4. Text book 2: AutoCAD 2D Tutorials, AutoCAD 2013, By Kristen S. Kurland, 2012.	Yes
Recommended Texts	3. Text book 3: 2D_AutoCAD.	Yes
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.