Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	MATHEMATICS I			**Module Delivery**	
Module Type	Support			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE1101				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader	Kareem Khalaf Ali		**e-mail**	dr.kareemkhalaf@mtu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PHD	
Module Tutor	Nuha Adnan Hussain		**e-mail**	Nuha.Adnan@mtu.edu.iq	
Peer Reviewer Name	Wissam Nibrass Adnan		**e-mail**	Wissam.Nubras@mtu.edu.iq	
Scientific Committee Approval Date	10/11/2024		**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 Aims أهداف المادة الدراسية	- **Develop Foundational Skills in Mathematics**: Introduce students to essential mathematical concepts and techniques foundational to engineering, ensuring a solid mathematical base for future studies. - **Apply Mathematical Methods in Engineering Contexts**: Enable students to apply calculus, algebra, and basic differential equations in solving engineering-related problems, fostering a practical understanding of mathematics as a tool in engineering analysis and design. - **Enhance Problem-Solving Abilities**: Strengthen analytical and problem-solving skills by engaging students in the formulation, manipulation, and solution of engineering mathematics problems. - **Understand and Use Mathematical Tools**: Familiarize students with mathematical tools (e.g., matrices, vectors, and complex numbers) and computational techniques that are commonly employed in engineering practices. - **Promote Logical and Critical Thinking**: Develop logical reasoning and critical thinking abilities by encouraging students to interpret results, verify solutions, and apply concepts rigorously in varied engineering scenarios. - **Prepare for Advanced Engineering Mathematics**: Establish a mathematical foundation that prepares students for more advanced engineering courses, equipping them with the necessary skills to tackle higher-level mathematical concepts and applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- **Understand Core Mathematical Concepts**: Describe and apply foundational mathematical principles, including algebra, calculus, and trigonometry, as they pertain to engineering problems. - **Solve Engineering Problems Using Calculus**: Use differential and integral calculus to analyze and solve basic engineering problems involving rates of change, areas, and volumes. - **Apply Linear Algebra in Engineering Contexts**: Utilize matrix operations, vector spaces, and linear transformations to solve systems of linear equations and model engineering systems. - **Work with Complex Numbers and Their Applications**: Represent and manipulate complex numbers, understanding their application in AC circuit analysis and other engineering contexts. - **Analyze and Solve Basic Differential Equations**: Formulate and solve first-order and simple second-order differential equations, interpreting solutions in terms of engineering applications. - **Interpret Mathematical Solutions in Engineering Terms**: Evaluate mathematical results and apply them to interpret physical and engineering

	phenomena, assessing the practicality and implications of solutions. - **Utilize Computational Tools for Mathematical Calculations**: Effectively use software tools, such as MATLAB or calculators, to perform complex calculations, verify results, and solve problems more efficiently. - **Develop Logical and Critical Thinking in Mathematical Contexts**: Demonstrate logical reasoning and critical thinking in approaching mathematical proofs, verifying solutions, and analyzing the validity of methods in solving engineering problems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part 1: Functions, Graphs, and Limits Part 2: Logarithms, Trigonometric Functions, and Conic Sections Part 3: Derivatives, Implicit Differentiation, and Curve Sketching Part 3: Integration, Fundamental Theorems, and Indefinite Integrals Part 4: Numerical Integration, Approximation Rules, and Methods of Integration Part 5: Trigonometric Integrals, Matrices, Determinants, and Vectors Part 6: Complex Variables, Applications of Integration
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	111	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	15%	5,10	
	Assignments	1	5%	8	
	Projects / Lab.				
	Report	1	10%	10	
Summative assessment	**Midterm Exam**	2hr	10%	8	
	Final Exam	4hr	60%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introductory Concepts to Functions, Graphs of Functions
Week 2	Introductory Concepts to Limits, Introductory Concepts to Continuity, Assignment on Continuity
Week 3	Introductory Concepts to Logarithms, Introductory Concepts to Natural Logarithms
Week 4	Introductory Concepts to Trigonometric Functions, Introductory Concepts to Hyperbolic Functions and Conic Sections
Week 5	Introductory Concepts to Circles, Parabolas, Ellipses, and Hyperbolas; Derivatives of Trigonometric Functions
Week 6	Implicit Differentiation, Differentiation with Fractional Powers
Week 7	Introduction to Curve Sketching with Y′ and Y″, Introduction to Graphing Rational Functions
Week 8	Applications of Differentiation
Week 9	Introductory Concepts to Integration, Fundamental Theorems of Integral Calculus
Week 10	Introductory Concepts to Indefinite Integrals, Introductory Concepts to Numerical Integration
Week 11	Rules for Approximating Integrals, Methods of Integration – Part 1

Week 12	Methods of Integration – Part 2, Methods of Integration – Part 3
Week 13	Trigonometric Integrals, Using an Integral Table, Mid-Term Exam
Week 14	Introductory Concepts to Matrices, Introductory Concepts to Determinants
Week 15	Introduction to Vectors and Complex Variables, Applications of Integration

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. "Thomas Calculus" G. Thomas, M. Weir, et al., 11th edition, 2004. 2. "Calculus II"; by Paul Dawkins, 2007. 3. "Engineering Mathematics", by John Bird, 5th edition, Elsevier Ltd., 2007. 4. "Engineering Mathematics", by K.A. Stroud, First edition, MACMILLAN and CO LTD, 1970.	
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.

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Principles of Computer			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MTU1004				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader	Othman Waleed Khalid		**e-mail**		
Module Leader's Acad. Title	Assist Lectrur		**Module Leader's Qualification**	M.S.C	
Module Tutor	Ziyad Qays Abdulkareem		**e-mail**	ziad.al-abbasi@mtu.edu.iq	
Peer Reviewer Name	Othman Waleed Khalid		**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	- **Understanding Computer Fundamentals**: To provide students with a comprehensive understanding of computer systems, including their components, types, and evolution through different generations. - **Recognizing Data and Information**: To explain the distinction between data and information, and the role of computers in processing, storing, and managing these entities. - **Exploring Computer Components**: To familiarize students with the hardware and software components of computers, including their functionalities and interrelationships. - **Learning Number Systems**: To introduce the various number systems used in computing, including binary, decimal, and hexadecimal, and their applications in computer systems. - **Addressing Ethical Considerations**: To discuss ethical issues in the digital realm, including computer security, privacy, and the implications of electronic hacking. - **Understanding Software Licensing**: To educate students on software licenses and the significance of intellectual property rights in the digital environment. - **Identifying Malware Threats**: To inform students about different types of malware, including viruses, and the methods to protect against them. - **Developing Practical Skills**: To equip students with practical skills in using computer interfaces, such as desktop backgrounds, control panels, and window management. - **Encouraging Responsible Usage**: To instill a sense of responsibility in students regarding their use of technology, emphasizing digital citizenship and safe computing practices.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- **Identify Key Concepts**: Recognize and explain fundamental concepts related to computer systems, including types, components, and functions. - **Distinguish Between Data and Information**: Differentiate between data and information, and understand how computers process and manage these elements. - **Describe Computer Components**: Describe the various hardware and software components of computers and their roles in system functionality. - **Explain Number Systems**: Understand and explain different number systems used in computing (binary, decimal, hexadecimal) and their relevance to computer operations. - **Analyze Ethical Issues**: Analyze ethical considerations in the digital world, including issues of computer security, privacy, and responsible usage. - **Understand Software Licensing**: Explain the types of software licenses and the importance of intellectual property rights in the context of software usage. - **Recognize Malware Types**: Identify various types of malware, including viruses, and understand their potential impact on computer systems. - **Utilize Computer Interfaces**: Demonstrate proficiency in navigating and using computer interfaces, such as the desktop environment, control panel, and window management features.

	- **Practice Digital Citizenship**: Exhibit responsible behavior in the digital environment, emphasizing safe computing practices and awareness of online risks. - **Engage in Practical Applications**: Apply theoretical knowledge through hands-on exercises and practical tasks related to computer usage and management.
Indicative Contents المحتويات الإرشادية	- **Computer Fundamentals**: • Evolution, types of computers, and distinction between data and information. - **Components and Structure**: • Overview of hardware (CPU, memory, storage) and software (operating systems, applications). - **Number Systems**: • Understanding binary, decimal, and hexadecimal systems and their conversions. - **Ethics and Security**: • Digital citizenship, computer security practices, and awareness of malware. - **Practical Applications**: • Hands-on exercises for computer setup, configuration, and software usage.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage Students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	11	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	10% (10)	5,10	
	Assignments	1	10% (10)	2,12	
	Projects / Lab.		15% (15)		
	Report		5% (5)		
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	4hr	50% (40 + 10)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	- Introduction to Computers: Hardware and Software concepts, their components. - Concepts of Computing, Data, and Information. - Applications of IECT. - Connecting input/output devices and peripherals to CPU.
Weeks 2–3	- Computer Components: Computer Portions and Hardware Parts. - Input/Output (I/O) Units, Memory Types, and Basic CPU Components. - Computer Ports and Features of Personal Computers (PCs), Types of PCs.
Weeks 4–5	- Operating Systems (OS) and Graphical User Interface (GUI): Basics of common OS, user interface, and mouse techniques. - Using common icons, status bar, menus, folders, and directories. - Opening, closing windows, and creating shortcuts.
Weeks 6–7	- Word Processing: Basics, opening/closing documents, text creation, and manipulation.

	- Formatting text, handling tables, spell check, language settings, and thesaurus. - Printing word documents.
Week 8	- **Review and Midterm Exam.**
Weeks 9–10	- Spreadsheets: Basics, cell manipulation, formulas, functions, editing, and printing.
Weeks 11–12	- Presentation Software: Basics of creating presentations, preparing slides, and delivering a slideshow. - Printing presentations/handouts.
Week 13	- Introduction to Internet and Web Browsers: Computer networks (LAN, WAN), Internet concepts, and applications. - World Wide Web, search engines, URL, domain name, and IP addresses.
Week 14	- Communication and Emails: Basics, creating an email account, sending/receiving emails, and document collaboration.
Week 15	- Computer Troubleshooting: Identifying/solving common hardware and software problems, basic troubleshooting techniques.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered

Week 1 Introduction to Computer:

- Concepts of hardware and software components.
- Fundamentals of computing, data, and information.
- Applications of information electronics and communication technology (IECT).
- Connecting input/output devices and peripherals to CPU.

Weeks 2–3 Computer Components:

- Exploration of computer portions and hardware parts.
- Identifying I/O units, memory types, and basic CPU components.
- Familiarizing with computer ports and personal computer features.

Weeks 4–5 Operating System and GUI:

- Basics of common operating systems.
- Navigating the user interface using mouse techniques.
- Utilizing common icons, status bar, menus, and directories.
- Opening, closing, and creating shortcuts for different windows.

Weeks 6–7 Word Processing:

- Exploring word processing basics.
- Opening and closing documents.
- Text creation, manipulation, and formatting.
- Handling tables, spell check, language settings, and thesaurus.
- Printing word documents.

Week 8 Review and Mid-Exam.

Weeks 9–10 Spreadsheet:

- Spreadsheet software basics.
- Manipulation of cells, formulas, and functions.
- Editing and printing spreadsheets.

Weeks 11–12 Presentation Software:

- Fundamentals of presentation software.
- Creating presentations.
- Preparing and delivering slide shows.
- Taking printouts of presentations and handouts.

Week 13 Introduction to Internet and Web Browsers:

- Computer networking concepts: LAN, WAN.
- Concept of the internet and its applications.
- Connecting to the internet and exploring the World Wide Web.
- Using web browsing software and search engines.
- Understanding URLs, domain names, and IP addresses.

Week 14 Communications and Emails:

- Basics of electronic mail.
- Setting up email accounts.
- Sending, receiving, and accessing emails.
- Utilizing email for document collaboration.

Week 15 Computer Troubleshooting:

- Identifying and solving common hardware issues.
- Identifying and solving common software problems.
- Applying basic troubleshooting techniques and tools.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	[1] G. Brown and D. Watson, "Cambridge IGCSE Information and Communication Technology," 3rd ed. Cambridge, U.K.: Cambridge Univ. Press, 2020. [2] A. Evans, K. Martin, and M. A. Poatsy, "Technology in Action Complete," 16th ed. Boston, MA, USA: Pearson, 2020	Yes
Recommended Texts	الخضر علي الخضر بحات, "أساسيات الحاسوب", 2016.	No
Websites	https://www.khanacademy.org/computing/computer-programming	

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.

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Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fundamental of Electricity**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EMTE1102**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader	Ziyad Qays Abdulkareem		**e-mail**	ziad.al-abbasi@mtu.edu.iq	
Module Leader's Acad. Title	Assist Prof		**Module Leader's Qualification**	PHD	
Module Tutor	Wadhah Esmaeel Ibraheem		**e-mail**	wadhah.esmaeel87@mtu.edu.iq	
Peer Reviewer Name	Saif Talal Bahar		**e-mail**	saif.talal@mtu.edu.iq	
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of circuit theory through the application of techniques. 2. To understand voltage, current and power from a given circuit. 3. This course deals with the basic concept of electrical circuits. 4. This is the basic subject for all electrical and electronic circuits. 5. To understand Kirchhoff's current and voltage Laws problems. 6. To perform Thevenin's Norton's Theorem. 7. Understanding the Alternating Current Network Types of Alternating Waveforms 8. Understanding the basic principle of series and parallel AC Circuit
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electricity works in electrical circuits. 2. List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic electric circuit. 4. Discuss the reaction and involvement of atoms in electric circuits. 5. Describe electrical power, charge, and current. 6. Define Ohm's law. 7. Identify the basic circuit elements and their applications. 8. Discuss the operations of DC circuits in an electric circuit. 9. Discuss the various properties of resistors. 10. Explain the two Kirchhoff's laws used in circuit analysis. 11. Describe Thevenin's theorem and Norton's theorem and how they work 12. Explain the basic concepts o AC Circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Definition: - Symbols And Abbreviations, Units, Electric Circuit & It's Element. The Direct Current Network. Ohms low, Charge, Force, Work, Power. Circuit Theory DC circuits – Current and voltage definitions, Passive sign convention and circuit elements, Combining resistive elements in series and parallel. Kirchhoff's laws and Ohm's law. Anatomy of a circuit, Network reduction Revision problem classes Fundamentals Resistive networks, voltage and current sources, Thevenin and Norton equivalent circuits, Conversion Delta To Star Connection, Superposition

	Method.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	106	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
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)	5,10	
	Assignments	1	10% (10)	8	
	Projects / Lab.		10% (10)	1-14	
	Report	2	10% (10)	6,12	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	4hr	50% (40 + 10)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Symbols And Abbreviations, Units, Electric Circuit & its Element, Ohms low.
Week 2	Series Circuits (Resistance in Series) Voltage Divider Rule.
Week 3	Parallel Circuits (Resistances in Parallel) Current Divider Rule.
Week 4	Open and Short Circuits, Source Transformation,
Week 5	Series-Parallel Circuits Transformation.
Week 6	Kirchhoff's Laws: Kirchhoff's current law (KCL) and its use in Network Analysis.
Week 7	Kirchhoff's voltage law (KVL) and its use in Network Analysis
Week 8	Conversion Delta to Star Connection and Conversion Star to Delta Connection
Week 9	Mid Term Exam + Superposition Method
Week 10	Thevenin's Theorem
Week 11	Norton's Theorem
Week 12	The Alternating Current Network Types of Alternating Waveforms, Generation of Alternating Current, and Definitions related to Alternating Waveforms
Week 13	The Mean and Effective Values of Current and Voltage
Week 14	Series and Parallel AC Circuits (R L C)
Week 15	**Preparing for final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: How to use ammeter, voltmeter and ohmmeter.
Week 2	Lab 2: Apply Ohm's Law
Week 3	Lab 3: Continuous Implementation for Lab1 and Lab2
Week 4	Lab 4: Apply Kirchhoff's law to measure current
Week 5	Lab 5: Continuous Implementation for Lab4
Week 6	Lab 6: Apply Kirchhoff's law to measure voltages
Week 7	Lab 7: Continuous Implementation for Lab6
Week 8	Lab 8: Superposition Method

Week 9	Lab 9: Norton's Theorem.
Week 10	Lab 10: Continuous Implementation for Lab9
Week 11	Lab 11: Thévenin's Theorem.
Week 12	Lab 12: Continuous Implementation for Lab11
Week 13	Lab 13: Delta To Star Connection And Conversion Star To Delta Connection
Week 14	Lab 14: Continuous Implementation for Lab13
Week 15	Lab 15: Preparing for final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

Grading Scheme مخطط الدرجات				
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Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Materials Engineering**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EMTE1103**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader	Mustafa Ahmed Rejab		**e-mail**	dr.mustafaAlnagar@mtu.edu.iq	
Module Leader's Acad. Title	Assist Prof		**Module Leader's Qualification**	PHD	
Module Tutor	Ahmed Abbas Khalaf		**e-mail**	ahmad1965@mtu.edu.iq	
Peer Reviewer Name	Abrar abdulhameed majeed		**e-mail**	abrar.Abdulhameed@mtu.edu.iq	
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	- **Fundamental Understanding**: To develop a foundational understanding of the various classes of materials (metals, ceramics, polymers, composites, and semiconductors) and their unique properties. - **Atomic and Molecular Structure Knowledge**: To explore the atomic structure and bonding in materials and understand how these influence material properties at both micro and macro levels. - **Material Defects and Solidification**: To introduce students to the types of defects in materials, their impact on mechanical properties, and the principles of solidification that influence material structure. - **Material Processing and Modification**: To examine the effects of processes like alloying and heat treatment on the mechanical, thermal, and electrical properties of materials. - **Application-Oriented Learning**: To connect theoretical knowledge with real-world applications, exploring how specific materials are chosen for various industries based on their performance characteristics. - **Mechanical and Thermal Behavior**: To analyze the mechanical behavior of metals, ceramics, polymers, and composites, focusing on properties like elasticity, plasticity, hardness, and thermal stability. - **Electrical Properties of Materials**: To investigate the electrical conductivity and applications of different materials, with a focus on the unique roles of ceramics, polymers, and semiconductors in modern technology. - **Problem-Solving Skills**: To develop critical thinking and problem-solving skills for materials selection and design based on performance requirements in various applications. - **Materials Science Framework**: To prepare students for advanced study and research in materials science, providing them with the theoretical and practical framework to understand and manipulate material properties for future innovations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- **Classify Materials**: Identify and describe key types and applications of materials. - **Atomic Structure & Bonding**: Explain how atomic structure and bonding affect material properties. - **Material Defects**: Recognize defects and assess their impact on materials. - **Solidification Principles**: Describe solidification and its influence on microstructure. - **Phase Diagrams & Heat Treatment**: Use phase diagrams and heat treatment to predict and modify material properties. - **Mechanical Behavior**: Differentiate elastic and plastic behavior in various materials. - **Mechanical Properties**: Measure and interpret properties like hardness and toughness. - **Physical & Electrical Properties**: Analyze materials' physical, thermal, and electrical traits.

	- **Application-Based Selection**: Select materials for applications based on performance. - **Critical Problem Solving**: Apply critical thinking to material selection and design challenges.
Indicative Contents المحتويات الإرشادية	Introduction to Materials Science, Crystallography and Defects, Alloys and Ceramics, Polymers and Composites, Semiconductors, Heat Treatment, Mechanical Properties, Physical and Electrical Properties.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	106	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
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)	5,10	
	Assignments	1	10% (10)	8	
	Projects / Lab.		10% (10)	1-14	
	Report	2	10% (10)	6,12	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	4hr	50% (40 + 10)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Classification of Materials
Week 2	Advanced materials – Atomic structure
Week 3	Atoms bonding- Crystal structure
Week 4	Defects-types of defect-linear defect-Principle of solidification
Week 5	Alloy applications- Types of Ceramics
Week 6	Polymers, Polymers types and properties
Week 7	Semiconductors, Composite materials
Week 8	Phase diagram -Carbon steel diagram
Week 9	Heat treatment
Week 10	Mechanical behavior for metals- elastic and plastic deformation
Week 11	Mechanical behavior for Ceramics, Polymers and composite materials
Week 12	Hardness and other mechanical properties
Week 13	Physical and electrical properties
Week 14	Electrical conductivity of polymers and Ceramics
Week 15	Thermal properties

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to Rockwell Hardness test
Week 2	Brinell Hardness test
Week 3	Vickers Hardness test
Week 4	Sample preparation for Microscopic examination
Week 5	ASTM GRAIN SIZE ANALYSIS
Week 6	Heat Treatment- Quenching and tempering
Week 7	Preparation and study of the Micro Structure of pure metals like Iron, copper and Aluminum.
Week 8	Metallographic Techniques
Week 9	Impact Testing

Week 10	Fatigue Testing
Week 11	Tensile Testing
Week 12	Hardness Testing of Non-Metallic Materials
Week 13	Composite Materials Testing
Week 14	Failure Analysis
Week 15	Metallographic Techniques

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Materials Science and Engineering: An Introduction by William D. Callister Jr. • Fundamentals of Materials Science and Engineering by William F. Smith	online
Recommended Texts	• Materials Science: An Introduction to Properties, Applications, and Design by J. C. Anderson • Physical Metallurgy Principles by Reza Malekian	online
Websites	• Materials Research Society: www.mrs.org • Engineering Toolbox: www.engineeringtoolbox.com	

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English Language I**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MTU1002**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader	Mohammed Yaseen Abdullah		**e-mail**	mohammedabd84@mtu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PHD	
Module Tutor	Wissam Nibras adnan		**e-mail**		
Peer Reviewer Name	Wadhah Esmaeel		**e-mail**	Wadhah.esmaeel87@mtu.edu.iq	
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• Develop foundational English communication skills for common social and practical contexts (e.g., social gatherings, travel, making requests). • Introduce and reinforce basic grammar structures to support everyday conversations and written communication. • Expand vocabulary related to numbers, places, countries, social expressions, and daily activities, enabling learners to communicate about familiar topics. • Build confidence in question formation and the ability to express information about themselves and others. • Enable learners to discuss past, present, and future activities using appropriate grammar structures (e.g., Present Simple, Past Simple, Present Continuous, and Future expressions).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Use basic grammar structures (Present Simple, Past Simple, and Present Continuous) to talk about routine activities, personal information, and future plans. • Form and respond to basic questions using question words and auxiliary verbs. • Make requests, express preferences, and provide personal information using appropriate expressions and grammar. • Understand and use possessive forms to indicate relationships and ownership in conversation. • Engage in simple conversations on the phone and in social situations, demonstrating basic competence in adjectives, expressions, and common verbs. • Distinguish between present, past, and future actions and use verbs in the correct tense to talk about events and plans.
Indicative Contents المحتويات الإرشادية	Speaking , Listening and Reading
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Unit one: At a party Grammar: Present Simple Vocabulary: Numbers
Week 2	Unit two: Going sightseeing Grammar: am / are / is Vocabulary: Cities and countries
Week 3	Unit three: In a café Grammar: Personal information Vocabulary: Social expressions

Week 4	Unit four : In a chemist's Grammar: Possessives Vocabulary: Word groups
Week 5	Unit Five : In a post office Grammar: present simple Vocabulary: Countries and nationalities
Week 6	Unit six : In a railway station Grammar: present simple Vocabulary: Your day
Week 7	Unit seven : On the phone Grammar: Question words, Verb patterns 1 Vocabulary: Adjectives
Week 8	Unit eight : Personal questions Grammar: Questions and answers, *There is / are* Vocabulary: Places and things
Week 9	Unit nine : What's the matter? Grammar: Past Simple irregular, was/were Vocabulary: have, do, go
Week 10	Unit ten: What's the problem? Grammar: Past Simple 1 Vocabulary: Work, sports, and leisure
Week 11	Unit eleven: Grammar: *can / can't,* Requests Vocabulary: Verbs
Week 12	Unit twelve: Grammar: *like / would like,* some / any Vocabulary: In a restaurant
Week 13	Unit thirteen: Grammar: Present Continuous Vocabulary: Opposite verbs
Week 14	Unit fourteen: Grammar: Future plans, Present Continuous for future Vocabulary: Transport and travel
Week 15	Assessment

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Material since & technology by W-Bolten	
Recommended Texts	• Material since & engineering by Van Vlack	

Website	• MIT OpenCourseWare - Engineering • Coursera - Engineering Courses • Khan Academy - Engineering	

Grading Scheme مخطط الدرجات				
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Ministry of Higher Education and Scientific Research – Iraq
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Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Democracy and Human Rights**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	**MTU1006**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader	Lara Wiryah Hameed		**e-mail**		
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	Msc	
Module Tutor	Nuha Adnan Hussein		**e-mail**	inasjk@mtu.edu.iq	
Peer Reviewer Name					
Scientific Committee Approval Date	19/10/2023		**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 Aims أهداف المادة الدراسية	1- التطور التاريخي لحقوق الإنسان: دراسة التطور التاريخي لفهم حقوق الإنسان من الحضارات القديمة إلى العصور الحديثة. 2- حقوق الإنسان في الشرائع السماوية: التركيز على حقوق الإنسان في الإسلام وكيف تم تضمينها في الشريعة الإسلامية. 3- اعتراف إقليمي بحقوق الإنسان: فحص اعتراف الأقاليم الأوروبي، الأمريكي، الإفريقي، الإسلامي، والعربي بحقوق الإنسان. 4- دور المنظمات غير الحكومية: دراسة دور المنظمات مثل اللجنة الدولية للصليب الأحمر ومنظمة العفو الدولية في حماية حقوق الإنسان. ه- الإطار القانوني الدولي والإقليمي: التركيز على المواثيق الدولية والإقليمية، مثل الاعلان العالمي لحقوق الإنسان. 6- تحليل حقوق الإنسان في التشريعات الوطنية: دراسة كيفية ترجمة حقوق الإنسان في التشريعات الوطنية، مع التركيز على الدستور العراقي. 7- تصنيف حقوق الإنسان وضماناتها: فهم مختلف أشكال حقوق الإنسان والضمانات الدستورية والقضائية والسياسية لحمايتها.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. القدرة على وصف وتحليل التطور التاريخي لحقوق الإنسان منذ الحضارات القديمة حتى العصور الحديثة. 2. القدرة على فحص حقوق الإنسان في حضارة وادي الرافدين وغيرها لفهم التأثير الثقافي على تطورها. 3. تفسير حقوق الإنسان في الإسلام وفهم كيف تم تضمينها في الشريعة الإسلامية. 4. القدرة على تحليل تطور حقوق الإنسان خلال العصور الوسطى والحديثة. 5. الفهم الشامل لاعتراف الأقاليم الأوروبي الأمريكي الإفريقي الإسلامي، والعرب بحقوق الإنسان. 6. القدرة على تقييم دور منظمات مثل اللجنة الدولية للصليب الأحمر ومنظمة العفو الدولية في حماية حقوق الإنسان. 7. القدرة على دراسة وتحليل المواثيق الدولية والإقليمية، بما في ذلك الاعلان العالمي لحقوق الإنسان. 8. القدرة على فحص كيف تم ترجمة حقوق الإنسان في التشريعات الوطنية، مع التركيز على مثال الدستور العراقي. 9. القدرة على تصنيف حقوق الإنسان إلى أشكال فردية وجماعية، وأجيال مثل الحقوق المدنية والسياسية والاقتصادية والاجتماعية. 10. القدرة على تحليل الضمانات الدستورية والقضائية والسياسية لحقوق الإنسان على الصعيدين الوطني والدولي والإقليمي.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم
تشجيع الطلبة على المشاركة في نقاشات تفاعلية حول تطور حقوق الانسان عبر التاريخ. مشروعات بحثية : توجيه الطالب حول إعداد مشروعات بحثية تستكشف تطور حقوق الانسان في فترات تاريخية محددة. استخدام التكنولوجيا: تضمين وسائل تكنولوجية لتعزيز تفاعل الطلبة وتقديم المعلومات بشكر أكثر فاعلية.

ورش العمل والتمثيل العملي: إجراء ورش عمل تفاعلية وأنشطة تمثيل لفهم أعمق لمفاهيم حقوق الانسان. تقديم تقييم مستمر: تقديم تقييم مستمر لفحص تقدم الطلبة وفهمهم لتطور حقوقو الانسان على مر العصور.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.1
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	18	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	
	Assignments	2	10% (10)	2, 12	
	Report	8	15% (15)	Continuous	
Summative assessment	**Midterm Exam**	1	5% (5)	13	
	Final Exam	2hr	10% (10)	7	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
الاسبوع الأول	التطور التاريخي لحقوق الانسان. حقوق الانسان في الحضارات القديمة (حضارة وادي الرافدين، الحضارات القديمة الأخرى).
الأسبوع الثاني	حقوق الانسان في الشرائع السماوية مع التركيز على حقوق الانسان في الاسلام. حقوق الانسان في العصور الوسطى والحديثة.
الأسبوع الثالث	الاعتراف الإقليمي بحقوق الانسان على الصعيد الأوربي ، الأمريكي، الأفريقي، الإسلامي، العربي).
الأسبوع الرابع	المنظمات غير الحكومية ودورها في حقوق الانسان ،اللجنة الدولية للصليب الأحمر، منظمة العفو الدولية، منظمة مراقبة حقوق الانسان، المنظمة العربية لحقوق الانسان.
الأسبوع الخامس	حقوق الانسان في المواثيق الدولية والإقليمية والتشريعات الوطنية حقوق الانسان في المواثيق الدولية (الاعلان العالمي لحقوق الانسان، العهدين الدوليين الخاصين بحقوق الانسان)
الأسبوع السادس	حقوق الانسان في المواثيق الإقليمية (الاتفاقية الأوربية لحقوق الانسان، الاتفاقية الأمريكية لحقوق الانسان، الميثاق الأفريقي لحقوق الأنسان، الميثاق العربي لحقوق الانسان)

الأسبوع السابع	امتحان منتصف الفصل الدراسي
الأسبوع الثامن	حقوق الانسان في التشريعات الوطنية (الدستور العراقي).
الأسبوع التاسع	أشكال وأجيال حقوق الانسان: أشكال حقوق الانسان : الحقوق الفردية، الحقوق الجماعية. أجيال حقوق الانسان: الجيل الأول الحقوق المدنية والسياسية، الجيل الثاني الحقوق الاقتصادية والاجتماعية، الجيل الثالث حقوق الانسان الحديثة.
الأسبوع العاشر	ضمانات حقوق الانسان وحمايتها على الصعيد الوطني الضمانات الدستورية والقضائية والسياسية
الأسبوع الحادي عشر	ضمانات حقوق الانسان وحمايتها على الصعيدين الإقليمي والدولي (دور الأمم المتحدة، دور المنظمات الإقليمية، جريمة الإبادة الجماعية)
الإسبوع الثاني عشر	تصنيف الحريات العامة : الحريات الأساسية والفردية ، حريمة الأمن والشعور بالاطمئنان، حرية الذهاب والإياب، الحرية الشخصية).
الأسبوع الثالث عشر	الحريات الفكرية والثقافية: حرية الرأي، حرية المعتقد، حرية التعليم، حرية الصحافة ، حرية التجمع، حرية تشكيل الجمعيات
الأسبوع الرابع عشر	الحريات الاقتصادية والاجتماعية : حرية العمل، حرية التملك ، حرية التجارة والصناعة
الأصبوع الخامس عشر	الاستعداد للامتحان النهائي

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- حقوق الانسان في العالم العربي : القضايا والتحديات، تأليف : علي حجازي وجمال شعت. ط:2، 2017. مبادئ حقوق الانسان: المفاهيم والقضايا الحديثة، تأليف: أحمد المجالي وغسان حمدان، ط:1، 2019.	Yes
Recommended Texts	1- حقوق الانسان والديمقراطية، تأليف: مصطفى كامل محمود،ط:1،2015. 2- تاريخ حقوق الانسان في العصور القديمة والوسطى، تأليف : نبيل رزق، ط:3، 2012. 3- حقوق الانسان في العراق : الواقع والتحديات، تأليف :سعدالله عباس، ط:1، 2014. 4- حقوق الانسان في العراق: المفهوم والتطور، تأليف: عبد الكريم السامرائي، ط:1، 2018. 5- حقوق الانسان في العراق: بين التحديات والافاق، تأليف : محمد السامرائي ولقاء الحربي، ط:1، 2020.	yes

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Workshop**			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**EMTE1204**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader	Ahmed Abbas khalaf		**e-mail**	ahmad1965@mtu.edu.iq	
Module Leader's Acad. Title	Assist Prof		**Module Leader's Qualification**	M.S.C	
Module Tutor	Dr.Mustafa Ahmed Rejab		**e-mail**	dr.mustafaAlnagar@mtu.edu.iq	
Peer Reviewer Name	Dr.Mohammed Yaseen		**e-mail**	mohammedabd84@mtu.edu.iq	
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• To provide students with a comprehensive understanding of engineering materials and their properties. • To develop practical skills in various material processing techniques, including welding, casting, blacksmithing, automotive maintenance, and turning. • To instill knowledge of occupational safety practices in workshops and laboratories. • To enhance students' ability to analyze and solve engineering problems related to material selection and processing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Demonstrate practical skills in welding, casting, blacksmithing, automotive maintenance, and turning. • Apply theoretical knowledge to select appropriate materials and processing techniques for specific engineering applications. • Conduct tests to evaluate the mechanical properties of materials and analyze the results. • Understand and implement safety practices in workshop environments. • Communicate effectively the principles and techniques of engineering materials through written and oral presentations.
Indicative Contents المحتويات الارشادية	• Introduction to engineering materials and their classifications • Welding techniques and safety practices • Metal casting processes and applications

Learning and Teaching Strategies استراتيجيات التعلم والتعليم
Utilize a combination of lectures and practical workshops to provide theoretical knowledge and hands-on experience in engineering materials and processing techniques. Incorporate group projects, case studies, and guest lectures to enhance collaboration, critical thinking, and industry insights.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem)	56	**Unstructured SWL (h/w)**	3.7

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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**		20%	5,10	
	Assignments				
	Report		60%	weekly	
Summative assessment	**Midterm Exam**				
	Final Exam		20%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Occupational safety and its importance in welding workshops, Introduction to the basics of welding, Electric arc exercise, Welding straight lines in a circular motion (helical)
Week 2	Welding straight lines with a crescent movement and other welding methods, Construction welding exercise
Week 3	Welding two pieces together, Written exam in practical exercises
Week 4	Occupational safety and its importance in plumbing workshops, Introduction to the basics of metal casting, Simple wooden disc exercise, Half workout
Week 5	Wheel exercise, Pushing arm exercise
Week 6	Complete pulley exercise, Circular pole exercise, Written exam in practical exercises
Week 7	Occupational safety and its importance in blacksmithing workshops, Introduction to the basics of blacksmithing, Barbell adjustment exercise, Eight-star exercise, Exercise forming the number eight in English, Six formation exercises in English

Week 8	Exercise forming the number five in English, Exercise forming the number nine in English, Exercise in forming an iron model in the form of a circle
Week 9	S-shape exercise, Air hammer hot barbell exercise, Exercise to form a circle on an electric bending machine, Exercising cold and hot ornament formation, Written exam in practical exercises
Week 10	Occupational safety and its importance in car maintenance workshops, Introduction to cars and their basic parts, Parts of the engine, how it works, types of engines, and methods of classification
Week 11	Open the engine and identify the parts, Lubrication system, Cooling system
Week 12	The fuel system, The old and new ignition circuits, Written exam in practical exercises
Week 13	Introduction to lathe machines and identifying their parts, Measuring tools and the use of an oven measuring instrument, Circular column lathing exercise on different diameters
Week 14	Exercise using the pen (semicircular R) brackets, Exercise in making different angles using a pen (square + angle pen 55)
Week 15	Making shaft with different diameter exercises using (left and right pen), Workout (Tube Connection), Written exam in practical exercises

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Materials Science and Engineering: An Introduction by William D. Callister Jr. • Fundamentals of Materials Science and Engineering by William F. Smith	
Recommended Texts	• Materials Science: An Introduction to Properties, Applications, and Design by J. C. Anderson • **Physical** Metallurgy Principles by Reza Malekian	
Websites	Engineering Toolbox: www.engineeringtoolbox.com	

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.

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Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Engineering Mechanics			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE1205				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	1		**Semester of Delivery**	2	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader	Mohammed Yaseen Abdullah		**e-mail**	mohammedabd84@mtu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PHD	
Module Tutor	Esraa Khadhum Ibraheem		**e-mail**		
Peer Reviewer Name	Ahmed Baqer		**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	- To provide a comprehensive understanding of the principles of statics and mechanics of materials. - To develop analytical skills for solving problems related to forces, friction, centroids, and moments of inertia. - To apply theoretical concepts to practical applications in engineering and mechanics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- Analyze two-dimensional and three-dimensional force systems to determine resultant forces. - Evaluate the friction coefficients between different surfaces and understand their implications in engineering applications. - Calculate centroids and centers of gravity for various shapes and composite areas. - Investigate and apply Hook's Law to understand the behavior of materials under load. - Communicate findings effectively through written reports and presentations.
Indicative Contents المحتويات الإرشادية	Statics, force systems, resultant forces, two-dimensional analysis, three-dimensional analysis, friction principles, coefficient of friction, centroids, centers of gravity, composite areas, Hook's Law, helical springs, problem-solving techniques.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures and interactive discussions will introduce theoretical concepts, supplemented by practical workshops to enhance hands-on experience in problem-solving. Collaborative group projects and case studies will foster teamwork and critical thinking, while demonstrations and real-world applications will reinforce learning. Assessments will include practical exams, written assignments, and peer evaluations to ensure understanding and skill development.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	81	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	10% (10)	5,10	
	Assignments	1	10% (10)	2,12	
	Projects / Lab.		15% (15)		
	Report		5% (5)		
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	4hr	50% (40 + 10)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to statics: Scalar quantity, vector quantity, standard units
Week 2	Two-dimensional force systems: Rectangular components
Week 3	Moment: Principle of moment, Couple, Couple-force system
Week 4	Resultants in two-dimensional force systems
Week 5	Moment in three-dimensional force systems
Week 6	Couple in three-dimensional force systems
Week 7	Couple-force system in three-dimensional force systems
Week 8	Resultant in three-dimensional force systems
Week 9	Equilibrium and free body diagram
Week 10	Mid-term Exam
Week 11	Friction
Week 12	Types of friction problems
Week 13	Centroids of lines and areas
Week 14	Moment of inertia - composite area
Week 15	Moment of inertia - composite area

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Weeks 1, 2, 3	The determination of the resultant of two forces (or more)
Weeks 4, 5, 6	The determination of the friction coefficient between two surfaces
Weeks 7, 8, 9	Centroids and center of gravity
Weeks 10, 11, 12	Center of gravity of composite areas
Weeks 13, 14	The investigation of Hook's law using helical springs
Week 15	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	- *Engineering Mechanics: Statics* by J.L. Meriam and L.G. Kraige - *Mechanics of Materials* by Ferdinand P. Beer and E. Russell Johnston Jr.	Yes
Recommended Texts	- *Statics and Mechanics of Materials* by George F. Limbrunner and William F. Riley - *Vector Mechanics for Engineers: Statics* by Ferdinand P. Beer, E. Russell Johnston Jr., and John T. DeWolf	No
Websites	Engineering Toolbox: www.engineeringtoolbox.com (for reference materials and engineering calculators)	

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

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Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electronic Physics			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE1206				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	2	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader	Ahmed Aizaldeen Abdullah		**e-mail**	Handsome.eng82@mtu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.S.C	
Module Tutor	Saif Talal Behar		**e-mail**	saif.talal@mtu.edu.iq	
Peer Reviewer Name	Wadhah Esmaeel		**e-mail**	wadhah.esmaeel87@mtu.edu.iq	
Scientific Committee Approval Date	10/20/2024		**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 Aims أهداف المادة الدراسية	• To provide a comprehensive understanding of the principles of electronics and semiconductor devices. • To develop practical skills in designing, analyzing, and troubleshooting electronic circuits. • To introduce students to various applications of semiconductor technology in modern electronic systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Explain the fundamental concepts of electronic components and their functions. • Analyze and design basic electronic circuits, including diodes and transistors. • Understand the operation and characteristics of semiconductor devices, including diodes, BJTs, and FETs. • Apply knowledge of circuit theory to solve practical problems in electronics. • Demonstrate proficiency in using laboratory equipment for circuit testing and analysis. • Evaluate the performance of semiconductor devices in various applications.
Indicative Contents المحتويات الإرشادية	Electronic Components, Atomic Structure, Electrical Properties, Diodes, Transistors, Circuit Analysis, Rectifiers, Amplifiers, Switching Circuits, Practical Experiments, Emerging Technologies.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures, laboratory work, group projects, case studies, problem-based learning, interactive simulations, guest lectures, online resources, quizzes and assessments, and feedback mechanisms.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	31	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.1
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**	1	10% (10)	5,10	
	Assignments	1	10% (10)	2,12	
	Projects / Lab.		15% (15)		
	Report		5% (5)		
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	4hr	50% (40 + 10)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to materials science and engineering
Week 2	Atomic structure and interatomic bonding
Week 3	Physical properties; Electrical properties; Electrical conduction in metals (Mobility and conductivity, Energy distribution of electrons, Fermi level)
Week 4	Semiconductors (Semiconductor materials: Si, Ge, and compound semiconductors, Extrinsic semiconductors, Fermi level in semiconductors)
Week 5	Semiconductor P-N junction; P-N junction in equilibrium; Current-voltage characteristics
Week 6	Charge control; Description of a diode; Transition and diffusion capacitances
Week 7	Diode models
Week 8	Diode switching times
Week 9	Clipping and clamping
Week 10	Mid-term exam
Week 11	Other types of semiconductor diodes; Varactor diode
Week 12	Photodiode and photovoltaic (solar) cell
Week 13	Light-emitting diode
Week 14	Principle and operation of semiconductor laser
Week 15	Field-effect unipolar transistor construction

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Characteristics Diode
Week 2	Half wave rectifier
Week 3	Full wave rectifier
Week 4	Clipper Circuit
Week 5	Clamper Circuit
Week 6	Voltage Multipliers
Week 7	Other Diode applications (AND circuit)
Week 8	Other Diode applications (OR circuit)
Week 9	Zener Diode characteristics
Week 10	Zener regulator
Week 11	BJT characteristics
Week 12	FET characteristics
Week 13	Transistor Amplifier Circuits
Week 14	Operational Amplifier Applications
Week 15	Rectifier Efficiency and Ripple Factor Measurement

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• "Microelectronic Circuits" by Adel S. Sedra and Kenneth C. Smith • "Electronic Devices and Circuit Theory" by Robert L. Boylestad and Louis Nashelsky	Yes
Recommended Texts	• "The Art of Electronics" by Paul Horowitz and Winfield Hill • "Semiconductor Physics and Devices" by Donald A. Neamen	No
Websites	All About Circuits https://www.allaboutcircuits.com/	

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
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Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Digital Electronics			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE1207				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	2	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader	Ziyad Qays Abdulkareem		**e-mail**	ziad.al-abbasi@mtu.edu.iq	
Module Leader's Acad. Title	Assist Prof		**Module Leader's Qualification**	PHD	
Module Tutor	Wadhah Esmaeel Ibraheem		**e-mail**	wadhah.esmaeel87@mtu.edu.iq	
Peer Reviewer Name	Saif Talal		**e-mail**	saif.talal@mtu.edu.iq	
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• To provide a foundational understanding of digital techniques and number systems. • To develop skills in the design and analysis of digital circuits using Boolean algebra and logic functions. • To equip students with practical knowledge of digital components and their applications in real-world scenarios.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Explain the principles of digital techniques and number systems. • Perform number base conversions and arithmetic operations on signed numbers. • Apply Boolean algebra to simplify digital circuits. • Design and analyze combinational circuits using SOP and POS forms. • Construct and utilize various digital components such as adders, subtractors, decoders, and multiplexers. • Understand and implement flip-flops and their applications in digital systems. • Solve practical problems related to digital circuits and demonstrate the ability to convert codes and verify data integrity using parity checkers.
Indicative Contents المحتويات الإرشادية	Digital Techniques, Number Systems, Number Base Conversion, Signed Numbers, Arithmetic Operations, Boolean Algebra, DeMorgan Theorem, Circuit Simplification.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures, hands-on labs, group projects, problem-solving sessions, interactive software tools, case studies, online resources, quizzes and assessments, feedback discussions, guest lectures.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.1
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**	1	10% (10)	5,10	
	Assignments	1	10% (10)	2,12	
	Projects / Lab.		15% (15)		
	Report		5% (5)		
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	4hr	50% (40 + 10)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to digital techniques Number systems Number base conversion Number base conversion
Week 2	Signed numbers Arithmetic operations Boolean algebra
Week 3	DeMorgan theorm Simplification for digital circuits
Week 4	SOP and POS
Week 5	Half and full Adders
Week 6	Subtractor and parallel adders
Week 7	Decoders and Encoders
Week 8	Comparators
Week 9	Multiplexers and Demultiplexers

Week 10	Parity checkers
Week 11	Code conversion
Week 12	Flip-Flop
Week 13	Application examples
Week 14	Review
Week 15	Exam

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Introduction to digital techniques
Week 2	Number systems
Week 3	Number base conversion
Week 4	Signed numbers
Week 5	Arithmetic operations
Week 6	Boolean algebra
Week 7	DeMorgan theorem
Week 8	Simplification for digital circuits
Week 9	Sum of Products (SOP) and Product of Sums (POS)
Week 10	Half adders
Week 11	Full adders
Week 12	Subtractors
Week 13	Parallel adders
Week 14	Decoders
Week 15	Encoders

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• "Digital Design" by M. Morris Mano • "Fundamentals of Logic Design" by Charles H. Roth Jr.	Yes

Recommended Texts	• "Digital Fundamentals" by Thomas L. Floyd • "Logic and Computer Design Fundamentals" by M. Morris Mano and Michael D. Ciletti	No
Websites	All About Circuits https://www.allaboutcircuits.com/	

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Arabic Language I**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MTU1001**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.S.C	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• التعرف على أنواع الأخطاء اللغوية الشائعة، أسبابها، وكيفية تصحيحها. • تعلم قواعد الإملاء الخاصة بالراء الممدودة والراء المفتوحة وكيفية كتابتها بشكل صحيح. • التعرف على قواعد كتابة الألف الممدودة والمقصورة واستخدام الحروف الشمسية والقمرية بشكل صحيح. • التفريق بين الضاد والظاء ومعرفة كيفية استخدامهما بشكل صحيح في الكتابة. • تعلم قواعد كتابة الهمزة بشكل صحيح وفقًا للقواعد اللغوية. • فهم علامات الترقيم واستخدامها بشكل صحيح في النصوص. • التفريق بين الاسم والفعل وتمييز استخدامهما في الجمل. • فهم المفاعيل واستخدامها بشكل صحيح في النصوص. • التعبير عن الكميات باستخدام الأعداد بشكل صحيح. • التعرف على الأخطاء اللغوية الشائعة وتصحيحها لتعزيز فهم القواعد وتحسين المهارات اللغوية. • دراسة التنوين والنون وفهم معاني حروف الجر واستخدامها بشكل صحيح. • التركيز على أشكال الخطاب الإداري وكيفية كتابته بأسلوب صحيح ومنظم. • فهم لغة الخطاب الإداري واستخدامها في التواصل الإداري. • تطبيق المفاهيم والمهارات المكتسبة في كتابة المراسلات الإدارية.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• قدرة الطلاب على تحليل الأخطاء اللغوية الشائعة وتطبيق القواعد الصحيحة لتصحيحها. • استخدام القواعد النحوية المتعلقة بالإملاء بشكل صحيح. • كتابة الألف الممدودة والمقصورة بشكل صحيح واستخدام الحروف الشمسية والقمرية بشكل دقيق. • التمييز بين الضاد والظاء وتطبيق القواعد الصحيحة في الكتابة. • كتابة الهمزة وفق القواعد اللغوية بشكل دقيق. • استخدام علامات الترقيم بشكل صحيح في النصوص. • فهم الفرق بين الاسم والفعل واستخدامهما بشكل صحيح. • تطبيق قواعد المفاعيل بشكل دقيق في النصوص. • استخدام الأعداد بشكل صحيح في التعبير عن الكميات. • تصحيح الأخطاء الشائعة وتطبيقها في النصوص العملية. • استخدام التنوين وفهم معاني حروف الجر واستخدامها في الجمل. • كتابة الخطاب الإداري بأسلوب صحيح ومنظم. • تطبيق المفاهيم المكتسبة في كتابة المراسلات الإدارية.
Indicative Contents المحتويات الإرشادية	• مقدمة عن الأخطاء اللغوية: الراء المشبعة والطويلة والراء المفتوحة. • قواعد كتابة الألف الممدودة والمقصورة والتعرف على الحروف الشمسية والقمرية. • دراسة الفرق بين الضاد والظاء وتعلم كتابة كل منهما. • تعلم كتابة الهمزة بشكل صحيح وفقًا للقواعد. • دراسة علامات الترقيم وتعلم استخدامها بشكل دقيق. • التعرف على الاسم والفعل والتفريق بينهما. • دراسة المفاعيل وتعلم استخدامها في النصوص. • التعرف على الأعداد واستخدامها بشكل صحيح في الجمل.

	• دراسة الأخطاء اللغوية الشائعة وتصحيحها. • دراسة التنوين وفهم معاني حروف الجر واستخدامها. • التعرف على بنية الخطاب الإداري وفهم لغته وقواعده. • دراسة نماذج من المراسلات الإدارية وتطبيقها.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• التفاعل النشط: تشجيع المشاركة الفعالة من خلال المناقشات والأنشطة التفاعلية. • التعلم التعاوني: تشجيع العمل الجماعي وتعزيز التعاون بين الطلاب. • التطبيق العملي: تقديم فرص لتطبيق المفاهيم في سياقات عملية. • استخدام التكنولوجيا الحديثة: مثل البحث عبر الإنترنت والتعلم الذاتي. • توفير التغذية الراجعة: تقديم ملاحظات شفوية وكتابية لتحسين الأداء. • تنويع وسائل التعليم: استخدام المحاضرات، المناقشات، الأنشطة العملية، والعروض التقديمية.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	مقدمة عن الأخطاء اللغوية – الراء المشبعة والطويلة
Week 2	الحروف الشمسية والقمرية – كتابة الألف الممدودة والمقصورة
Week 3	الضاد والظاء
Week 4	كتابة الهمزة
Week 5	علامات الترقيم
Week 6	الاسم والفعل
Week 7	المفاعيل والأعداد
Week 8	امتحان منتصف الفصل
Week 9-10	تطبيقات الأخطاء الشائعة
Week 11	التنوين ومعاني حروف الجر
Week 12	بنية الخطاب الإداري
Week 13	نماذج من المراسلات الإدارية
Week 14-15	التحضير للامتحان النهائي

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"أخطاء لغوية شائعة" - تأليف: خالد بن هلال بن ناصر العنثري. "قواعد الإملاء وعلامات الترقيم" - تأليف: عبد السلام هارون.	
Recommended Texts	"ألفاظ الكلام العربي من حيث الشكل والوظيفة" - تأليف: فاضل مصطفى الغاق.	

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.

Ministry of Higher Education and Scientific Research – Iraq
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Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Engineering and Electrical Drawing			**Module Delivery**	
Module Type	Core			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE1208				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	2	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader	Samiya Ahmed Nazzal		**e-mail**	samia-ahmed@mtu.edu.iq	
Module Leader's Acad. Title	Assist Lecturer		**Module Leader's Qualification**	M.S.C	
Module Tutor	Nuha Adnan Hussain		**e-mail**		
Peer Reviewer Name	Wissam Nibras		**e-mail**		
Scientific Committee Approval Date	10/20/2024		**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 Aims أهداف المادة الدراسية	• To provide students with foundational knowledge and practical skills in using AutoCAD for 2D and 3D design. • To develop the ability to create, modify, and annotate technical drawings using AutoCAD. • To enhance students' understanding of drafting standards and conventions relevant to engineering and architectural design.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- Demonstrate proficiency in navigating the AutoCAD interface and utilizing its tools. - Create and edit basic 2D objects and drawings using AutoCAD. - Apply coordinate systems and object snap features for precise drawing. - Use construction aids to assist in drafting and design processes. - Understand and create solid and curved objects in AutoCAD. - Modify and manipulate existing objects efficiently. - Generate orthographic and isometric projections for technical drawings. • - Prepare comprehensive drawings suitable for presentation or production.
Indicative Contents المحتويات الإرشادية	AutoCAD, foundational knowledge, practical skills, 2D design, 3D design, drafting standards, proficiency, interface, tools, create drawings, edit objects, coordinate systems, object snap, construction aids, solid objects, curved objects, modify objects, orthographic projections, isometric projections
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures, hands-on practice, demonstrations, group projects, interactive tutorials, problem-based learning, quizzes and assessments, feedback sessions, guest lectures, online resources.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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**	3	40%	1-10, 11-15	
	Assignments				
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	1hr	10%	10	
	Final Exam	4hr	50%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Tour of AutoCAD
Week 2	User Interface
Week 3	Entering commands
Week 4	Basic Objects
Week 5	Object selection
Week 6	Entering coordinates
Week 7	Object snap
Week 8	Construction Aids
Week 9	Solid and curved objects
Week 10	Mid-term Exam
Week 11	Moving and Duplicating Objects
Week 12	Modifying and Maneuvering
Week 13	Orthographic projection
Week 14	Isometric Projection
Week 15	Preparing for the final exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• "AutoCAD for Dummies" by Bill Fane and David Reed • "Mastering AutoCAD 2023 and AutoCAD LT 2023" by George Omura and Brian C. Benton	Yes
Recommended Texts	• "AutoCAD 2023: A Problem-Solving Approach" by Sham Tickoo • "Beginning AutoCAD 2023" by Elliot Gindis	No
Websites	https://www.cadtutor.net/#google_vignette	

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Advanced Mathematics			**Module Delivery**	
Module Type	Support			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE2309				
ECTS Credits	7				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	3	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• To develop students' understanding of advanced calculus, including partial differentiation, vectors, and series. • To provide skills for solving ordinary differential equations (ODEs) and applications using methods like Laplace transforms. • To prepare students for applying calculus concepts to complex, multi-variable problems in engineering and science.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• By the end of this module, students should be able to: • Differentiate multi-variable functions and apply chain rules for variable changes. • Solve first and second-order ordinary differential equations using separation of variables, integration factors, and Laplace transforms. • Understand and apply the principles of Laplace transforms to ODEs. • Perform vector operations, including dot and cross products, for applications in physics and engineering. • Analyze and solve problems using Taylor, Maclaurin, and Fourier series for function approximation.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Partial differentiation, chain rule, ordinary differential equations, Laplace transforms, vector operations, Taylor and Maclaurin series, Fourier series, and applications.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	111	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Partial differentiation for functions with two or more variables, first and higher order derivatives
Week 2	Chain rule for change of variables with two or more independent variables
Week 3	Principles of first-order ordinary differential equations, solving techniques using separation of variables and integration factors
Week 4	Principles of second-order ordinary differential equations
Week 5	Solving second-order differential equations, homogeneous and non-homogeneous types
Week 6	Introduction to Laplace transforms and anti-Laplace transforms
Week 7	Application of Laplace transforms in differential equations
Week 8	Mid-term Exam
Week 9	Definition and operations of vectors
Week 10	Dot product and cross product of vectors
Week 11	Definition of sequences and problem-solving

Week 12	Taylor and Maclaurin series definitions and applications
Week 13	Fourier series definitions and applications
Week 14	Discussion and review of topics
Week 15	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. "Thomas Calculus" G. Thomas, M. Weir, et al., 11th edition, 2004. 2. "Calculus II"; by Paul Dawkins, 2007. 3. "Engineering Mathematics", by John Bird, 5th edition, Elsevier Ltd., 2007. 4. "Engineering Mathematics", by K.A. Stroud, First edition, MACMILLAN and CO LTD, 1970.	
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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Strength of Materials			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE2310				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	1		**Semester of Delivery**	3	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	10/20/2024		**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 Aims أهداف المادة الدراسية	• To introduce foundational concepts in stress, strain, and deformation of materials, enhancing the understanding of material behavior under various loading conditions. • To equip students with analytical and problem-solving skills for applications in structural and mechanical systems. • To provide insight into failure theories and material performance, preparing students for advanced studies in engineering mechanics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Explain fundamental concepts of stress, strain, and elasticity, including axial, biaxial, and thermal stresses. • Apply knowledge of mechanical properties to analyze stress distributions in beams, columns, and vessels. • Solve problems involving statically indeterminate structures and evaluate impact loads and torsional stresses. • Use Mohr's Circle for stress transformation and apply failure theories to material design. • Calculate deflection and understand stability in structural elements using methods like bending moment diagrams and the moment area method.
Indicative Contents المحتويات الإرشادية	Stress and strain concepts, Poisson's ratio, Hooke's law, biaxial and thermal stresses, structural stresses in thin/thick wall vessels, joint stress, statically indeterminate problems, torsion in circular shafts, shear stress and strain, bending moment and shear force diagrams, beam deflection and loading, stress transformation, Mohr's Circle, axial stress and strain theories, column buckling, moment area method, and failure theories.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures, hands-on practice, demonstrations, group projects, interactive tutorials, problem-based learning, quizzes and assessments, feedback sessions, guest lectures, online resources.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	109	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	66	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	10% (10)	5,10	
	Assignments	1	10% (10)	2,12	
	Projects / Lab.		15% (15)		
	Report		5% (5)		
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	4hr	50% (40 + 10)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Concept of stress (Tension and compression), Poisson's ratio, Hooke's law
Week 2	Application of Poisson's ratio on biaxial stresses, Axial load on composite bar
Week 3	Thermal stresses, Composite rods and pipes
Week 4	Stresses on thin-wall vessels, Stresses on thick-wall vessels
Week 5	Joint stress, Statically indeterminate problems
Week 6	Impact load, Elastic and plastic deformation, Torsion formula for solid circular shafts
Week 7	Shear stress, Strain, and Twisting
Week 8	Maximum shear stress and Torque, Bending moment diagram, Shear force diagram
Week 9	Beams, Deflection of beams, Stress on beams
Week 10	Shear force diagram in beams, Beam loading
Week 11	Stresses and Bending stress, Stress transformation, Mohr's Circle
Week 12	Mohr's Circle, Axial stress, and Strain theory
Week 13	Columns, Buckling of columns
Week 14	Moment area method, Theory of shear stress and strain
Week 15	Bending stresses in beams, Failure theory

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Weeks 1-2	Tensile Test
Weeks 3-5	Compression Test
Weeks 6-8	Impact Test
Weeks 9-10	Torsion Test
Week 11	Spring Test
Week 12	Fatigue Test
Weeks 13-15	Bending Test – Deflection Test

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Mechanics of Materials by Ferdinand P. Beer and E. Russell Johnston Jr. • Mechanics of Materials by James M. Gere and Barry J. Goodno.	Yes
Recommended Texts	• Strength of Materials by S. Timoshenko and J. N. Goodier. • Introduction to Solid Mechanics by Irving H. Shames.	No
Websites	https://www.coursera.org/courses?query=mechanics%20of%20materials	

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

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Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electrical circuits			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE2311				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	1		**Semester of Delivery**	3	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	10/20/2024		**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 Aims أهداف المادة الدراسية	This module aims to build students' understanding and technical skills in electric circuit theory, electromagnetic principles, transient response, and system analysis techniques essential for engineering applications and advanced study.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completing this module, students will be able to: • Demonstrate an understanding of core electrical circuit concepts, including inductance, polyphase systems, and transient analysis. • Apply analytical methods to solve first- and second-order circuit problems. • Utilize operational amplifiers and filter designs in circuit applications. • Perform circuit analysis in the frequency domain, including Laplace and Fourier methods. • Interpret and analyze two-port networks for complex circuit interconnections.
Indicative Contents المحتويات الإرشادية	Electric circuits, mutual inductance, polyphase systems, transient and frequency response, operational amplifiers, active filter design, two-port network theory, Laplace and Fourier transforms, and circuit interconnections.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures, hands-on practice, demonstrations, group projects, interactive tutorials, problem-based learning, quizzes and assessments, feedback sessions, guest lectures, online resources.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	109	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	66	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	10% (10)	5,10	
	Assignments	1	10% (10)	2,12	
	Projects / Lab.		15% (15)		
	Report		5% (5)		
Summative assessment	Midterm Exam	2hr	10% (10)	7	
	Final Exam	4hr	50% (40 + 10)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	First Order Circuit: Source-free RC and RL circuits, Singularity functions.
Week 2	Step Response: Step response of RC and RL circuits.
Week 3	Second Order Circuit: Initial and final values, Source-free series RLC circuit.
Week 4	Second Order Circuit: Source-free parallel RLC circuit, step response of series RLC circuit.
Week 5	Second Order Circuit: Step response of parallel RLC circuit, general second-order circuits.
Week 6	Magnetically Coupled Circuits: Mutual inductance, energy in coupled circuits, linear transformers.
Week 7	Transformers: Ideal transformers, ideal autotransformers.
Week 8	Three-Phase Transformers and Frequency Response: Transfer function.
Week 9	Frequency Response: Decibel scale, Bode plots, series resonance.
Week 10	Frequency Response and Filters: Parallel resonance, active filters, impedance parameters.
Week 11	Two-Port Networks: Admittance parameters, hybrid parameters.
Week 12	Transmission Parameters and Three-Phase Circuits: Balanced three-phase voltages.
Week 13	Three-Phase Circuits: Balanced Delta-Delta connection.
Week 14	Three-Phase Circuits: Balanced Delta-Wye connection, power in balanced systems.
Week 15	Unbalanced Three-Phase Systems: Power measurement in unbalanced systems.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Nodal Theorem
Week 2	Series RL Circuits
Week 3	Series RC Circuits
Week 4	Natural Response of a Series RLC Circuit
Week 5	Step Response of a Series RLC Circuit
Week 6	Natural Response of Parallel RLC Circuits
Week 7	Step Response of Parallel RLC Circuits
Week 8	Low-Pass Filters
Week 9	High-Pass Filters
Week 10	Power Factor Correction
Week 11	Transformer
Week 12	Transformer
Week 13	Transformer
Week 14	Transformer
Week 15	Transformer

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• "Electric Circuits" by James W. Nilsson and Susan Riedel • "Fundamentals of Electric Circuits" by Charles K. Alexander and Matthew N.O. Sadiku	Yes
Recommended Texts	• "Microelectronic Circuits" by Adel S. Sedra and Kenneth C. Smith • "Engineering Circuit Analysis" by William H. Hayt, Jack Kemmerly, and Steven M. Durbin	No
Websites	**All About Circuits** Worksheets and tutorials on electrical engineering principles.	

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

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Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	DC Electrical Machine			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE2312				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	3	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	10/20/2024		**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 Aims أهداف المادة الدراسية	The module aims to provide foundational knowledge and practical skills in electromechanical systems, focusing on DC machines, transformers, and key aspects of machine operation and efficiency. It aims to develop understanding in machine construction, principles, characteristics, and control methods, and enhance problem-solving skills for practical engineering applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Explain the construction, working principles, and applications of DC generators, DC motors, single-phase transformers. • Analyze and solve problems related to EMF, torque equations, armature reactions, and losses in electrical machines. • Evaluate the performance of DC machines, including efficiency, torque-speed characteristics, and control methods. • Understand and apply principles of transformer and induction motor operation in three-phase systems. • Conduct practical assessments on electrical machines, interpreting results to evaluate machine characteristics and operational efficiency.
Indicative Contents المحتويات الإرشادية	Electric circuits, mutual inductance, polyphase systems, transient and frequency response, operational amplifiers, active filter design, two-port network theory, Laplace and Fourier transforms, and circuit interconnections.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures, hands-on practice, demonstrations, group projects, interactive tutorials, problem-based learning, quizzes and assessments, feedback sessions, guest lectures, online resources.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	56	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.7
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	1	10% (10)	5,10	
	Assignments	1	10% (10)	2,12	
	Projects / Lab.		15% (15)		
	Report		5% (5)		
Summative assessment	Midterm Exam	2hr	10% (10)	7	
	Final Exam	4hr	50% (40 + 10)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction, Construction, and Principle of DC Generator
Week 2	Lap and Wave Winding, EMF and Torque Equation
Week 3	Armature Reaction and Commutation, Types of Generators
Week 4	Equivalent Circuit of DC Generators
Week 5	Construction and Principle of DC Motor, Types of Motors, Armature Torque Characteristics
Week 6	Equivalent Circuit of the Motor, Torque-Speed Characteristics
Week 7	Losses and Efficiency of DC Motors, Starting and Braking
Week 8	Speed Control Methods of DC Motors
Week 9	Field control methods and their applications
Week 10	Maintenance and troubleshooting of DC machines
Week 11	Special types of DC motors (e.g., series, shunt, and compound)
Week 12	Applications of DC machines in industrial settings
Week 13	Introduction to AC machines and their principles
Week 14	Overview of electromechanical energy conversion
Week 15	Preparing to the Exam

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Operation and loaded operation of the separately excited DC shunt generator.
Week 2	No-load and loaded operation of the self-excited DC shunt generator.
Week 3	Swinburne's test on a DC shunt generator, no-load operation of the DC series generator.
Week 4	Loaded operation of the DC series generator, load characteristics of a DC cumulatively compound generator.
Week 5	Load characteristics of a DC differentially compound generator.
Week 6	Study of operational working and principles of the DC shunt motor.
Week 7	Study of running/reversing phenomenon and no-load characteristics of a DC shunt motor.
Week 8	Study of load characteristics and brake test on a DC shunt motor.
Week 9	Brake test on a DC series motor.
Week 10	Retardation test on a DC machine.
Week 11	Study of DC shunt motor speed control using armature voltage and flux field control methods.
Week 12	Determine losses and efficiency of a DC shunt motor using Swinburne's test.
Week 13	Hopkinson's test on a pair of DC machines, OC & SC tests on a single-phase transformer.
Week 14	Direct load test on a single-phase transformer, separation of constant losses of a single-phase transformer.
Week 15	Sumpner's test, parallel operation of two dissimilar single-phase transformers, OC & SC tests on a three-phase transformer.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• "Electrical Machinery" by A.E. Fitzgerald, Charles Kingsley, and Stephen D. Umans • "Electric Machines" by Theodore Wildi	Yes
Recommended Texts	• "Fundamentals of Electric Drives" by G. K. Dubey • "Electrical Engineering: Principles and Applications" by Allan R. Hambley	No
Websites	YouTube Channels - Channels such as "The Engineering Mindset" and "Learn Engineering" that provide visual explanations and practical insights into electrical machines and concepts.	

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

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Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	جرائم نظام البعث في العراق			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MTU1007**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	1		**Semester of Delivery**	3	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.S.C	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• المعرفة بانتهاكات الحقوق والحريات من قبل النظام البعثي البائد. • المعرفة باساليب البعث البائد الظالمه التي اثرت على الميدان النفسي والاجتماعي . • المعرفة باثر القمع والحروب على البيئة والسكان
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• معرفة نبذة وصفية عن الانظمة السياسية في العراق .(1921-2003) • معرفة إنتهاكات النظام البعثي للحقوق والحريات العامة. • معرفة أثر سلوكيات النظام البعثي في المجتمع وتسلطه على الدولة • معرفة أثر المرحلة الانتقالية في محاربة السياسة الاستبدادية • معرفة اساليب البعث البائد الظالمة التي اثرت على الميدان النفسي • معرفة اساليب البعث البائد الظالمة التي اثرت على الميدان الاجتماعي • معرفة تعامل حزب البعث البائد مع الدين ومفهوم الدولة • معرفة اساليب حزب البعث • معرفة عسكرة المجتمع • معرفة أستعمال الاسلحة المحرمة دوليا من قبل حزب البعث البائد والتلوث البيئى • معرفة سياسة الارض المحروقة من قبل حزب البعث البائد • معرفة تجفيف الاهوار والهجرة القسرية من قبل حزب البعث البائد • معرفة تدمير البيئة الزراعية والحيوانية والتلوث الاشعاعي من قبل حزب البعث البائد • معرفة المقابر الجماعية وقصف دور العبادة من قبل حزب البعث البائد
Indicative Contents المحتويات الإرشادية	• إنتهاكات الحقوق والحريات

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	• التفاعل النشط: تشجيع المشاركة الفعالة من خلال المناقشات والأنشطة التفاعلية. • التعلم التعاوني: تشجيع العمل الجماعي وتعزيز التعاون بين الطلاب. • التطبيق العملي: تقديم فرص لتطبيق المفاهيم في سياقات عملية. • استخدام التكنولوجيا الحديثة: مثل البحث عبر الإنترنت والتعلم الذاتي. • توفير التغذية الراجعة: تقديم ملاحظات شفوية وكتابية لتحسين الأداء. • تنويع وسائل التعليم: استخدام المحاضرات، المناقشات، الأنشطة العملية، والعروض التقديمية.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	نبذة وصفية عن الأنظمة السياسية في العراق (1921-2003)
Week 2	انتهاكات النظام البعثي للحقوق والحريات العامة
Week 3-4	أثر سلوكيات النظام البعثي في المجتمع وتسلطه على الدولة
Week 5	أثر المرحلة الانتقالية في محاربة السياسة الاستبدادية
Week 6	الميدان النفسي
Week 7	الميدان الاجتماعي
Week 8	الدين والدولة
Week 9	الثقافة والإعلام
Week 10	عسكرة المجتمع
Week 11	استعمال الأسلحة المحرمة دولياً والتلوث البيئي
Week 12	سياسة الأرض المحروقة
Week 13	تجفيف الأهوار والهجرة القسرية
Week 14	تدمير البيئة الزراعية والحيوانية والتلوث الإشعاعي
Week 15	المقابر الجماعية وقصف دور العبادة

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	منهاج جرائم حزب البعث البائد -2023 وزارة التعليم العالي والبحث العلمي – دائرة الدراسات والتخطيط والمتابعة	

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Computer Applications			**Module Delivery**	
Module Type	Support			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MTU1005				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level	1		**Semester of Delivery**	4	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• To introduce students to the basic concepts of computer systems, their components, and their operation. • To equip students with the knowledge and practical skills necessary to use common software applications such as word processors, spreadsheets, and presentation software. • To enhance students' understanding of computer hardware, operating systems, and internet technologies. • To develop problem-solving skills through troubleshooting basic computer hardware and software issues.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Identify and explain computer hardware, software, data, and information. • Create and manage documents, spreadsheets, and presentations. • Use operating systems and navigate GUIs. • Understand basic networking and use the internet and web browsers. • Troubleshoot basic computer hardware and software problems.
Indicative Contents المحتويات الإرشادية	• Introduction to Computers: Overview of hardware, software, and input/output devices. • Computer Components: Identifying CPU, memory, storage, and external devices. • Operating Systems and GUI: Basic OS functions and file management.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	11	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.74

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Computer: Concepts of Hardware and Software, Computing, Data, and Information
Week 2-3	Computer Components: Hardware Parts, I/O Units, Memory Types, CPU, and Ports
Week 4-5	Operating System and Graphical User Interface (GUI) Basics
Week 6-7	Word Processing: Document Creation, Formatting, and Printing
Week 8	Review and Mid Exam
Week 9-10	Spreadsheet: Basics, Formulas, Functions, and Printing
Week 11-12	Presentation Software: Creating and Presenting Slides
Week 13	Internet and Web Browsers: Basics of Networking, Internet Applications, and Web Browsing
Week 14	Communications and Emails: Using Email Accounts and Document Collaboration
Week 15	Computer Troubleshooting: Diagnosing and Resolving Common Issues
Week 16	Preparatory Week Before Final Exam

Week 14	Discussion and review of topics
Week 15	Final Exam

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Introduction to Computers: Concepts of hardware and software components, fundamentals of computing, data, and information. Applications of information electronics and communication technology (IECT). Connecting input/output devices and peripherals to CPU.
Weeks 2-3	Computer Components: Exploration of computer parts and hardware. Identifying I/O units, memory types, and basic CPU components. Familiarizing with computer ports and personal computer features.
Weeks 4-5	Operating System and GUI: Basics of common operating systems. Navigating the user interface using mouse techniques. Utilizing common icons, status bar, menus, and directories. Opening, closing, and creating shortcuts for different windows.
Weeks 6-7	Word Processing: Exploring word processing basics. Opening and closing documents. Text creation, manipulation, and formatting. Handling tables, spell check, language settings, and thesaurus. Printing word documents.
Week 8	Review and Mid-Exam: Review of topics covered so far and mid-course exam.
Weeks 9-10	Spreadsheet: Spreadsheet software basics. Manipulation of cells, formulas, and functions. Editing and printing spreadsheets.
Weeks 11-12	Presentation Software: Fundamentals of presentation software. Creating presentations. Preparing and delivering slide shows. Taking printouts of presentations and handouts.
Week 13	Introduction to Internet and Web Browsers: Computer networking concepts: LAN, WAN. Concept of the internet and its applications. Connecting to the internet and exploring the World Wide Web. Using web browsing software and search engines. Understanding URLs, domain names, and IP addresses.
Week 14	Communications and Emails: Basics of electronic mail. Setting up email accounts. Sending, receiving, and accessing emails. Utilizing email for document collaboration.
Week 15	Computer Troubleshooting: Identifying and solving common hardware issues. Identifying and solving common software problems. Applying basic troubleshooting techniques and tools.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**

Required Texts	[1] G. Brown and D. Watson, "Cambridge IGCSE Information and Communication Technology," 3rd ed. Cambridge, U.K.: Cambridge Univ. Press, 2020. [2] A. Evans, K. Martin, and M. A. Poatsy, "Technology in Action Complete," 16th ed. Boston, MA, USA: Pearson, 2020	
Websites	The Collage E-Library	

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.

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Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Fluids Mechanic			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE2413				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	1		**Semester of Delivery**	4	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• To introduce the fundamental principles of fluid mechanics, including fluid properties, fluid statics, dynamics, and applications to engineering systems such as pumps, turbines, and heat exchangers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Understand fluid properties and behavior in different flow conditions (laminar and turbulent). • Apply fluid mechanics principles to solve real-world engineering problems. • Analyze fluid systems, including flow in pipes and around bodies, using relevant equations (Bernoulli, continuity, Navier-Stokes).
Indicative Contents المحتويات الإرشادية	Introduction to fluid properties (density, viscosity, pressure, etc.), fluid statics, and basic fluid concepts, Fluid dynamics (Bernoulli's equation, flow rate, continuity equation, and fluid flow behavior).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	66	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	

	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Phases of matter and thermodynamic properties of fluids
Week 2	Definition of work, heat, system, types of systems, energy, temperature, pressure, and SI units
Week 3	Properties of a pure substance, phase boundaries, phase change on P-h diagram (fluid-focused)
Week 4	Ideal gas states and fluid properties: Charles' law, Boyle's law, equations of state, specific heat capacity
Week 5	Engineering applications of fluids: mass conservation, work-energy equation in fluid systems
Week 6	Engineering applications of energy equations in fluid systems: boiler, compressor, pump, turbine, throttling device
Week 7	Thermodynamic reversible processes applied to fluid systems (constant pressure, volume, temperature, adiabatic)
Week 8	Thermodynamic irreversible processes in fluid dynamics (heat exchangers, throttling, mixing)
Week 9	Fluid process representation on P-V, T-S, and P-h diagrams, focusing on fluid flow dynamics
Week 10	Principle of fluid motion and flow classification in fluid dynamics
Week 11	Bernoulli’s equation and its application in fluid dynamics
Week 12	Concept of entropy in fluid systems and its role in energy transformations
Week 13	Conservation of energy and conservation of mass in fluid systems

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Flow Visualization and Streamlines: Techniques for visualizing fluid flow using dyes, smoke, or tracers. Study of streamlines and flow patterns.
Week 2	Measurement of Fluid Flow Rate: Methods to measure the flow rate of fluids using flow meters like orifice plates, venturi tubes, or rotameters.
Week 3	Bernoulli’s Theorem in Practice: Experimental verification of Bernoulli’s equation by measuring

	pressure, velocity, and height in fluid flow.
Week 4	Viscosity of Fluids: Determining the viscosity of fluids using capillary tubes or rotational viscometers. Studying the effect of temperature on viscosity.
Week 5	Reynolds Number and Flow Regimes: Determining Reynolds number and studying the transition from laminar to turbulent flow.
Week 6	Measurement of Fluid Velocity Profile: Using Pitot tubes or laser Doppler anemometry to measure fluid velocity profiles.
Week 7	Orifice Flow and Discharge Coefficient: Study of flow through orifices and determination of discharge coefficient.
Week 8	Flow in Pipes (Head Loss and Friction Factors): Measuring head loss in pipes, calculating friction factors, and comparing with theoretical predictions.
Week 9	Flow in Open Channels: Study of flow in open channels and measurement of discharge and velocity in systems like flumes or weirs.
Week 10	Hydraulic Machines and Pumps: Performance testing of centrifugal pumps, reciprocating pumps, and other hydraulic machinery.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introduction to Fluid Mechanics ،Robert W. Fox و Alan T. McDonald ،Wiley Fluid Mechanics ،Frank M. White ،McGraw-Hill Education	
Websites	https://ocw.mit.edu/courses/mechanical-engineering/2-50-fluid-mechanics-fall-2013/ https://phet.colorado.edu/en/simulations/category/physics	

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.

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Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Thermodynamic			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE2414				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	1		**Semester of Delivery**	4	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• To provide a comprehensive understanding of thermodynamic principles, laws, and processes, focusing on energy conservation, heat transfer, and the behavior of substances under various thermodynamic conditions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Grasp the basic laws of thermodynamics (First, Second, Zero). • Calculate work, heat, and efficiency in various thermodynamic processes (e.g., ideal gas, refrigeration cycles). • Analyze thermodynamic cycles like Rankine, Brayton, and refrigeration systems.
Indicative Contents المحتويات الإرشادية	Basic concepts (work, heat, energy, and systems).The laws of thermodynamics (First, Second, Zero Law).Ideal gas laws and thermodynamic processes (isobaric, isochoric, isothermal).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم			
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials		
Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	109	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	51	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	

	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Dimensions, energies, phases of matter, units of measurement, and thermodynamic properties of fluids
Week 2	Definition of work, heat, system, types of systems, energy, temperature, pressure, and SI units
Week 3	Properties of a pure substance, phase boundaries, phase change on P-h diagram, thermodynamic properties of steam and R134a
Week 4	Ideal gas states: Charles' law, Boyle's law, equations of state, specific heat capacity at constant pressure and volume
Week 5	First law of thermodynamics, zero law of thermodynamics, definition of work, energy equation for open systems, mass conservation
Week 6	Engineering applications of energy equations in open systems: boiler, compressor, pump, turbine, throttling device
Week 7	Thermodynamic reversible processes (pure substance and ideal gas): constant pressure, constant volume, constant temperature, hyperbolic, adiabatic, and polytropic processes
Week 8	Thermodynamic irreversible processes (pure substance and ideal gas): adiabatic mixing, heat exchanger, separator, throttling
Week 9	Process representation on P-V, T-S, and P-h diagrams for constant volume, constant temperature, hyperbolic, adiabatic, and polytropic processes
Week 10	Principle of fluid motion and flow classification (theoretical thermodynamics)
Week 11	Bernoulli’s equation (relation to energy conservation in thermodynamic processes)
Week 12	Concept of entropy in thermodynamic systems
Week 13	Conservation of energy and conservation of mass (applied thermodynamics)

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Measurement of Temperature and Pressure: Techniques to measure temperature and pressure in

	various thermodynamic systems.
Week 2	Calorimetry: Determining the specific heat capacity of different materials using calorimeters.
Week 3	Adiabatic Expansion of Gas: Study of the adiabatic expansion process of gases and its effect on pressure and temperature.
Week 4	Isothermal Compression/Expansion: Experiment to observe the behavior of gases under isothermal compression and expansion.
Week 5	Joule-Thomson Effect: Investigation of the Joule-Thomson effect and the change in temperature during the expansion of gases.
Week 6	Steam Boiler Performance: Testing the efficiency of steam boilers, including heat transfer and energy conversion.
Week 7	Thermodynamic Cycles: Study of Rankine or Brayton cycles through practical setup, measuring work and heat transfer.
Week 8	Compressors and Pumps: Experimental analysis of compressors and pumps in thermodynamic systems.
Week 9	Entropy Measurement: Experiment to measure and calculate entropy changes in different thermodynamic processes.
Week 10	Heat Exchanger Efficiency: Study of heat exchangers, heat transfer rates, and performance in energy conservation.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Fundamentals of Thermodynamics by Richard E. Sonntag and Claus Borgnakke 2. Fluid Mechanics: Fundamentals and Applications by Yunus A. Cengel, John Cimbala	
Recommended Texts	Engineering Thermodynamics by J.B. Jones and R.E. Childers	
Websites	Coursera - Thermodynamics and Fluid Mechanics Courses MIT OpenCourseWare - Fluid Mechanics & Thermodynamics	

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
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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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English Language II**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**MTU1003**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	1		**Semester of Delivery**	4	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• Develop foundational English communication skills for common social and practical contexts (e.g., social gatherings, travel, making requests). • Introduce and reinforce basic grammar structures to support everyday conversations and written communication. • Expand vocabulary related to numbers, places, countries, social expressions, and daily activities, enabling learners to communicate about familiar topics. • Build confidence in question formation and the ability to express information about themselves and others. • Enable learners to discuss past, present, and future activities using appropriate grammar structures (e.g., Present Simple, Past Simple, Present Continuous, and Future expressions).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Use basic grammar structures (Present Simple, Past Simple, and Present Continuous) to talk about routine activities, personal information, and future plans. • Form and respond to basic questions using question words and auxiliary verbs. • Make requests, express preferences, and provide personal information using appropriate expressions and grammar. • Understand and use possessive forms to indicate relationships and ownership in conversation. • Engage in simple conversations on the phone and in social situations, demonstrating basic competence in adjectives, expressions, and common verbs. • Distinguish between present, past, and future actions and use verbs in the correct tense to talk about events and plans.
Indicative Contents المحتويات الإرشادية	Speaking , Listening and Reading
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	At the Airport: Possessive 's, Verbs, Conversations
Week 2	Going Shopping: Questions and answers, Present Simple 1, Times
Week 3	In a Cafe: Present Simple 2, Present Simple 3, Adverbs of frequency, Words that go together
Week 4	Making Suggestions: Some/any, There is/are, Adjectives, Numbers
Week 5	Social Expressions: Can/could, was/were, Present Simple and Past Simple, Noun + noun
Week 6	What Time Is It?: Past Simple 1, Past Simple 2, Adjectives
Week 7	(Theme Not Provided): Past Simple 3, Adverbs, In, at, or on?
Week 8	(Theme Not Provided): Like and would like, Some, Any, Much, Many, Food and Drink
Week 9	(Theme Not Provided): Directions, Comparatives and Superlatives, Places

Week 10	(Theme Not Provided): Present Continuous, Social Expressions
Week 11	(Theme Not Provided): Going to and Past Simple, Suggestions, The Weather
Week 12	(Theme Not Provided): Present Perfect 1, Take, Get, Go
Week 13	(Theme Not Provided): Anything, Something, Nothing, Everything, Months of the Year
Week 14	(Theme Not Provided): Present Perfect 2, Verb + Noun
Week 15	Assessment Week

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	New headway, Liz and John Soars, OXFORD	
Recommended Texts	English Grammar in Use, 5th Edition by Raymond Murphy.	
Websites	https://elt.oup.com/student/headway/elementary4/?cc=global&selLanguage=en	

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	AC Electrical Machine			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE2315				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	4	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	10/20/2024		**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 Aims أهداف المادة الدراسية	This module aims to provide foundational knowledge and practical skills in AC machines, focusing on their construction, working principles, types, and applications. Students will gain an understanding of the principles of induction motors, synchronous motors, and transformers, along with control methods and performance evaluation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the construction, working principles, and applications of AC generators, induction motors, synchronous motors, and transformers. 2. Analyze and solve problems related to EMF, torque equations, armature reactions, and losses in electrical machines. 3. Evaluate the performance of AC machines, including efficiency, torque-speed characteristics, and control methods. 4. Conduct practical assessments on electrical machines, interpreting results to evaluate machine characteristics and operational efficiency.
Indicative Contents المحتويات الإرشادية	Electric circuits, polyphase systems, AC machines (transformers, induction motors, synchronous motors), transient and frequency response, operational amplifiers, and energy conversion principles.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures, hands-on practice, demonstrations, group projects, interactive tutorials, problem-based learning, quizzes and assessments, feedback sessions, guest lectures, online resources.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	41	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.7
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	1	10% (10)	5,10	
	Assignments	1	10% (10)	2,12	
	Projects / Lab.		15% (15)		
	Report		5% (5)		
Summative assessment	Midterm Exam	2hr	10% (10)	7	
	Final Exam	4hr	50% (40 + 10)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction, Construction, and Principle of AC Generators
Week 2	EMF Generation and Torque Equations
Week 3	Induction Motors: Principles, Types, and Applications
Week 4	Synchronous Motors: Principles, Types, and Applications
Week 5	Equivalent Circuit of AC Machines
Week 6	Performance Evaluation of Induction Motors
Week 7	Losses and Efficiency in AC Motors
Week 8	Speed Control Methods of Induction Motors
Week 9	Transformer Construction and Working Principle
Week 10	Equivalent Circuit of Transformers
Week 11	Applications of Transformers in Industrial Settings
Week 12	Maintenance and Troubleshooting of AC Machines
Week 13	Overview of Electromechanical Energy Conversion
Week 14	Principles of AC and DC Motor Interactions
Week 15	Preparing for the Exam

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Operation and Loaded Operation of AC Generators
Week 2	No-load and Loaded Operation of Induction Motors
Week 3	Swinburne's Test on Induction Motors
Week 4	Load Characteristics of a Synchronous Motor
Week 5	Study of Operational Working of AC Transformers
Week 6	Measurement of Efficiency and Losses in AC Motors
Week 7	Brake Test on Induction Motors
Week 8	Transformer Load Test
Week 9	Study of Voltage Regulation in AC Transformers
Week 10	Speed Control Methods on Induction Motors
Week 11	Study of AC Motor Performance under Different Load Conditions
Week 12	Efficiency Measurement of Induction Motors Using Direct Load Test
Week 13	OC & SC Tests on AC Transformers
Week 14	Parallel Operation of Transformers
Week 15	Final Lab Exam Preparation

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• "Electrical Machinery" by A.E. Fitzgerald, Charles Kingsley, and Stephen D. Umans • "Electric Machines" by Theodore Wildi	Yes
Recommended Texts	• "Fundamentals of Electric Drives" by G. K. Dubey • "Electrical Engineering: Principles and Applications" by Allan R. Hambley	No
Websites	YouTube Channels - Channels such as "The Engineering Mindset" and "Learn Engineering" that provide visual explanations and practical insights into electrical machines and concepts.	

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

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Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electrical Devices and instruments			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE2316				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	4	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	10/20/2024		**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 Aims أهداف المادة الدراسية	The aim of this module is to provide students with foundational knowledge and practical skills in measurement and instrumentation. Students will gain a deep understanding of the various types of measuring instruments, error analysis, signal processing, and the principles behind analogue and digital systems. The module will focus on practical applications, including the calibration, testing, and maintenance of electrical measurement equipment, and will also explore the use of transducers and sensors in real-world settings.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the principles of measurement systems, including accuracy, precision, sensitivity, and the use of standard units. 2. Identify and describe different types of electrical measuring instruments and their applications in both analogue and digital forms. 3. Analyze errors in measurements, including random and systematic errors, and apply error analysis to improve measurement accuracy. 4. Understand and apply the use of bridges, oscilloscopes, and other measurement tools to test electrical devices such as diodes, fuses, and resistors. 5. Use transducers and sensors for measurement in various applications, including displacement, strain, temperature, and pressure.
Indicative Contents المحتويات الإرشادية	• Elements of measurement systems: static characteristics, accuracy, precision, resolution, linearity, sensitivity. • Measuring units, dimensions, and standards: MKS system, system of units, and SI units.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures, hands-on practice, demonstrations, group projects, interactive tutorials, problem-based learning, quizzes and assessments, feedback sessions, guest lectures, online resources.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	16	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
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**	1	10% (10)	5,10	
	Assignments	1	10% (10)	2,12	
	Projects / Lab.		15% (15)		
	Report		5% (5)		
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	4hr	50% (40 + 10)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to measurements: Elements of measurement system; static characteristics, accuracy, precision, resolution, linearity, sensitivity, etc. Measuring units, dimensions and standards: Introduction to MKS system, system of units of measurements, SI units.
Week 2	Fundamental and derived units: Electric and magnetic units.
Week 3	Types of errors and their calculations: Limiting error, random error.
Week 4	General theory of analogue measuring instruments: Indicating type; PMMC.
Week 5	Moving iron electrodynamometer: Thermal instrument.
Week 6	Watt meters: Integrating type (energy kWh meter).
Week 7	Recording type: Self-balancing strip chart recorder (pot. Bridge, LVDT)
Week 8	Bridges and their applications: DC bridges (Wheatstone, Kelvin, Kelvin double bridge); AC bridges (Maxwell, Hay's, Schering, Wien).
Week 9	Cathode Ray Oscilloscope (CRO): CRT, block diagram.
Week 10	Vertical and horizontal reports deflection systems: Applications.
Week 11	Primary sensing elements: Displacement, LVDT, strain gauge, piezoelectric, acceleration,

	thermoelectric.
Week 12	Signal analysis: Wave analyzer, harmonic distortion analyzer.
Week 13	Spectrum analyzer: Electronic analogue measuring instruments.
Week 14	Direct coupled, FET bridge type: DC & AC voltage, current, and power and resistance measurement.
Week 15	Digital instruments: D/A & A/D, voltage, current and resistance measurements.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Introduction to electrical devices & measurements: How to use the oscilloscope, function generator, DC power supply, digital multimeter.
Week 2	How to test: Diode, LED Diode, Zener diode.
How to test a fuse.	
Week 3	Passive and Active filters.
Week 4	Low & high pass filters.
Week 5	Band pass filter.
Week 6	Using of Galvanometer.
Week 7	Transducers (sensors and actuators).
Week 8	Relay using and testing.
Week 9	Calibration of Ammeter.
Week 10	Tungsten Filament.
Week 11	Incandescent Lamp.
Week 12	D.C. Bridge Measurement.
Week 13	Wheatstone Bridge.
Week 14	Design and construction of analogue multimeter.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Electrical Measurement and Instrumentation" by U. A. Bakshi, A. V. Bakshi	Yes
Recommended Texts	"Principles of Measurement and Instrumentation" by John P. Bentley	No
Websites	YouTube Channels - The Engineering Mindset	

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.

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Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Heat Transfer			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3518				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	1		**Semester of Delivery**	5	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	The aim of this module is to provide students with an in-depth understanding of heat transfer principles and their practical applications. The course focuses on different modes of heat transfer, including conduction, convection, radiation, and heat exchangers. Students will develop the skills to analyze and solve heat transfer problems in various engineering systems, with a particular emphasis on practical applications such as thermocouple calibration, heat exchangers, and boiling heat transfer.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Analyze and apply the principles of linear and radial heat conduction in one-dimensional and multi-dimensional systems. • Demonstrate an understanding of steady and transient heat conduction, including methods for solving heat transfer problems in different geometries. • Design and evaluate heat exchangers, including cross-flow and shell-and-tube types, considering factors such as heat transfer rates, fluid flow patterns, and efficiency. • Calibrate and use thermocouples to measure temperature in heat transfer experiments, and interpret the results with respect to heat transfer principles. • Understand and calculate radiation heat transfer between surfaces using laws such as the Stefan-Boltzmann law and evaluate the emissivity of materials.
Indicative Contents المحتويات الإرشادية	The module covers topics such as linear and radial heat conduction, thermocouple calibration, cross-flow heat exchangers, radiation heat transfer, gear trains, and boiling heat transfer, with a focus on both theoretical concepts and practical applications in engineering systems.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	36	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Heat Transfer: Overview of heat transfer modes (conduction, convection, and radiation). Basic concepts and terminology in heat transfer.
Week 3	Conduction Heat Transfer (1D): One-dimensional heat conduction in solids. Temperature distribution and heat flux in simple geometries (slabs, rods, etc.).
Week 4	Heat Transfer Through Fins: Heat conduction with extended surfaces (fins). Efficiency of fins in heat dissipation.
Week 5	Two-Dimensional Steady-State Heat Conduction: Heat conduction in two dimensions. Solutions for steady-state heat conduction in rectangular and cylindrical coordinates.
Week 6	One and Two-Dimensional Unsteady-State Heat Conduction: Transient heat conduction in solids. Solution methods for transient heat conduction (lumped system analysis, finite difference method).
Week 7	Convective Heat Transfer: Basics of convection (natural vs forced convection). Governing equations for convective heat transfer.
Week 8	Forced Convection: Heat transfer in forced convection systems (flow over flat plates, inside pipes). Use of Nusselt number correlations for forced convection.
Week 9	Natural Convection: Heat transfer in natural convection systems (buoyancy-driven flow). Grashof number and Rayleigh number, correlation for natural convection heat transfer.
Week 10-11	Thermal Radiation: Basic concepts in thermal radiation (emissivity, Stefan-Boltzmann law). Radiative heat transfer between surfaces and black body radiation.
Week 12-15	Heat Exchangers: Types of heat exchangers (e.g., shell-and-tube, plate). Heat exchanger analysis (log mean temperature difference, effectiveness-NTU method). Design considerations and applications of heat exchangers in industry.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1-4	Linear Heat Conduction: One-dimensional steady-state heat conduction, conduction in various materials, Fourier's Law, and solving for temperature distributions in simple geometries.
Week 5-8	Radial Heat Conduction: Heat conduction in cylindrical coordinates, radial heat conduction through pipes and other cylindrical bodies.
Week 9	Calibration of Thermocouple: Methods for calibrating thermocouples, understanding their accuracy and error analysis in heat transfer experiments.
Week 10	Cross-Flow Heat Exchanger: Study of cross-flow heat exchangers, analysis of heat transfer and fluid flow in such exchangers, performance evaluation.
Week 11	Gear Trains and Radiation Heat Transfer: Basic principles of gear trains, and radiation heat transfer between bodies, including Stefan-Boltzmann law and emissivity.
Week 12-15	Boiling Heat Transfer: Heat transfer during boiling, including nucleate boiling, film boiling, and critical heat flux. Applications in industry and power systems.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Fundamentals of Heat and Mass Transfer" by Frank P. Incropera and David P. DeWitt	
Recommended Texts	"Introduction to Heat Transfer" by T.L. Bergman, F.P. Incropera, and D.P. DeWitt	
Websites	MIT OpenCourseWare - Heat Transfer	

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electrical power systems			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3519				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	5	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• To introduce students to the general structure of the network for transferring power from generating stations to consumers. • To expose students to the electrical and mechanical aspects of the power network along with its environmental and safety constraints. • To teach students how to solve and analyze power systems using digital computers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Design and analyze real-time electrical transmission systems with respect to electrical parameters, considering environmental and economic obligations. • Implement appropriate safety equipment for designing electrical power systems and enhance transmission/distribution system efficiency with environmentally friendly technologies. • Apply basic mathematical, physical, and electrical principles to formulate solutions for significant electrical hazards. • Assess the suitability of overhead and underground power transmission strategies considering electrical, mechanical, environmental, performance, safety, and economic constraints.
Indicative Contents المحتويات الإرشادية	Generation of Electrical Energy, Transmission Lines, Distribution System, Cables and Electrical Substations
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	56	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.7
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Generation of Electrical Energy, Sources of Energy
Week 2	Generating Stations, Types of Generating Stations
Week 3	Economic Considerations of Generating Stations
Week 4	Load Curves and Load Factors
Week 5	Performance of Transmission Lines, Overhead Transmission Lines
Week 6	Transmission Line Representation (Short, Medium, Long)
Week 7	Generalized Constants of Other Elements in Transmission Line
Week 8	Power Flow and Power Circle, Insulators
Week 9	Distribution System Configuration
Week 10	Distribution System Components and Parameters
Week 11	Distribution Parameters (Radial, Ring)
Week 12	Voltage Drop and Cross-sectional Area of Conductors
Week 13	Cable Construction, Insulating Materials
Week 14	Underground Cables, Types of Cables
Week 15	Electrical Substations

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Three-phase Transformer Turns Ratio Test
Week 2	MIT (10KV Diagnostic Insulation Resistance Tester)
Week 3	Oil Insulation Test
Week 4	Protection Relay
Week 5	Grounding System
Week 6	Neutral Grounding Resistance (NGR)
Week 7	Power Transmission Line Model Study
Week 8	Voltage Distribution and String Efficiency of Model Suspension Insulator
Week 9-11	Power Transmission Line Performance Study
Week 12-14	Load Flow Analysis using Power World Simulator
Week 15	Voltage Control in Power System

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	M.E. El-Hawary, "Electrical Energy Systems" (1st Ed., CRC, 2000) Hadi Saadat, "Power System Analysis" (2nd Ed., McGraw-Hill, 2002)	
Recommended Texts	Weedy, B.M., "Electrical Power Systems"	
Websites	Website: Khan Academy: 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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Special electrical machines			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3520				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	5	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	The module aims to provide students with a comprehensive understanding of special electrical machines, focusing on their design, operation, control methods, and applications in various industries, while enhancing their ability to analyze, design, and optimize electrical systems incorporating these machines.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Understand the principles of operation and construction of special electrical machines like synchronous motors, stepper motors, and permanent magnet motors. • Analyze and design circuits that incorporate special electrical machines, ensuring their performance, stability, and efficiency. • Apply control strategies for special electrical machines, including variable speed drives, for optimal performance in industrial applications. • Evaluate the applications of special electrical machines in various industries, considering factors like energy efficiency, performance, and cost-effectiveness.
Indicative Contents المحتويات الإرشادية	The indicative contents of this module cover the principles, construction, operation, and control of special electrical machines, including synchronous motors, permanent magnet motors, stepper motors, and specialized induction machines, with a focus on their applications, efficiency, and performance analysis.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	56	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.7
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Synchronous generators: Composition and working principle, ways to stir coils, equivalent circuit and phase diagram, armature reaction, voltage regulation.
Week 2	E.M.F: Open and short circuit characteristics, generators work in parallel, load angle control.
Week 3	Characteristics of the power angle of machines with prominent cylindrical rotor, voltage ratings, speed, frequency, power, and power factor, direct-orthogonal axes theory, conditions for generators to work in parallel, transient stability of synchronous generators working with infinite bars.
Week 4	Synchronous motor: Composition and working principle, equivalent circuit and phase diagram. Principle of DC motor. The special machines: single-phase induction motors – composition and working principle, equivalent circuit and phase diagram, positive and negative sequence analysis.
Week 5	Steady-state properties, synchronous motor ratings.
Week 6	Power angle curve, velocity-torque curve.
Week 7	The effect of field current change on the properties of synchronous motors and synchronous capacitors.
Week 8	Special machines: Single-phase induction motors – composition and working principle, equivalent circuit and phase diagram, positive and negative sequence analysis.
Week 9	Split-phase motor, permanent expansion motor, starting capacitor motor, shaded pole motor, speed control methods.
Week 10	Universal motors: Composition and working principle, equivalent circuit and phase diagram. Properties, speed control methods. Repulsion motor: Composition and working principle,

	equivalent circuit and phase diagram. Properties.
Week 11	Step motors: Composition and working principle, equivalent circuit and phase diagram. Variable impedance motors, permanent magnet motors, hybrid engines, different stirring methods, momentum prediction theory.
Week 12	Linear and nonlinear analysis of market circuits: Characteristics, speed control methods, impedance motors, composition and working principle, torque prediction ability, controllers, motor characteristics. Types of impedance motors: Variable impedance keyed impedance, speed control methods.
Week 13	Permanent magnet synchronous motors: Composition and working principle, equivalent circuit and phase diagram, magnetic circuit analysis. DC motors with permanent magnets: Composition and working principle, equivalent circuit and phase diagram, magnetic circuit analysis.
Week 14	Brushless DC motors: Composition and working principle, equivalent circuit and phase diagram, magnetic circuit analysis. Servo motors: Composition and working principles, equivalent circuit and phase diagram. AC and DC servo motors, speed control methods.
Week 15	Synchronizers: Composition and working principle, equivalent circuit and phase diagram, speed control methods. Modern technologies to control the speed of electric motors: Digital signal processor technology, programmable field gate array technology, hybrid technology.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Alternator regulation.
Week 2	Alternator characteristics.
Week 3	Load test on a three-phase induction motor.
Week 4	Open circuit and short circuit test on a three-phase induction motor.
Week 5	Synchronous motor operation.
Week 6	Load test on synchronous motor and measurement of power angle.
Week 7	Determination of parameters of synchronous machine.
Week 8	No-load operation of 3-phase synchronous machine as generator.
Week 9	Short circuit test of the three-phase synchronous generator.
Week 10	Connecting the three-phase synchronous alternator in parallel with the network.
Week 11	Obtaining the V-curve of the synchronous motor operating at load.
Week 12	Short circuit test for the 3-phase synchronous generator.
Week 13	Power factor correction in three-phase circuit.

Week 14	Power factor correction using 3-phase synchronous motor.
Week 15	Discussion.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	M.E. El-Hawary, “Electrical Energy Systems,” 1st Ed., CRC, 2000	
Recommended Texts	Hughes, "Electric Motors and Drives"	
Websites	www.electrical4u.com www.powermag.com	

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Hydraulic systems			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3521				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	1		**Semester of Delivery**	5	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	The aim of this module is to provide students with a comprehensive understanding of hydraulic systems, including their design, operation, and maintenance, while also developing skills in applying fluid mechanics principles to real-world applications in industries like automotive, manufacturing, and construction.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Understand the principles and components of hydraulic systems. • Design and analyze basic hydraulic circuits. • Select appropriate hydraulic components (pumps, actuators, valves) for specific applications. • Troubleshoot and maintain hydraulic systems efficiently. • Apply advanced control strategies in hydraulic systems. • Recognize safety and environmental concerns related to hydraulic systems.
Indicative Contents المحتويات الإرشادية	This module covers the principles, components, design, and maintenance of hydraulic systems, including pumps, actuators, valves, fluid properties, and energy efficiency, as well as advanced topics in system control, simulation, and real-world applications.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	34	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	66	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	7.5%	5	
	Assignments	1	7.5%	7	

	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Material Covered	
Week 1	**Introduction to Hydraulic Systems** - Definition and importance of hydraulic systems - Basic components: pumps, actuators, valves, reservoirs, hydraulic fluid - Basic principles of hydraulics (Pascal's Law, pressure, flow) - Applications in industry
Week 2	**Fluid Properties and Flow** - Properties of hydraulic fluids (viscosity, density, compressibility) - Fluid flow and its measurement (flow rate, velocity) - Laminar vs. turbulent flow - Flow control methods
Week 3	**Hydraulic Pumps** - Types of hydraulic pumps: gear pumps, vane pumps, piston pumps - Pump characteristics and selection criteria - Pump performance curves and efficiency - Pump maintenance
Week 4	**Hydraulic Actuators** - Types of actuators: cylinders and motors - Working principle of hydraulic cylinders - Types of cylinders (single-acting, double-acting) - Hydraulic motors and their operation
Week 5	**Hydraulic Fluids** - Selection of hydraulic fluids: mineral oils, synthetic fluids, and water-based fluids - Fluid contamination and its effects - Filtration methods and system cleanliness standards - Fluid reservoirs and cooling systems
Week 6	**Hydraulic Valves** - Types of hydraulic valves: pressure relief, directional control, flow control - Operation and application of valves

	- Valve symbols and identification - Valve sizing and selection
Week 7	**Hydraulic Circuit Design** - Basic hydraulic circuits and systems - Series and parallel circuit configurations - Designing simple circuits for control of actuators - Pressure, flow, and directional control in circuits
Week 8	**Energy Transfer and Efficiency in Hydraulic Systems** - Energy conversion in hydraulic systems - Power transmission and losses in hydraulic systems - Efficiency analysis of hydraulic components - Troubleshooting and performance optimization
Week 9	**Hydraulic System Components and System Integration** - Integration of components into a complete hydraulic system - System layout design - Understanding the role of each component in system performance - System control and integration techniques
Week 10	**Hydraulic Maintenance and Troubleshooting** - Preventive and corrective maintenance techniques - Common hydraulic system faults and failure modes - Troubleshooting methods for pumps, actuators, and valves - System testing and diagnostic equipment
Week 11	**Advanced Hydraulic Systems** - Electro-hydraulic systems: actuators and control systems - Proportional and servo control systems - Advanced valves and control devices - Variable displacement pumps and motors
Week 12	**Hydraulic System Safety and Environmental Impact** - Safety standards in hydraulic systems - Safety features in hydraulic systems: pressure relief, overload protection - Environmental impact and sustainability considerations - Fluid disposal and recycling methods
Week 13	**Hydraulic Applications** - Industrial applications: automotive, aerospace, manufacturing - Agricultural machinery - Mobile equipment: cranes, excavators, loaders - Hydraulic presses and automation
Week 14	**Hydraulic System Simulation and Modeling** - Introduction to hydraulic system simulation - Software tools for modeling hydraulic systems

	- Dynamic modeling and simulation of hydraulic circuits - Performance analysis using simulation tools
Week 15	**Review and Practical Applications** - Review of key concepts and systems - Case studies of real-world hydraulic systems - Final practical project or demonstration - Discussion of future trends in hydraulic technology

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introduction to Hydraulic Systems, Andrew P. Wickens	
Recommended Texts	Hydraulics and Pneumatics, Robert S. Balmer	
Websites	https://www.fluidpowerworld.com	

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electromechanics Design			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3522				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	5	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	
Indicative Contents المحتويات الإرشادية	
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				

	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Electromechanics: Overview of Electromechanical systems, importance, and applications in industry.
Week 2	Basic Concepts in Mechanics: Force, torque, energy, power, and motion. Introduction to simple mechanical systems.
Week 3	Fundamentals of Electrical Systems: Voltage, current, resistance, inductance, capacitance, and their role in electromechanical systems.
Week 4	Electrical Machines: Types of electrical machines (DC, AC motors, transformers) and their electromechanical interaction.
Week 5	Electromagnetic Fields: Magnetic fields, electromagnetism, and their effects on mechanical movement. Analysis of magnetic forces in electromechanical systems.
Week 6	Electric Motors: Principles of operation for DC motors, AC motors, and synchronous motors. Motor characteristics and performance.
Week 7	Mechanical Design of Motors: Torque-speed characteristics, efficiency, and power rating. Design of motor components (armature, rotor, stator).
Week 8	Electromechanical Transducers: Principles and applications of electromechanical transducers, such as sensors and actuators.
Week 9	Control of Electromechanical Systems: Introduction to control systems, PID controllers, and feedback mechanisms in electromechanical devices.
Week 10	Power Transmission Systems: Gear systems, belt drives, and coupling in electromechanical systems.
Week 11	Thermal Effects in Electromechanics: Heat generation in electromechanical systems, cooling methods, and temperature rise in motors and electrical components.
Week 12	Advanced Motor Design: Introduction to special types of motors (stepper motors, brushless DC motors) and their applications in electromechanics.
Week 13	Mechanical Vibrations in Electromechanical Systems: Vibrations in machines, resonance, damping, and isolation techniques.

Week 14	System Integration: Integrating electrical and mechanical subsystems to form a complete electromechanical system. Challenges and best practices in design and analysis.
Week 15	Final Project Presentations and Review: Students present their final electromechanical design projects. Discussion of course material and review for the final exam.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Introduction to Electromechanical Systems: Overview of lab setup, safety precautions, introduction to measurement tools and instruments used in electromechanics labs.
Week 2	Measurement of Basic Electrical Quantities: Practical exercises on measuring voltage, current, resistance, and frequency in electrical circuits using multimeters and oscilloscopes.
Week 3	DC Motor Characteristics: Testing and analyzing the characteristics of a DC motor, such as speed-torque relationship, efficiency, and power loss.
Week 4	AC Motor Operation: Measuring and analyzing the performance of AC motors (single-phase and three-phase), including current, voltage, power, and efficiency calculations.
Week 5	Transformer Operation and Testing: Setting up and testing a transformer to analyze input/output voltage, current, and power ratings. Investigating efficiency and loss.
Week 6	Electromagnetic Field Analysis: Demonstrating magnetic field generation around conductors and analyzing the forces on mechanical systems.
Week 7	Electromechanical Transducer Testing: Experimenting with sensors and actuators to understand electromechanical transduction and measuring their response to input changes.
Week 8	Electromechanical System Control: Implementing and testing feedback control systems (e.g., PID controllers) to control the speed of motors and position of actuators.
Week 9	Power Transmission Systems - Gears and Belts: Practical demonstration and analysis of power transmission systems such as gears, belts, and pulleys in mechanical systems.
Week 10	Thermal Effects and Heat Management: Measuring and analyzing the temperature rise in motors and electrical components, implementing cooling methods and thermal management systems.
Week 11	Stepper Motor Control and Operation: Testing stepper motors, analyzing control signals, and controlling their motion for precise positioning applications.
Week 12	Brushless DC Motor Testing: Practical exercises on brushless DC motors, analyzing their performance and control methods compared to conventional DC motors.
Week 13	Mechanical Vibration in Electromechanical Systems: Measuring and analyzing mechanical vibrations in machines, resonance effects, and testing different vibration damping methods.
Week 14	System Integration and Troubleshooting: Integrating electrical and mechanical components to form a complete electromechanical system and troubleshooting the system for optimal

	performance.
Week 15	Final Project Lab – System Demonstration and Review: Students demonstrate their final electromechanical system design projects, explaining the integration of electrical and mechanical components.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Mohan, N., "Electric Machines and Drives: A First Course," Wiley, 2011. Hughes, E., "Electric Motors and Drives: Fundamentals, Types, and Applications," 4th Edition, Elsevier, 2013.	
Recommended Texts	A. S. Dorf and R. H. Bishop, "Modern Control Systems," 12th Edition, Prentice-Hall, 2011.	
Websites	www.controleng.com	

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Numerical Analysis			**Module Delivery**	
Module Type	Core			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3623				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	6	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	To introduce students to numerical methods for solving mathematical problems, including techniques for linear and nonlinear equations, interpolation, differentiation, integration, and solving differential equations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Ability to solve linear and nonlinear equations using various numerical methods. • Competence in applying curve fitting and interpolation techniques to real-world data. • Knowledge of numerical differentiation and integration techniques. • Ability to solve ordinary differential equations (ODEs) and partial differential equations (PDEs) using numerical methods. • Understanding the properties and applications of Fourier and Z-transforms.
Indicative Contents المحتويات الإرشادية	The course covers numerical methods for solving linear and nonlinear equations, curve fitting, interpolation, differentiation, integration, solution of ordinary and partial differential equations, and transforms (Z and Fourier).
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	56	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.7
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative	**Midterm**	2hr	15%	10	

assessment	**Exam**				
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly LAB Syllabus) المنهاج الاسبوعي العملي في المختبر	
	Material Covered
Week 1	Solution of Non-Linear Equations by Numerical Methods: Closed Methods (Bracketing methods) - Bisection method, Open Methods (Iterative methods) - Newton-Raphson, Secant method.
Week 2	Curves Fitting: Least Square Method - Linear Regression, Polynomial Regression. Linearization of Nonlinear Models.
Week 3	Interpolation: Gregory-Newton Interpolation Formula, Forward Difference, Backward Difference, Central Difference, Gauss Forward, Gauss Backward, and Lagrange Interpolation.
Week 4	Numerical Solution of Linear Equations Systems: Direct Methods - Gauss Elimination, Gauss-Jordan Method. Indirect Methods - Gauss-Jacobi Method, Gauss-Seidel Method.
Week 5	Numerical Differentiation: Derivatives Based on Newton's Forward/Backward Interpolation. Numerical Integration: Midpoint Rule, Trapezoidal Rule, Simpson's (1/3) Rule.
Week 6	Simpson's (3/8) Rule of Double Integration, Numerical Solution of Ordinary Differential Equations (1st Order) - Euler's Method, Modified Euler's Method.
Week 7	Runge-Kutta Method: 2nd Order, 4th Order. Partial Differential Equations (PDEs): Classification of PDEs, Solution of PDEs by Separation of Variables.
Week 8	Wave Equation, Heat Equation.
Week 9	Laplace Equation, Solution of Ordinary Differential Equations by Power Series. Classification of ODEs.
Week 10	Solution Methods for ODEs: Undetermined Coefficients Method, Fresenius Method (Case I).
Week 11	Fresenius Method (Case II and Case III).
Week 12	Z-Transform: Sequences, Table of Z-Transform, Properties of Z-Transform.
Week 13	Inverse Z-Transform, Solving Recurrence Relations.
Week 14	Fourier Transform: Complex Fourier Series, Some Special Functions and Transforms - Even Function, Odd Functions, Top-Hat Function.
Week 15	Properties of Fourier Transform: Linearity, Time Shifting, Frequency Shifting.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Applied Numerical Methods with MATLAB for Engineers and Scientists" by Steven C. Chapra. • Numerical Analysis" by Richard L. Burden and J. Douglas Faires.	Online
Recommended Texts	Numerical Methods in Engineering with MATLAB" by Jaan Kiusalaas	Online
Websites	Numerical Methods Group - University of Utah https://my.mech.utah.edu/~pardyjak/me2450.php	Online

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Theory of machines			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3625				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	1		**Semester of Delivery**	6	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	This module aims to provide students with a comprehensive understanding of the kinematics and dynamics of machinery. It focuses on the theoretical foundations and practical applications of various mechanical systems such as gears, linkages, clutches, flywheels, and belt drives. By the end of the course, students should be able to analyze and solve engineering problems involving motion, forces, and energy transformations in machinery.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Understand and distinguish between static and dynamic problems in mechanical systems. • Analyze and calculate linear and angular velocity, power, torque, and acceleration in machines. • Construct and interpret velocity and acceleration diagrams for mechanical linkages and mechanisms. • Apply the principles of gear theory, including the involute profile and governor parameters in spur gears. • Solve complex problems involving gear trains, belt drives, and mechanical linkages.
Indicative Contents المحتويات الإرشادية	Static/dynamic analysis, velocity, torque, spur gears, gear trains, clutches.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	49	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	51	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	7.5%	5	
	Assignments	1	7.5%	7	

	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Interview of Static and Dynamic Problems: Static Method vs. Dynamic Method, Slider-Crank Mechanism: Introduction to static vs. dynamic analysis, and understanding the application of the slider-crank mechanism in engines and machines.
Week 2	Linear and Angular Velocity: Power, Torque, Moment of Inertia, and Acceleration: Explore linear and angular velocity, their relationship with power, torque, and the importance of moment of inertia in rotational motion.
Week 3	Velocity and Acceleration Diagrams: Constructing and interpreting velocity and acceleration diagrams, and solving related problems in linkages and mechanisms.
Week 4	Spur Gear Theory: Involute of Spur Gear, Governor Parameters of Spur Gears: Understanding the gear tooth profile (involute curve), gear calculations (pitch, module), and how spur gears are used in speed control mechanisms like governors.
Week 5	Review of Spur Gear Applications: Hands-on review of various applications involving spur gears, solving problems related to gear ratios, power transmission, and gear efficiency.
Week 6	Gear Train Theory: Compound and Inverted Gear Trains: Calculating gear ratios, understanding the different configurations and applications of compound and inverted gear trains.
Week 7	Theory of Belt Drives: Modifications for V-Grooved Pulley: Understanding the basic theory of belt drives, including pulley modifications (e.g., V-grooved pulleys), and solving related problems in power transmission.
Week 8	Mid-term Exam: Covers all topics from Weeks 1 to 7, including both theoretical questions and practical problem-solving.
Week 9	Balancing Theory: Static and Dynamic Balance, Balancing of Masses Rotating in the Same Plane: Introduction to balancing techniques, focusing on balancing rotating masses to reduce vibrations in machinery.
Week 10	Balancing of Masses Rotating in Different Planes: Dalby's Method, Dynamic Forces at Bearings: Understanding multi-plane balancing, Dalby's method for reducing dynamic forces, and the impact of these forces on bearings.
Week 11	Turning Moment Diagram and Flywheel: Single Cylinder Double-Acting, Max Fluctuation of Energy,

	Flywheel Design and Rim Dimensions: Learning how to create turning moment diagrams, designing flywheels to minimize energy fluctuation, and determining flywheel dimensions.
Week 12	Theory of Friction Clutches: Plate Clutches and Clutch Analysis: Working principles of friction clutches, particularly plate clutches, and solving problems related to clutch engagement, torque transmission, and efficiency.
Week 13	Adjustment of Toggle Mechanism: Cone and Centrifugal Clutches: Understanding the theory and design of toggle mechanisms, cone clutches, and centrifugal clutches, along with their adjustments for smooth operation.
Week 14	Review of Previous Topics: Comprehensive review of all topics covered in the course, solving various related problems, and final Q&A session to clarify any doubts before the final assessment.
Week 15	Prepare for the Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Theory of Machines by R.S. Khurmi and J.K. Gupta. • Kinematics and Dynamics of Machinery by Hamilton H. Mabie and Charles D. Reinholtz.	Online
Recommended Texts	Theory of Machines and Mechanisms by Joseph E. Shigley, John Uicker	Online
Websites	MIT OpenCourseWare - Introduction to Mechanisms	Online

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

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Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Industrial Engineering			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3526				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	1		**Semester of Delivery**	6	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	This module aims to provide students with the tools and techniques to analyze and optimize production systems, improve productivity, solve transportation and network models, and apply quality control principles in manufacturing and operations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Understand and compute productivity, and identify factors that affect it. • Apply break-even analysis for productivity improvement. • Solve minimization and maximization optimization problems. • Formulate and solve transportation and assignment problems using various methods. • Apply network models for sequencing and job processing across multiple machines. • Use inventory control models and material requirement planning techniques. • Apply reliability and quality control concepts, including Six Sigma, ISO, and TQM.
Indicative Contents المحتويات الإرشادية	Introduction to productivity, optimization of production, transportation problems, assignment models, network models, job sequencing, inventory control, material planning, and quality control techniques like Six Sigma, ISO, and TQM.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	21	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	The Production and the Productivity: Introduction to production and productivity concepts in manufacturing and operations.
Week 2	Computing Productivity: Techniques and methods for measuring and computing productivity in different sectors.
Week 3	Factors that Affect Productivity: Exploration of internal and external factors influencing productivity.
Week 4	Productivity Improvement & Break-Even Analysis: Methods for improving productivity and understanding break-even analysis.
Week 5	Solving Minimization Problems: Techniques for solving problems that minimize cost, time, or resources in production systems.
Week 6	Solving Maximization Problems: Methods for maximizing output, profit, or efficiency in operations management.
Week 7	Solving Maximization Problems (Continued): Further practice in solving optimization problems focusing on maximization.
Week 8	Assignment Model: Understanding and solving assignment problems using linear programming methods.
Week 9	Transportation Model - Setting up Transportation Problem: Introduction to transportation problems, including how to set them up for optimization.
Week 10	Developing an Initial Solution: Techniques for developing initial feasible solutions for

	transportation problems.
Week 11	Northwest Corner Method - Least-Cost Method: Methods for finding solutions to transportation problems, including the Northwest Corner and Least-Cost methods.
Week 12	Vogel's Approximation Method - Stepping Stone Method: Advanced techniques for solving transportation problems efficiently.
Week 13	Network Models: Minimal Spanning Tree Technique, Sequencing Models, Processing N Jobs through One Machine.
Week 14	Processing N Jobs through Two Machines, Three Machines, Inventory Control Models & Material Requirement Planning: Job sequencing through multiple machines, inventory models, and material planning.
Week 15	Reliability, Quality Control, Statistical Concepts in Quality Control: Control charts, Six Sigma, ISO, and TQM principles for improving product and process quality.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Production and Manufacturing Lab: Introduction to production systems and assembly line optimization.
Week 2	Operations Research Lab: Solving linear programming and optimization problems.
Week 3	Simulation Lab: Modeling and simulating simple manufacturing systems and processes.
Week 4	Quality Control & Six Sigma Lab: Applying basic quality control tools, including control charts and Pareto analysis.
Week 5	Ergonomics Lab: Designing workstations and applying ergonomic principles for human-centered work environments.
Week 6	Supply Chain & Logistics Lab: Solving transportation problems and inventory control models.
Week 7	Materials Handling & Automation Lab: Introduction to automated material handling systems, conveyors, and robotics.
Week 8	Work Design & Measurement Lab: Conducting time-motion studies and analyzing work processes for efficiency.
Week 9	Manufacturing Process Lab: Hands-on work with machining, welding, and 3D printing processes.
Week 10	Operations Management Lab: Applying scheduling and inventory management techniques in operations.
Week 11	Automation & Robotics Lab: Programming and controlling industrial robots and automated systems.
Week 12	Production and Manufacturing Lab: Optimizing production processes using simulation and real-

	time data.
Week 13	Operations Research Lab: Advanced optimization problems, including network flow and transportation models.
Week 14	Quality Control & Six Sigma Lab: Applying Six Sigma tools for process improvement and statistical quality control.
Week 15	Manufacturing Process Lab: A comprehensive project applying machining, welding, and additive manufacturing.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introduction to Industrial Engineering by Avraham Shtub, Shmuel Y. Melamed, and Yaakov Radomsky Industrial Engineering and Management by O.P. Khanna	
Recommended Texts	"Work Systems and the Methods, Measurement, and Management of Work" by Mikell P. Groover	Online
Websites	Lean Enterprise Institute Provides learning materials, case studies, and resources related to Lean principles, focusing on waste elimination and efficiency in industrial engineering systems.	Online

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
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Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electromechanics Design			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3527				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	6	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	The aim of this module is to provide students with a comprehensive understanding of the design principles of electromechanical systems, including mechanical and electrical components, their integration, and their applications in real-world engineering systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand and apply the principles of electromechanical system design. 2. Design and select appropriate materials and components for electromechanical systems. 3. Analyze and test mechanical and electrical components within electromechanical systems. 4. Integrate electrical and mechanical components into functional systems.
Indicative Contents المحتويات الإرشادية	1. Introduction to electromechanical design principles. 2. Materials selection for electromechanical systems. 3. Design for different types of loading and stress analysis.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.7
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				

	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Materials in Electromechanical Design: Introduction to materials used in electromechanical systems, focusing on properties, selection, and application methods.
Week 2	Design for Different Types of Loading: Understanding the effects of different loads (tensile, compressive, shear) on mechanical components and their design considerations.
Week 3	Electromotor and Controls: Overview of electric motors (AC, DC), control systems, and techniques like VFDs and motor starters used in electromechanical systems.
Week 4	Shaft Design: Principles of shaft design, including material selection, stress analysis, and optimization for size and load-bearing capacity.
Week 5	Key Design: Design and selection of keys for connecting machine components, focusing on types, dimensions, material selection, and load considerations.
Week 6	Rolling Control Bearings: Study of rolling bearings (ball, roller), their selection criteria, and how they reduce friction in electromechanical systems.
Week 7	Belt Drives & Chain Drives: Design principles for belt and chain drives, including selection, sizing, and power transmission considerations for mechanical systems.
Week 8	Pulleys: Design and selection of pulleys in mechanical systems, including materials, types, and their role in power transmission and mechanical advantage.
Week 9	Gears: Gear design fundamentals, including types of gears (spur, bevel, helical), gear ratios, and considerations for strength and performance in mechanical systems.
Week 10	Bolted Connections: Design of bolted connections in mechanical assemblies, focusing on strength, materials, and proper bolt selection for load-bearing efficiency.
Week 11	Riveted Connections: Design and analysis of riveted joints, including their strength under load, and considerations for material selection and joint configuration.
Week 12	Welded Joints: Principles of welded joints in electromechanical systems, including material selection, welding methods, and stress analysis in welded connections.
Week 13	Clutches: Design of clutches (friction, centrifugal, etc.) for mechanical power transmission, considering their types, efficiency, and application in machines.

Week 14	Brakes: Design and operation of brake systems (disc, drum), including material selection, performance analysis, and their role in stopping and controlling mechanical motion.
Week 15	Couplings: Design and selection of couplings for mechanical power transmission systems, focusing on types (rigid, flexible, fluid) and their role in vibration control and torque transfer.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Materials Testing & Selection: Hands-on experience with selecting and testing materials for electromechanical components, focusing on properties and application suitability.
Week 2	Loading and Stress Analysis: Practical experiments to analyze the effects of different types of loading (tensile, compressive, shear) on mechanical structures and components.
Week 3	Electromotor & Control Systems: Lab work involving different types of motors (AC, DC) and their control systems, including wiring, testing, and control techniques like VFDs.
Week 4	Shaft Design & Testing: Practical applications of shaft design, including the selection of materials, dimensioning, and testing under various loading conditions.
Week 5	Key Design & Assembly: Hands-on lab to design, fabricate, and test keys used to transmit torque in mechanical assemblies, ensuring proper fit and function.
Week 6	Bearing Selection & Analysis: Experimenting with rolling bearings, testing their load capacity, and selecting appropriate bearing types for different electromechanical systems.
Week 7	Belt and Chain Drive Systems: Design, assembly, and performance testing of belt and chain drives, including analysis of power transmission and efficiency.
Week 8	Pulley Design & Testing: Hands-on design and testing of pulleys for various mechanical systems, including size, material selection, and performance evaluation.
Week 9	Gear Design & Meshing: Designing, fabricating, and testing gears (spur, bevel, helical) for correct mesh, load distribution, and efficiency in mechanical systems.
Week 10	Bolted Connection Assembly: Practical assembly of bolted connections, including torque analysis, fastener selection, and strength testing for different joint configurations.
Week 11	Riveting Techniques & Testing: Hands-on work with riveting processes, designing and assembling riveted joints, and testing their strength under different loads.
Week 12	Welding & Joint Integrity: Performing different types of welding (MIG, TIG, Arc) to create welded joints, and testing for strength, durability, and quality.
Week 13	Clutch Mechanism Testing: Experimenting with various clutch designs (friction, centrifugal) to analyze engagement/disengagement performance and torque transmission.
Week 14	Brake System Design & Testing: Hands-on testing of brake systems (disc, drum), including performance evaluation, material selection, and heat dissipation analysis.

Week 15	Coupling Selection & Vibration Testing: Testing different types of couplings (rigid, flexible, fluid) for vibration damping, torque transmission, and misalignment tolerance.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Mechanical Engineering Design" by J.E. Shigley "Introduction to Electromechanical Systems" by D. P. M. Vullers	
Recommended Texts	"Engineering Design: A Materials and Processing Approach" by George E. Dieter	Online
Websites	SolidWorks Education Offers CAD tools and tutorials for designing mechanical and electromechanical systems. Ideal for students and engineers involved in 3D modeling and simulations.	Online

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Synchronous machines			**Module Delivery**	
Module Type	Core			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3528				
ECTS Credits	5				
SWL (hr/sem)	121				
Module Level	1		**Semester of Delivery**	6	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	The aim of this module is to provide students with a thorough understanding of synchronous machines, their operating principles, characteristics, and applications. Students will gain practical knowledge through the testing and analysis of synchronous motors and generators.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the theory and principles of synchronous machines (motors and generators). 2. Analyze the operational characteristics and performance of synchronous machines under various load conditions. 3. Perform load tests, open circuit tests, short circuit tests, and determine the parameters of synchronous machines. 4. Apply synchronization techniques for connecting synchronous machines to the electrical grid. 5. Understand and implement power factor correction using synchronous motors
Indicative Contents المحتويات الإرشادية	This course covers the principles, construction, operation, performance characteristics, testing, synchronization, and applications of synchronous machines, including motors and generators, with a focus on power factor correction and industrial integration
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61`	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Alternator Regulation: Study of the regulation of alternators, including the measurement of voltage variations under different loads.
Week 2	Alternator Characteristics: Testing and analysis of the key characteristics of alternators, including voltage, current, and frequency variations.
Week 3	Load Test on a Three-Phase Induction Motor: Performing a load test on a three-phase induction motor to analyze efficiency and power factor under load.
Week 4	Open Circuit and Short Circuit Test on a Three-Phase Induction Motor: Conducting open-circuit and short-circuit tests to determine equivalent circuit parameters.
Week 5	Synchronous Motor Operation: Study and testing of synchronous motor operation, including starting methods and synchronization with the grid.
Week 6	Load Test on Synchronous Motor & Measurement of Power Angle: Performing load tests on synchronous motors, measuring power angles and efficiency.
Week 7	Determination of Parameters of Synchronous Machine: Measuring and determining key parameters of synchronous machines, including inductance and resistance.
Week 8	No Load Operation of a Three-Phase Synchronous Machine as Generator: Testing synchronous machines at no load while operating them as a generator.
Week 9	Short Circuit Test of the Three-Phase Synchronous Generator: Performing short-circuit tests on three-phase synchronous generators to determine fault characteristics.
Week 10	Connecting Three-Phase Synchronous Alternator in Parallel with Network: Hands-on practice in

	connecting a three-phase synchronous alternator in parallel with the grid.
Week 11	Obtaining the V Curve of the Synchronous Motor Operating at Load: Analyzing and obtaining the V curve for a synchronous motor under load conditions.
Week 12	Short Circuit Test for the Three-Phase Synchronous Generator: Repeating short-circuit tests on a three-phase synchronous generator to analyze behavior under faults.
Week 13	Power Factor Correction in Three-Phase Circuit: Study of power factor correction techniques in three-phase circuits, including the use of capacitors.
Week 14	Power Factor Correction Using Three-Phase Synchronous Motor: Power factor correction by using a three-phase synchronous motor in a real electrical system.
Week 15	Discussion: Recap and discussion of the key concepts and experimental findings from previous weeks, with focus on troubleshooting and optimization.

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1. Electrical Machines by A.E. Fitzgerald, Charles Kingsley, and Stephen D. Umans. 2. Principles of Electric Machines and Power Electronics by P.C. Sen.	
Recommended Texts	Electric Machinery Fundamentals by Stephen J. Chapman.	Online
Websites	All About Circuits - Educational resources on electrical machines and circuits.	Online

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.

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Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Power electronics			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE4729				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	7	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	The aim of this module is to provide students with a deep understanding of power semiconductor devices, rectifiers, and power converters. Students will learn the operation, characteristics, and applications of these devices, and gain practical experience through hands-on testing and analysis of various circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the working principles and characteristics of power semiconductor devices (SCR, DIAC, TRIAC, MOSFET, IGBT). 2. Analyze and design different types of rectifiers (uncontrolled and controlled) for single-phase and three-phase systems. 3. Understand the operation of DC-AC converters (inverters), DC-DC converters (choppers), and AC-AC converters (cyclo-converters). 4. Apply speed control techniques for DC motors and AC motors (induction and synchronous). 5. Implement trigger circuits for semiconductor devices and power control techniques.
Indicative Contents المحتويات الإرشادية	Characteristics of SCR, DIAC, TRIAC, MOSFET, and IGBT.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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	**Quizzes**	1	7.5%	5	

assessment	**Assignments**	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to power semiconductor devices and their applications
Week 2-4	Single phase and three phase ACDC converter (Rectifier)
Week 5	DC-AC converter (Inverter)
Week 6	DC-DC converter (DC chopper)
Week 7-8	AC-AC converter (AC voltage regulator and cyclo converter)
Week 9-11	Speed control of DC motors
Week 12-15	Speed control of AC motors (Induction and Synchronous motors)

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Single phase half wave uncontrolled rectifier (R-load & RL-load)
Week 2	Single phase full wave (mid-point) or center tap uncontrolled rectifier (R-load)
Week 3	Single phase full wave uncontrolled rectifier (bridge) (R-load & RL-load)
Week 4	Three phase half wave uncontrolled rectifier (R-load & RL-load)
Week 5	Three phase full wave uncontrolled rectifier (bridge) (R-load & RL-load)
Week 6	Characteristics of SCR (Silicon Controlled Rectifier)
Week 7	R-trigger circuit of SCR, UJT (Uni-Junction Transistor) trigger circuit of SCR
Week 8	Single phase full wave (mid-point) or center tap controlled rectifier (R-load)

Week 9	Single phase full wave controlled rectifier (bridge) (R-load & RL-load)
Week 10	Three phase half wave controlled rectifier (R-load & RL-load)
Week 11	Three phase full wave controlled rectifier (bridge) (R-load & RL-load)
Week 12	Characteristics of DIAC (Diode for Alternating Current)
Week 13	Characteristics of TRIAC (Triode for Alternating Current)
Week 14	Characteristics of MOSFET (Metal-Oxide-Semiconductor Field-Effect Transistor)
Week 15	Characteristics of IGBT (Insulated-Gate Bipolar Transistor)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Power Electronics: Converters, Applications, and Design by Ned Mohan, Tore M. Undeland, William P. Robbins.	
Websites	Electronics Tutorials - Provides detailed information on semiconductor devices.	

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.

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Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Air-conditioning systems			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3531				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	7	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	To provide students with fundamental knowledge of air conditioning and refrigeration systems, focusing on their design, operation, and performance analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Demonstrate understanding of basic principles of thermodynamics applied to HVAC systems. • Analyze and calculate cooling and heating loads for buildings. • Design air conditioning systems, including duct and refrigeration systems. • Apply psychometric charts and processes in practical air conditioning solutions. • Understand and apply the performance characteristics of refrigeration and air conditioning components like compressors, fans, and evaporators.
Indicative Contents المحتويات الإرشادية	Introduction to air conditioning and refrigeration principles, Maintenance and troubleshooting of HVAC systems.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	56	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.7
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to basic concepts of air conditioning and comfort properties. Principles of psychometric chart and air processes.
Week 2	Understanding principles of the by-pass factor and air mixing processes.
Week 3	Cooling load estimations for buildings. Introduction to the use of material properties in cooling load calculations.
Week 4	Skills for solving cooling load problems, estimations of the required cooling load for different conditions.
Week 5	Development of knowledge in duct system designs for conditioned air distribution.
Week 6	Understanding the use of the required fan power to ensure proper air supply and circulation.
Week 7	Piping system design for hot and cold water and relevant applied examples for HVAC systems.
Week 8	Mid-term Exam – Review of topics covered so far.
Week 9	Heating load estimations and review of various material types used in HVAC systems.
Week 10	Discussion and review of previous topics to clarify concepts and address any questions.
Week 11	Definition of refrigeration, introduction to Carnot cycle and ideal vapor compression cycles with examples.
Week 12	Review of Carnot cycle and ideal vapor compression cycles, understanding practical applications.
Week 13	Introduction to absorption refrigeration cycle, its advantages and disadvantages, and the use of solar absorption refrigeration systems.
Week 14	Discussion and review of previous topics and preparation for final exam.
Week 15	Final Exam – Comprehensive assessment of all topics covered during the course.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Effect of Wind Speed on Relative Humidity – Measure and analyze the effect of wind speed on humidity levels in different environments.
Week 2	Psychometric Processes – Hands-on exercises to study psychometric chart processes, such as heating, cooling, humidifying, and dehumidifying.
Week 3	Main Air Conditioning and Refrigeration Systems – Introduction and practical demonstration of the key components and working principles of air conditioning and refrigeration systems.
Week 4	Air Conditioner Unit Performance – Performance testing of an air conditioning unit, evaluating cooling capacity, efficiency, and energy consumption under varying load conditions.
Week 5	Heat Pump Unit Performance – Test the performance of a heat pump system in both heating and cooling modes, analyzing efficiency and energy use.
Week 6	Electric Refrigerator Training Panel – Hands-on experience with the refrigeration cycle, including compression, condensation, expansion, and evaporation processes in an electric refrigerator.
Week 7	Duct Design and Air Distribution – Practical application of duct design concepts to understand airflow, pressure drops, and distribution in HVAC systems.
Week 8	Mid-term Practical Exam – Assessment of laboratory skills and understanding of key experiments, including air conditioning performance, refrigeration, and psychometric analysis.
Week 9	Fan Performance Testing – Measurement of fan air flow rates, power requirements, and efficiency for different fan types and speeds used in HVAC systems.
Week 10	Cooling Load Calculation and Application – Practical exercises to calculate and verify cooling loads for different spaces, based on materials, size, and environmental conditions.
Week 11	Heating Load Calculation – Hands-on calculation and analysis of heating loads for different building structures, based on insulation, external temperature, and heating equipment.
Week 12	Refrigeration Cycle in Detail – Study of the refrigeration cycle, with practical experimentation using refrigerants and temperature-pressure measurements to understand the system's performance.
Week 13	Absorption Refrigeration Cycle – Introduction and experimentation with absorption refrigeration systems, focusing on the use of ammonia and water or lithium bromide solutions.
Week 14	Power Consumption and Efficiency Testing – Measure the power consumption and efficiency of various HVAC and refrigeration units under different operational conditions.
Week 15	Final Lab Assessment – Comprehensive practical exam covering all experiments and techniques learned throughout the course. Students demonstrate their proficiency in diagnosing and solving real-world air conditioning and refrigeration problems.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Fundamentals of Refrigeration by William C. Whitman, William M. Johnson, and John A. Tomczyk. 2. Air Conditioning and Refrigeration Engineering by Frank Kreith & F. B. Fischer.	
Recommended Texts	HVAC Fundamentals by Samuel Sugarman.	Online
Websites	ASHRAE - American Society of Heating, Refrigerating, and Air-Conditioning Engineers	Online

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electro-mechanical devices			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3532				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	7	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	The aim of this module is to provide students with an in-depth understanding of signal conditioning, motor control, and feedback systems. Students will gain hands-on experience with practical applications such as DC motor control, speed control using thyristors, and stepper motor operations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Understand the principles of signal conditioning, signal conversion, and their applications in control systems. • Design and implement self-holding circuits and closed-loop control systems for various control applications. • Develop practical skills in motor control using thyristors, stepper motors, and DC motors. • Analyze and optimize feedback control systems, including the application of PID controllers. • Design and implement feedback systems for real-time control in industrial automation.
Indicative Contents المحتويات الإرشادية	• Signal conditioning and conversion circuits, self-holding circuits, feedback systems, motor control, and PID control. • DC motor control, stepper motor operation, closed-loop systems, and real-time control applications.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	104	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	41	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.7
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Components of Servo-Mechanisms
Week 2	Transducers – Types, principles, and applications
Week 3	Reduction Rules for control systems
Week 4	Sensors in control systems
Week 5	Industrial Detection Sensors and applications
Week 6	Gears – Types, functions, and role in servo systems
Week 7	Relays – Function and applications
Week 8	Theoretical and Experimental Study – Combining theory and experiments in servo-systems
Week 9	Pressure Control Systems
Week 10	Flow Rate Control Systems
Week 11	Level Control Systems – Overview of applications in industrial settings
Week 12	Temperature Control Systems – Principles and applications
Week 13	Feedback Control Systems – Theory and application in servo systems
Week 14	Advanced Control Techniques – PID control and other advanced control strategies
Week 15	PLC Applications – Introduction to Programmable Logic Controllers and their applications

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Characteristics of a Signal Conditioning Circuit
Week 2	Characteristics of a Signal Converter Circuit
Week 3	Temperature Characteristics of the LM 35 Integrated Circuit
Week 4	Pneumatic System Control
Week 5	Self-Holding Circuit
Week 6	Closed Loop On/Off Control of the Level with Pressure Sensor
Week 7	Open Loop and Closed Loop Control for DC Motor
Week 8	Speed and Position Control using Thyristor
Week 9	Stepper Motor Operation and Control Mode
Week 10	PID Control System Design and Implementation
Week 11	Simulation of Feedback Control System (Closed-Loop Control)
Week 12	Control of AC Motors using VFD (Variable Frequency Drive)
Week 13	Position Feedback and Control in Servo Motors
Week 14	H-Bridge Motor Driver Circuit for Bi-directional Control
Week 15	Final Project: Design and Control of a Complete Motor System

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introduction to Mechatronics and Measurement Systems (Alciatore, Histand)	
Recommended Texts	Electromechanics: Principles, Concepts, and Devices (A. M. Meeker)	Online
Websites	All About Circuits: Electro-mechanical Systems	Online

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Control and Automation			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3533				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	7	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	The aim of this module is to provide students with a comprehensive understanding of control systems and automation technologies, focusing on hardware and software components, advanced control techniques, and the application of intelligent systems such as artificial neural networks (ANNs), fuzzy logic, and genetic algorithms. The module will explore practical techniques used in industrial automation and control systems through both theoretical and hands-on lab sessions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand and explain the fundamental concepts of control systems and automation. 2. Demonstrate practical knowledge of DC sensors, actuators, servo motors, and other automation components. 3. Apply Z-transforms in control system analysis and design. 4. Implement and assess intelligent control systems, including artificial neural networks and fuzzy logic controllers. 5. Design and analyze optimization problems using genetic algorithms.
Indicative Contents المحتويات الإرشادية	Introduction to control systems, automation, sensors, actuators, Z-transforms, intelligent systems, fuzzy logic, genetic algorithms, microcontrollers.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.1
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to control and automation technology
Week 2	Basic elements of automation and production control systems
Week 3	Advanced automation functions and industry levels
Week 4	Hardware components for controlling the automation process
Week 5	DC sensors, actuators, and servo motors
Week 6	Z-transform for control systems
Week 7	Intelligent control systems (artificial neural networks)
Week 8	Effective functions used in artificial neural networks
Week 9	Topology of neural networks, types of neural networks, neural network controller models
Week 10	Implementation of fuzzy logic systems
Week 11	Fuzzy inference systems, fuzzy control infrastructure
Week 12	Genetic algorithm: introduction and biological background
Week 13	Genetic algorithm steps, genetic algorithm operators
Week 14	Microprocessor: brief description and definition, characteristics, uses, and programming
Week 15	Microcontroller: differences between microprocessor and microcontroller, microcontroller chips

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Introduction to basic control systems, exploring components like sensors, actuators, and controllers.
Week 2	Hands-on experiment with basic automation and production control systems.
Week 3	Experiment with advanced automation functions and industry applications.
Week 4	Setting up and testing hardware components for controlling automation processes (e.g., PLCs, sensors).
Week 5	Experiment with DC sensors, actuators, and servo motors for motion control and position feedback.
Week 6	Z-transform applications: practical exercises using Z-transform for discrete-time control systems.
Week 7	Introduction to intelligent control systems using artificial neural networks (ANNs).
Week 8	Implementing functions in artificial neural networks for control system applications.
Week 9	Building and testing neural network controllers, exploring different types and topologies.
Week 10	Implementing and testing fuzzy logic controllers for a given process control problem.
Week 11	Building fuzzy inference systems and evaluating their performance in control tasks.
Week 12	Implementing genetic algorithms for optimization in control system applications.
Week 13	Applying genetic algorithm steps and operators for solving automation-related optimization problems.
Week 14	Hands-on experimentation with microprocessors: Programming and control applications.
Week 15	Microcontroller applications: Hands-on programming and testing microcontrollers in automation projects.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Core textbook: "Modern Control Engineering" by Ogata	
Recommended Texts	"Genetic Algorithms in Search, Optimization, and Machine Learning" by David E. Goldberg	Online

Websites	https://www.controleng.com	Online

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Project Preparations			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	EMTE3534				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level	1		**Semester of Delivery**	7	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of the Final Year Project module is to provide students with the opportunity to apply the theoretical knowledge and practical skills they have gained throughout their studies in an independent, self-directed project. The project will involve designing, analyzing, and solving an engineering problem, demonstrating the ability to research, innovate, and implement solutions in real-world scenarios.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Apply engineering principles: Demonstrate the ability to apply relevant principles to solve a real-world engineering problem. • Conduct research and analysis: Critically analyze engineering challenges and conduct thorough research to propose solutions. • Design and develop solutions: Design and implement systems, products, or processes to address engineering problems. • Work independently: Demonstrate the ability to manage time effectively and work independently to meet project deadlines. • Communicate technical information: Prepare and deliver a detailed technical report and oral presentation of the project findings. • Demonstrate problem-solving skills: Use engineering tools and methodologies to analyze and solve complex engineering problems. • Collaborate effectively: Work with peers and supervisors to develop, refine, and present solutions.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Independent Learning: Students will be encouraged to work independently, with the project serving as a self-directed learning experience. • Research-Oriented Approach: Emphasis on research and analysis, where students are expected to explore academic and technical literature, conduct experiments, and apply engineering methodologies. • Project Supervision: Regular meetings with a project supervisor who will provide guidance, feedback, and support throughout the project duration. • Practical Application: Students will apply theoretical concepts to real-world problems, ensuring the development of practical skills. • Collaborative Learning: Encouraging peer discussions and group work when necessary, facilitating knowledge sharing and collaboration. • Workshops and Seminars: Providing workshops on writing technical reports, presentations, and research methodologies to enhance academic and presentation skills. • Presentation Skills: Students will be trained to present their findings and communicate technical information clearly to diverse audiences.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	47	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.1
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	28	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.9
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Renewable Energy Systems			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE4835				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	8	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	The aim of this module is to introduce students to the fundamental principles and practical applications of renewable energy systems, with a focus on solar and wind energy. Students will learn about the technologies, installation, and maintenance of these systems, and understand how renewable energy contributes to sustainable development.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Understand the basic principles of renewable energy systems, particularly solar and wind power. • Analyze the technical, economic, and environmental factors influencing renewable energy systems. • Design and implement solar and wind energy systems, and integrate them into practical applications. • Evaluate the performance of renewable energy systems under different environmental and load conditions. • Identify and solve engineering problems related to the installation and operation of renewable energy systems. • Apply modern tools and software for renewable energy system design and analysis.
Indicative Contents المحتويات الإرشادية	Principles of solar radiation, photovoltaic systems, and solar energy conversion technologies, Introduction to wind energy, turbines, and power generation.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	56	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.7
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Renewable Energy Systems: Overview of global energy needs, types of renewable energy, and their significance.
Week 2	Solar Energy Basics: Solar radiation, photovoltaic (PV) effect, solar thermal energy, and applications.
Week 3	Photovoltaic Systems: Principles of solar panels, components, installation, and efficiency.
Week 4	Design of Solar PV Systems: System sizing, off-grid and grid-connected systems, and power conversion.
Week 5	Solar Thermal Energy Systems: Solar collectors, applications, and integration into heating systems.
Week 6	Wind Energy: Principles of wind energy conversion, types of wind turbines, and efficiency.
Week 7	Wind Turbine Design: Sizing, installation, and operation of wind turbines; energy capture and optimization.
Week 8	Hydropower: Principles of hydroelectric power generation, types of hydropower plants, and their efficiency.
Week 9	Biomass and Bioenergy: Conversion of biomass into energy (biogas, biofuels), applications, and environmental impacts.
Week 10	Geothermal Energy: Types of geothermal systems (dry steam, flash, binary), and applications for heating and power generation.
Week 11	Ocean Energy: Tidal, wave, and ocean thermal energy conversion (OTEC), and related technologies.
Week 12	Energy Storage Systems: Importance of energy storage in renewable energy, types of storage

	(batteries, pumped hydro, flywheels).
Week 13	Grid Integration of Renewable Energy: Challenges of integrating renewable energy into the grid, smart grids, and hybrid systems.
Week 14	Environmental and Economic Aspects of Renewable Energy: Life cycle analysis, cost-benefit analysis, and sustainability considerations.
Week 15	Future of Renewable Energy: Emerging technologies, innovations in renewable energy, and the transition to a sustainable energy future.
Delivery Plan (Weekly LAB Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Introduction to Solar Energy Systems: Introduction to solar panels, basic setup, measuring solar radiation, and understanding the efficiency of PV modules.
Week 2	Photovoltaic (PV) System Performance Testing: Measure and test the output of solar PV modules under different light conditions and load conditions.
Week 3	Solar PV System Design and Installation: Design and install a small grid-connected solar PV system, measure voltage, current, and power output.
Week 4	Solar Panel Array Configuration: Learn how to connect multiple solar panels in series and parallel; measure voltage, current, and output power.
Week 5	Wind Energy Basics: Wind Turbine Setup: Assemble and install a small wind turbine. Measure and analyze its performance under various wind speeds.
Week 6	Wind Turbine Power Generation: Measure output power from the wind turbine at different wind speeds. Analyze efficiency and optimize turbine performance.
Week 7	Wind Power Curve Analysis: Determine and analyze the power curve of a wind turbine by varying wind speeds and turbine rotation.
Week 8	Hybrid Solar and Wind System Design: Design and simulate a small hybrid solar-wind system, combining both energy sources and measure system output.
Week 9	Energy Storage Integration: Experiment with storing energy from solar and wind systems into a battery, and measure charging/discharging behavior.
Week 10	Distribution Board Basics: Learn the basic functions and wiring of a distribution board, including safety and protection features.
Week 11	Solar Power Distribution to Load: Integrate a solar PV system with a distribution board and test the supply of power to a resistive load.
Week 12	Wind Power Distribution to Load: Integrate a wind turbine to a distribution board and supply power to a resistive load. Measure voltage, current, and power.
Week 13	Simulation of Grid-Tied Solar System: Simulate a grid-tied solar system and connect it to a distribution board, monitoring performance and power flow.

Week 14	Wind and Solar Power with Load Management: Experiment with load management techniques, integrating wind and solar power to meet a variable load.
Week 15	Final Project: System Integration and Testing: Integrate both the solar and wind systems to a common distribution board. Test the complete setup with a variable load and optimize the system for efficiency.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Fundamentals of Renewable Energy" by Vaughn C. Nelson. • Renewable Energy: Power for a Sustainable Future" by Godfrey Boyle.	
Websites	https://www.renewableenergyworld.com	

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Professional Ethics			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	MTU1008				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level	1		**Semester of Delivery**	8	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	
Indicative Contents المحتويات الإرشادية	
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	34	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	41	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.7
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				

Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	الوحدة (1) – الأخلاق: مفهوم الأخلاق، القواعد العامة للأخلاقيات، القيم الأخلاقية.
Week 2	الوحدة (2) – العمل والمهنة: أهمية العمل، سلوكيات العمل، الفرق بين العمل والمهنة.
Week 3	الوحدة (3) – أخلاقيات المهنة: خصائص أخلاقيات العمل، صفات أخلاقيات المهنة.
Week 4	الوحدة (4) – القيم وأخلاقيات المهنة: الأمانة، الصدق، النصح، العدل، الإتقان.
Week 5	الوحدة (5) – أنماط السلوك الغير أخلاقي في المهنة: الفساد الإداري، الرشوة، الغش.
Week 6	الوحدة (6) – وسائل وأساليب ترسيخ قيم أخلاقيات المهنة: أساليب ترسيخ أخلاقيات المهنة، تعزيز السلوك الأخلاقي.
Week 7	الوحدة (7) – أخلاقيات مهنة الهندسة: أهمية المهندسين في المجتمع، شروط المهندس المحترف.
Week 8	الوحدة (8) – ميثاق أخلاقيات مهنة الهندسة لاتحاد المهندسين العرب: مرتكزات ميثاق أخلاقيات مهنة الهندسة.
Week 9	الوحدة (9) – أخلاقيات المهندس في التعليم والتدريب المستمر: المشاركة في التعليم المستمر، قواعد السلوك الواجب على المهندس.
Week 10	الوحدة (10) – أخلاقيات المهن الهندسية في مشاريع البحث والتطوير: أخلاقيات البحث العلمي في الهندسة، دور المهندس في مشاريع البحث.
Week 11	الوحدة (1) – الأخلاق: مفهوم الأخلاق، القواعد العامة للأخلاقيات، القيم الأخلاقية.
Week 12	الوحدة (2) – العمل والمهنة: أهمية العمل، سلوكيات العمل، الفرق بين العمل والمهنة.
Week 13	الوحدة (3) – أخلاقيات المهنة: خصائص أخلاقيات العمل، صفات أخلاقيات المهنة.
Week 14	الوحدة (4) – القيم وأخلاقيات المهنة: الأمانة، الصدق، النصح، العدل، الإتقان.
Week 15	الوحدة (5) – أنماط السلوك الغير أخلاقي في المهنة: الفساد الإداري، الرشوة، الغش.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"أخلاقيات المهنة في الهندسة" (Engineering Ethics) - تأليف: حسين العجمي "مقدمة في أخلاقيات المهنة" (Introduction to Professional Ethics) - تأليف: جون كيرنز	

Websites	الموقع الرسمي لاتحاد المهندسين العرب: يحتوي على ميثاق الأخلاقيات والمبادئ الأخلاقية الخاصة بالمهنة.

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.

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Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Computer aided design and manufacturing			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE4837				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	8	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• Develop students' proficiency in using AutoCAD software for creating 2D and 3D drawings. • Equip students with the knowledge to generate technical drawings and manufacturing diagrams required in engineering design. • Enable students to understand the principles of drafting and design and apply these to solve real-world engineering problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Demonstrate proficiency in using AutoCAD's drawing commands, including line, circle, arc, and rectangle. • Produce 2D technical drawings for manufacturing and engineering purposes using AutoCAD tools and commands. • Create and manipulate 3D models within AutoCAD, applying appropriate commands to visualize complex shapes. • Apply engineering drawing standards and practices to create professional-quality manufacturing drawings. • Utilize the finite element method (FEM) for solving basic problems related to engineering design and simulations.
Indicative Contents المحتويات الإرشادية	Introduction to FEM and problem-solving using AutoCAD.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.1
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	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to AutoCAD: Overview and ways to enter commands
Week 2	Continuation: Methods of entering commands in AutoCAD
Week 3-4	Drawing basics: Lines, Circles, Squares, Rectangles
Week 5-6	Practical exercises: Drawing using keyboard shortcuts
Week 7-8	Applying AutoCAD tools for accurate design and drawings
Week 9-10	Mastering 2D drawing techniques in AutoCAD
Week 11-12	Introduction to 3D drawing in AutoCAD
Week 13-14	Creating manufacturing drawings with AutoCAD
Week 15	Introduction to Finite Element Method (FEM) and solving simple problems
Delivery Plan (Weekly LAB Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1-3	Methods to enter commands in AutoCAD (line, circle, square, etc.)
Week 4-6	Explanation and practice: Drawing lines, circles, rectangles, etc.
Week 8-9	Execute drawing using keyboard shortcuts and commands
Week 10	Best practices and right application for specific tasks in AutoCAD
Week 11-12	Introduction to 2D drawing techniques in AutoCAD

Week 13-14	Introduction to 3D drawing techniques in AutoCAD
Week 15	Drawing manufacturing drawings with AutoCAD

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"AutoCAD and Its Applications" by Terence M. Shumaker "Engineering Drawing and Design" by David A. Madsen	
Websites	AutoCAD Official Website Lynda.com - AutoCAD Courses	

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.

Ministry of Higher Education and Scientific Research – Iraq
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Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electro-mechanical devices-Advance			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE4838				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	8	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• To provide an in-depth understanding of the principles, applications, and technologies related to Electro-mechanical Devices. • To equip students with practical skills for designing, analyzing, and troubleshooting electro-mechanical systems in various industrial and commercial contexts.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Understand the fundamental concepts and operating principles of electro-mechanical devices. • Design basic electro-mechanical systems by integrating electrical, mechanical, and control engineering principles. • Analyze the performance of electro-mechanical systems using appropriate mathematical and simulation tools. • Apply industry-standard techniques for the testing and maintenance of electro-mechanical devices. • Solve real-world problems related to the integration of sensors, actuators, motors, and controllers in electro-mechanical systems.
Indicative Contents المحتويات الإرشادية	Types of actuators, sensors, and controllers in electro-mechanical systems, Integration of microcontrollers and PLCs in electro-mechanical systems.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	56	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.7
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	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Electro-mechanical Systems: Overview of electro-mechanical devices, components, and their applications.
Week 2	Basic Principles of Electromechanics: Relationship between electrical and mechanical components, laws of electromechanics.
Week 3	Actuators and Sensors: Types of actuators (motors, solenoids) and sensors (position, velocity, force, etc.) used in systems.
Week 4	Electric Motors (AC/DC): Working principles of AC and DC motors, types, and their applications in electro-mechanical devices.
Week 5	Servo Systems: Introduction to servo motors, feedback systems, and their applications in robotics and automation.
Week 6	Transducers and Signal Conditioning: Types of transducers, their characteristics, and how they condition signals for control systems.
Week 7	Mechanical Linkages and Transmission Systems: Gear systems, belt drives, cams, and linkages for mechanical power transmission.
Week 8	Control Systems for Electro-mechanical Devices: Open and closed-loop control systems, PID controllers, and their integration with electromechanical devices.
Week 9	Vibration and Stability Analysis: Vibration theory, resonance, and stability considerations in electro-mechanical systems.
Week 10	Electro-mechanical Energy Conversion: Energy conversion mechanisms in motors, actuators, and other electro-mechanical devices.

Week 11	Advanced Actuation Systems: Hydraulic and pneumatic actuators, their working principles, and applications in robotics and automation.
Week 12	Smart Materials and Electro-mechanics: Piezoelectric materials, shape-memory alloys, and their role in advanced electro-mechanical devices.
Week 13	Fault Diagnosis and Troubleshooting: Techniques for diagnosing and troubleshooting electro-mechanical systems, signal analysis, and diagnostics tools.
Week 14	System Integration and Applications: Designing integrated electro-mechanical systems for industrial automation, robotics, and smart technologies.
Week 15	Final Project & Review: Presentation of student projects on electro-mechanical systems, review of the course topics, and discussions.
Delivery Plan (Weekly LAB Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Introduction to Electro-mechanical Lab Equipment: Familiarization with lab equipment, tools, and safety protocols. Introduction to basic electro-mechanical systems.
Week 2	AC and DC Motor Testing: Experiment with the characteristics of AC and DC motors, including speed, torque, and efficiency measurements.
Week 3	Motor-Driven Actuators: Hands-on work with electric actuators, including motor control, positioning, and feedback mechanisms.
Week 4	Servo Systems and Feedback Loops: Set up a basic servo motor system, incorporating feedback and control systems to demonstrate position control.
Week 5	Transducers and Signal Conditioning: Experiment with different types of transducers (e.g., temperature, pressure, displacement) and signal conditioning techniques.
Week 6	Introduction to Electro-mechanical Control Systems: Build and test basic control circuits (open-loop and closed-loop) with sensors and actuators.
Week 7	Gear Systems and Mechanical Linkages: Study the mechanical linkages and transmission systems, including gear ratio calculations and performance.
Week 8	PID Control in Electro-mechanical Systems: Implement a simple PID controller to regulate motor speed or position in a feedback-controlled system.
Week 9	Vibration and Resonance in Electro-mechanical Systems: Experiment with mechanical resonances, damping, and vibration testing in motors and actuators.
Week 10	Energy Conversion in Motors and Actuators: Conduct tests on energy conversion efficiency in various electro-mechanical systems (e.g., motors and actuators).
Week 11	Hydraulic and Pneumatic Actuators: Hands-on testing with hydraulic and pneumatic actuators, including their operation and applications.
Week 12	Smart Materials in Actuation Systems: Experiment with piezoelectric and shape-memory alloys in

	actuation and control systems.
Week 13	Fault Diagnosis and Troubleshooting: Use diagnostic tools to identify faults in electro-mechanical systems, testing motors, controllers, and sensors.
Week 14	System Integration: Integrate multiple electro-mechanical components (e.g., motors, sensors, actuators) into a complete system for a practical application.
Week 15	Final Project and Presentation: Work on a final lab project involving a complete electro-mechanical system (e.g., robot, automation system). Present findings and results.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Electro-Mechanical Systems and Devices" by Sergey R. Balandin Modern Control Engineering" by Ogata Katsuhiko	
Websites	https://www.automationdirect.com/adc/home/home	

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

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Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Final Project			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	EMTE3539				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	8	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of the Final Year Project module is to provide students with the opportunity to apply the theoretical knowledge and practical skills they have gained throughout their studies in an independent, self-directed project. The project will involve designing, analyzing, and solving an engineering problem, demonstrating the ability to research, innovate, and implement solutions in real-world scenarios.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Apply engineering principles: Demonstrate the ability to apply relevant principles to solve a real-world engineering problem. • Conduct research and analysis: Critically analyze engineering challenges and conduct thorough research to propose solutions. • Design and develop solutions: Design and implement systems, products, or processes to address engineering problems. • Work independently: Demonstrate the ability to manage time effectively and work independently to meet project deadlines. • Communicate technical information: Prepare and deliver a detailed technical report and oral presentation of the project findings. • Demonstrate problem-solving skills: Use engineering tools and methodologies to analyze and solve complex engineering problems. • Collaborate effectively: Work with peers and supervisors to develop, refine, and present solutions.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Independent Learning: Students will be encouraged to work independently, with the project serving as a self-directed learning experience. • Research-Oriented Approach: Emphasis on research and analysis, where students are expected to explore academic and technical literature, conduct experiments, and apply engineering methodologies. • Project Supervision: Regular meetings with a project supervisor who will provide guidance, feedback, and support throughout the project duration. • Practical Application: Students will apply theoretical concepts to real-world problems, ensuring the development of practical skills. • Collaborative Learning: Encouraging peer discussions and group work when necessary, facilitating knowledge sharing and collaboration. • Workshops and Seminars: Providing workshops on writing technical reports, presentations, and research methodologies to enhance academic and presentation skills. • Presentation Skills: Students will be trained to present their findings and communicate technical information clearly to diverse audiences.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Vibration and Theory of Machine			**Module Delivery**	
Module Type	ELECTIVE I			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3517				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	5	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• To provide students with foundational knowledge of mechanical vibrations and dynamics. • To equip learners with the skills to analyze, model, and solve vibration-related engineering problems. • To develop an understanding of vibration control methods in mechanical systems. • To foster problem-solving and critical thinking skills in applied engineering scenarios.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Demonstrate a deep understanding of the principles of mechanical vibrations and dynamics. • Analyze and model single and multi-degree of freedom systems. • Apply theoretical knowledge to solve practical vibration problems in engineering. • Evaluate and design vibration control and damping solutions. • Interpret and use mathematical and computational tools for vibration analysis.
Indicative Contents المحتويات الإرشادية	Topics include vibration theory, single and multi-degree systems, damping methods, forced vibrations, gyroscopic effects, balancing of masses, and vibration control techniques.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	General principle of vibration
Week 2	Oscillatory motion
Week 3	Free vibration
Week 4	Free vibration without damping
Week 5	Free vibration with damping
Week 6	Gyroscopic couple
Week 7	Harmonically Forced vibration
Week 8	Transient vibration
Week 9	Balancing of rotating masses
Week 10	Balancing of reciprocating masses
Week 11	Multi-degree of freedom systems
Week 12	General balancing
Week 13	Mechanical systems analysis
Week 14	Vibration control techniques
Week 15	Review and integration

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Mechanical Vibrations" by S. S. Rao "Theory of Vibrations with Applications" by William T. Thomson and Marie Dillon Dahleh	
Websites	https://www.engineer4free.com/	

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Manufacturing processes			**Module Delivery**	
Module Type	ELECTIVE I			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3517				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	5	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	To provide students with a fundamental understanding of key manufacturing processes such as casting, machining, welding, and metal forms. To equip students with the knowledge and skills necessary for selecting and applying manufacturing techniques for various engineering applications. To develop problem-solving abilities in students to address real-world manufacturing challenges. To enhance the understanding of the relationship between product design, material selection, and manufacturing process choices.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Explain the principles and operations of various manufacturing processes such as casting, machining, welding, and metal forming. Analyze the effects of material properties, design constraints, and process parameters on product quality. Evaluate and select suitable manufacturing processes for specific engineering applications based on technical and economic factors. Apply knowledge of nontraditional machining techniques and explain their applications in modern manufacturing. Demonstrate understanding of welding physics and the behavior of materials during welding processes. Design simple manufacturing systems, considering material properties, process limitations, and cost-effectiveness.
Indicative Contents المحتويات الإرشادية	Topics covered include casting processes (permanent mold casting, solidification), machining operations (turning, drilling, milling), nontraditional machining techniques, welding processes, metal forming operations (rolling, forging, extrusion), sheet metal working, and plastics processes (injection molding, blow molding).
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Fundamentals of Metal Casting: Casting processes, solidification of metals, shrinkage.
Week 2	Permanent Mold Casting: Foundry practice, casting quality, metals for casting.
Week 3	Product Design Considerations in Casting: Design aspects for cast products, material selection, mold design.
Week 4	Theory of Metal Machining: Overview of machining technology, chip formation, force relationships.
Week 5	Merchant Equation in Metal Machining: Cutting force and energy relationships, merchant equation.
Week 6	Power and Energy in Machining: Power and energy relationships in machining, cutting temperature.
Week 7	Turning and Related Operations: Theory and practice of turning, lathe operation, related processes.
Week 8	Drilling and Related Operations: Drilling techniques, tools, applications, and related operations.
Week 9	Milling Operations: Milling process, tools, types of milling machines, related operations.
Week 10	Nontraditional Machining: Overview of nontraditional machining processes (e.g., EDM, laser cutting).
Week 11	Fundamentals of Welding: Overview of welding technology, weld joint types, physics of welding.

Week 12	Metal Forming Processes: Material behavior in metal forming, temperature, strain rate sensitivity.
Week 13	Bulk Deformation Processes: Rolling, forging, extrusion, wire and bar drawing.
Week 14	Sheet Metal Working: Cutting operations, bending operations, drawing.
Week 15	Plastics Processes: Extrusion, injection molding, blow molding, coating processes, fiber spinning.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Manufacturing Engineering and Technology" by Serope Kalpakjian and Steven R. Schmid "Fundamentals of Modern Manufacturing" by Mikell P. Groover	
Websites	https://www.engineer4free.com/	

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Internal Combustion Engines			**Module Delivery**	
Module Type	ELECTIVE II			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3624				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	6	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• To introduce students to the fundamental principles of engine operation, focusing on both Spark Ignition (SI) and Compression Ignition (CI) engines. • To equip students with an understanding of engine performance, combustion processes, and the role of engine design and fuel properties. • To explore the characteristics of engine fuels, fuel injection systems, and the impacts on combustion efficiency and emissions. • To analyze various engine cycles and their effects on engine operation and efficiency.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Explain the operational principles of SI and CI engines. • Identify and analyze key engine design parameters and their effects on performance. • Compare and contrast the different engine cycles (Otto and Diesel) and their efficiencies. • Understand and evaluate the properties of fuels, including knock resistance and calorific value. • Analyze the combustion process in both SI and CI engines, including abnormal combustion and ignition delays.
Indicative Contents المحتويات الإرشادية	Topics include engine cycles (Otto and Diesel), combustion processes, engine design parameters, fuel characteristics, ignition systems, fuel injection systems, engine performance, emissions, and mixture preparation for SI and CI engines.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem)	61	**Unstructured SWL (h/w)**	4.1

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Principles of SI and CI Engine Operation, 2-Stroke Engines
Week 2	4-Stroke Engines, Engine Design and Operating Parameters
Week 3	Air-Standard Cycles, Ideal Standard Cycles, Thermal Efficiencies
Week 4	Classification of Engine Fuels, Characteristics of Engine Fuels
Week 5	Knock Resistance, Ignition Tendency, Combustion Chemistry
Week 6	Air Excess Ratio, Calorific Value, Adiabatic Flame Temperature
Week 7	Dissociation, Real Engine Strokes, Induction Stroke, Volumetric Efficiency
Week 8	Compression Stroke, Combustion in SI Engines
Week 9	Abnormal Combustion in SI Engines, Parameters Influencing Knock and Early Ignition
Week 10	Combustion in CI Engines, Parameters Influencing Ignition Delay
Week 11	Expansion and Exhaust Strokes, Exhaust Emissions
Week 12	Mixture Preparation in SI Engines, Carburetor Fundamentals
Week 13	Fuel Injection Systems in Diesel Engines, Atomization

Week 14	Combustion Chamber Types in Diesel Engines
Week 15	Engine Characteristics and Performance, Review

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Internal Combustion Engine Fundamentals" by John B. Heywood "Fundamentals of Internal Combustion Engines" by Richard Stone	
Websites	https://www.sae.org/	

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Energy Storage Systems			**Module Delivery**	
Module Type	ELECTIVE II			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE3624				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	6	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	The aim of this module is to provide students with a comprehensive understanding of various energy storage technologies and their applications in modern energy systems. Students will learn about different types of energy storage, including mechanical, electrochemical, thermal, and superconducting systems, as well as their role in renewable energy integration and grid management. The module will also explore the economic and environmental aspects of energy storage, including cost analysis, sustainability, and future trends.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the different types of energy storage systems and their operating principles. 2. Evaluate the role of energy storage in the integration of renewable energy sources (e.g., solar, wind). 3. Analyze the advantages and challenges of various energy storage technologies (e.g., batteries, pumped hydro, supercapacitors). 4. Understand the economic considerations and environmental impact of energy storage systems. 5. Assess the technical and operational factors influencing energy storage performance and efficiency.
Indicative Contents المحتويات الإرشادية	Mechanical Energy Storage: Pumped Hydro, Compressed Air Energy Storage (CAES), Flywheels. Electrochemical Storage: Lead-acid, Lithium-Ion, and Flow Batteries.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Energy Storage Systems (ESS): Overview of energy storage, importance, types of energy storage (mechanical, electrical, chemical, and thermal).
Week 2	Mechanical Energy Storage: Pumped Hydro Storage, Compressed Air Energy Storage (CAES), Flywheel Energy Storage.
Week 3	Electrochemical Energy Storage: Introduction to batteries, lead-acid, lithium-ion batteries, and flow batteries.
Week 4	Lithium-Ion Batteries: Working principles, design, applications, advantages, and challenges.
Week 5	Lead-Acid Batteries: Design, operation, advantages, and limitations. Comparison with lithium-ion.
Week 6	Flow Batteries: Principles, types (Vanadium Redox, Zinc-Bromine), advantages, applications.
Week 7	Thermal Energy Storage: Types (Molten Salt, Phase Change Materials, Ice storage), applications, and efficiencies.
Week 8	Supercapacitors and Superconducting Magnetic Energy Storage (SMES): Working principles, advantages, and applications.
Week 9	Energy Storage for Renewable Integration: Role of ESS in managing renewable energy sources (wind, solar), balancing supply and demand.
Week 10	Grid-Scale Energy Storage: Large-scale storage systems, load leveling, frequency regulation, and grid stability.
Week 11	Hybrid Storage Systems: Combining different storage technologies, advantages of hybrid systems.
Week 12	Energy Storage Applications in Electric Vehicles (EVs): Battery types used, charging infrastructure,

	vehicle-to-grid systems.
Week 13	Economic and Environmental Aspects of ESS: Cost analysis, lifecycle assessment, recycling, environmental impacts of storage technologies.
Week 14	Future Trends in Energy Storage: Emerging technologies (solid-state batteries, hydrogen storage), innovations in materials and energy management.
Week 15	Review and Case Studies: Real-world applications of ESS in industry, review of the key concepts covered, and discussion of future developments in ESS.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Energy Storage" by Robert A. Huggins: Covers various energy storage technologies, especially in the context of battery systems and energy management. "Energy Storage Systems: Operation and Control" by Hongyu Wu, Lichao Liu: This book covers the operation and integration of energy storage systems in power grids.	
Websites	Energy Storage Association MIT Energy Initiative	

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Programmable Logic Controller (PLC)			**Module Delivery**	
Module Type	ELECTIVE III			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE4730				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	7	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	The aim of this module is to provide students with a foundational understanding of Programmable Logic Controllers (PLCs) and their applications in industrial automation systems. It focuses on programming and configuring PLCs using software tools, particularly Siemens LOGO! PLC and the SoftComfort IDE. Students will gain the necessary skills to create control systems, configure modules, and implement logic using Function Block Diagram (FBD).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand PLC Basics: Define basic PLC concepts, characteristics, and their role in automation systems. 2. Work with IEC 61131-3 Standard: Apply the standard IEC 61131-3 to device creation, testing, and programming languages. 3. Program PLCs using SoftComfort IDE: Use SoftComfort software for the development of control programs for Siemens LOGO! PLCs. 4. Design and Configure Control Systems: Implement effective control and regulation functions using Siemens LOGO! modules and the SoftComfort IDE. 5. Use Function Block Diagrams (FBD): Understand and apply various FBD concepts such as digital I/O, shift registers, and analog I/O in control systems.
Indicative Contents المحتويات الإرشادية	PLC Basics: Introduction to programmable logic controllers (PLCs), their core concepts, functions, characteristics (core memory, duty cycle, time response), and applications in automation systems.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1

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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to PLC: basic concepts, characteristics (core/discharge-bit/memory/duty cycle/time response)
Week 2	Sections of standard IEC 31131-3: 1-General; 2-Device creation/testing requirements; 3-Program languages; 4-User manual; 5-Messages; 6-Industrial networks; 7-Unclear logical direction.; 8-Application principles and implementation.
Week 3	LOGO SoftComfort Integrated IDE for program creation
Week 4	Siemens LOGO! micro PLC: modules
Week 5	Siemens LOGO! micro PLC: configuration selection.
Week 6	Siemens LOGO! micro PLC: network composition, connection.
Week 7	SoftComfort user interface.
Week 8	SoftComfort instrument panel (controls).
Week 9	SoftComfort program creation procedure: algorithm creation / func. block selection / block placement / configuration / connecting blocks / enabling
Week 10	FBD - Digital I/O / Cursor Control.
Week 11	FBD – shift register / logic levels / flags / analog I/O.
Week 12	FBD - basic functions.

Week 13	FBDs are special functions.
Week 14	FBD is the implementation of the control function.
Week 15	FBD is the implementation of the regulation function

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Introduction to PLCs and the SoftComfort IDE: Overview of components, software setup, and user interface.
Week 2	Basic PLC Programming Concepts: Create simple programs, understanding I/O configuration and wiring.
Week 3	Introduction to Siemens LOGO! PLC Modules: Hands-on with various Siemens LOGO! PLC modules and setup.
Week 4	Simple Program Creation with SoftComfort: Develop basic ladder diagrams and control logic.
Week 5	IEC 61131-3 Standard: Learn how to apply the IEC standard to create basic device configurations and testing procedures.
Week 6	Siemens LOGO! Micro PLC Configuration: Configure the PLC, understand module integration and setup of network connections.
Week 7	SoftComfort Program Creation Procedure: Practice creating algorithms, block selection, and program configuration.
Week 8	Digital I/O and Cursor Control: Implement basic digital input/output operations using FBD.
Week 9	Advanced FBD Concepts - Shift Registers and Logic Levels: Learn to use shift registers, logic levels, and flags in FBD programming.
Week 10	Analog I/O and Basic Functions in FBD: Set up and control analog inputs and outputs.
Week 11	Special FBD Functions: Use advanced functions for handling complex control and monitoring systems.
Week 12	Implementing Control Functions in FBD: Program PLC to execute control logic such as timers, counters, and motors.
Week 13	Implementing Regulation Functions in FBD: Create programs that control system regulation (e.g., temperature, pressure).
Week 14	Debugging and Troubleshooting PLC Programs: Identify and fix errors in a PLC control system using SoftComfort.
Week 15	Final Project: Create a full automation project integrating all the PLC programming concepts and FBD functionalities.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Programmable Logic Controllers: Principles and Applications" by John W. Webb and Ronald A. Reis. This book offers a comprehensive introduction to PLCs and covers various programming techniques, including ladder logic and function block diagrams. "Siemens PLC Programming" by R. L. Tilley. This book provides specific insights into Siemens PLC systems, including the LOGO! series and programming with SoftComfort.	
Websites	https://www.automationdirect.com/adc/home/home	

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Communications Systems			**Module Delivery**	
Module Type	ELECTIVE III			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE4730				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	7	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	The aim of this module is to introduce students to the fundamental concepts of communication systems. It focuses on both analog and digital communication techniques and systems, covering various modulation techniques, error control, and the impact of noise. Students will gain a solid understanding of communication theory, which is essential for the design and analysis of real-world communication systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Understand and explain the basic principles of communication systems, including analog and digital communication techniques. • Analyze and design different types of modulation schemes (AM, FM, PM, ASK, FSK, PSK). • Evaluate the performance of communication systems under different conditions, including noise and bandwidth limitations. • Apply the concepts of error detection and correction in communication systems. • Understand the role of multiplexing techniques such as TDM and FDM in communication systems.
Indicative Contents المحتويات الإرشادية	Analog Modulation Techniques: Principles and applications of AM, FM, and PM modulation. Digital Modulation Techniques: Techniques like ASK, FSK, PSK, and QAM in digital communication.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Communication Systems: Basic components, types of communication systems (analog vs digital), signal classification, and the general communication model.
Week 2	Signal Analysis: Time-domain analysis of signals, periodic and aperiodic signals, Fourier series, and Fourier transform.
Week 3	Amplitude Modulation (AM): Modulation principles, AM signal generation, spectrum analysis, and power distribution in AM.
Week 4	Frequency Modulation (FM) and Phase Modulation (PM): FM and PM principles, mathematical analysis, and comparison of AM, FM, and PM.
Week 5	AM/FM Transmitters and Receivers: Design and working principles of AM and FM transmitters and receivers, demodulation techniques, and practical applications.
Week 6	Angle Modulation and its Applications: Detailed analysis of angle modulation techniques (FM and PM), bandwidth requirements, and applications in radio broadcasting.
Week 7	Digital Communication Basics: Digital signals, binary signaling, Nyquist criterion, pulse shaping, and band-limited signals.
Week 8	Pulse Code Modulation (PCM): PCM principles, encoding, quantization, sampling theorem, and its application in digital communication systems.
Week 9	Digital Modulation Techniques: Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), and Quadrature Amplitude Modulation (QAM).
Week 10	Error Detection and Correction: Types of errors in communication systems, parity checks, Hamming codes, convolutional codes, and error correction techniques.

Week 11	Bandwidth and Data Rate: Data rate limits, Shannon's capacity theorem, bandwidth efficiency, and factors affecting bandwidth.
Week 12	Noise in Communication Systems: Types of noise, signal-to-noise ratio (SNR), noise figure, and its impact on system performance.
Week 13	Multiplexing Techniques: Time Division Multiplexing (TDM), Frequency Division Multiplexing (FDM), and Code Division Multiple Access (CDMA).
Week 14	Communication Channel Models: Channel characteristics, channel capacity, and fading in wireless communication systems.
Week 15	Modern Communication Systems: Overview of recent advancements in communication systems (e.g., 5G, optical communication, satellite communication), trends, and future technologies.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Introduction to Communication Systems Lab: Overview of lab equipment (oscilloscope, function generator), basic signal generation and measurement.
Week 2	Signal Analysis: Generate and analyze sine, square, and triangular signals using oscilloscopes, Fourier analysis of signals.
Week 3	Amplitude Modulation (AM): Create AM signals using a function generator, analyze spectra using a spectrum analyzer, and measure the modulation index.
Week 4	Frequency Modulation (FM): Generate FM signals, analyze frequency deviation, modulation index, and bandwidth using a spectrum analyzer.
Week 5	Phase Modulation (PM): Generate and measure phase-modulated signals and compare the characteristics of FM and PM.
Week 6	AM/FM Transmitters and Receivers: Simulate AM/FM transmission and reception, measure signal quality, and analyze demodulation techniques.
Week 7	Pulse Code Modulation (PCM): Generate and analyze PCM signals, study quantization error, and observe signal reconstruction from the quantized data.
Week 8	Digital Modulation Techniques: Implement Binary ASK, FSK, and PSK modulation techniques, analyze error rates and spectra.
Week 9	Error Detection and Correction: Implement and simulate Hamming codes for error detection and correction, and observe the effects of noise on communication.
Week 10	Signal-to-Noise Ratio (SNR) Measurement: Measure SNR in communication systems, analyze the impact of noise on communication performance.
Week 11	Time Division Multiplexing (TDM): Implement TDM and measure data transmission rates, analyze the effect of multiplexing on bandwidth.

Week 12	Frequency Division Multiplexing (FDM): Implement and analyze FDM systems, measure bandwidth usage, and compare with TDM.
Week 13	Channel Models and Noise Effects: Study channel fading and measure noise effects in different communication environments (e.g., AWGN, Rayleigh fading).
Week 14	Hands-on Project - Basic Communication System: Design and implement a simple communication system involving modulation, transmission, and reception.
Week 15	Final Project Presentation and Review: Present the final project, discuss the implementation challenges, and review the key concepts covered throughout the course.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• "Communication Systems" by Simon Haykin – A widely used textbook offering in-depth coverage of both analog and digital communication systems, modulation techniques, and noise analysis. • "Modern Digital and Analog Communication Systems" by B.P. Lathi – A detailed guide on communication theory, modulation, and digital communication systems.	
Websites	Coursera (Digital Communication Courses): Various online courses related to digital communication, modulation techniques, and signal processing.	

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

(0 – 49)				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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Artificial Intelligence and Robotics			**Module Delivery**	
Module Type	ELECTIVE IV			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE4836				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	8	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• To provide students with an understanding of the fundamental principles of artificial intelligence (AI) and robotics. • To enable students to apply AI techniques to solve problems in robotics, including perception, planning, and control. • To introduce students to modern tools and programming environments used in AI and robotics, such as ROS (Robot Operating System) and machine learning libraries.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Demonstrate a comprehensive understanding of AI and robotics concepts, including machine learning, perception, and motion control. • Implement and apply basic AI algorithms (such as search algorithms, decision-making, and learning algorithms) to robotic systems. • Design, program, and test robotic systems for various applications. • Use ROS to control robots, process sensor data, and implement robotic control algorithms. • Analyze and solve problems related to robot kinematics, planning, and coordination.
Indicative Contents المحتويات الإرشادية	Introduction to AI and Robotics: Basic principles, history, and evolution of AI and robotics. Machine Learning for Robotics: Overview of machine learning algorithms, supervised and unsupervised learning, and their application in robotics.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	31	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.1
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Artificial Intelligence & Robotics: Overview of AI and robotics, history, and key concepts.
Week 2	AI Fundamentals: Machine learning basics, search algorithms, and problem-solving techniques.
Week 3	Knowledge Representation and Reasoning: Logic-based AI, reasoning techniques, and knowledge representation methods.
Week 4	Machine Learning Techniques: Supervised and unsupervised learning, decision trees, k-NN, and Naïve Bayes.
Week 5	Robotics Fundamentals: Types of robots, components, kinematics, and dynamics.
Week 6	Robotic Kinematics: Forward and inverse kinematics, transformation matrices, and motion analysis.
Week 7	Robot Control Systems: Open-loop and closed-loop control, PID control, adaptive and model predictive control.
Week 8	AI in Robotics: Perception and Sensing: Vision systems, sensor integration, and SLAM.
Week 9	Robotics Operating Systems and Programming: ROS basics, programming languages (Python, C++), and sensor interfacing.
Week 10	AI in Robotics: Planning and Navigation: Motion planning, path planning algorithms, and localization techniques.
Week 11	Multi-Robot Systems: Coordination, collaboration, and distributed control in multi-robot systems.

Week 12	Human-Robot Interaction: Social robots, speech and gesture recognition, and safety considerations.
Week 13	AI in Industrial Automation: Applications in manufacturing systems, automation frameworks, and precision tasks.
Week 14	Advanced Topics in AI & Robotics: AI-based optimization, self-driving cars, and healthcare robotics.
Week 15	Future Trends and Emerging Technologies: Quantum computing, AGI, and ethical considerations in robotics.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Introduction to Robotics & AI: Hands-on introduction to robots, AI concepts, and simple programming setups (e.g., using a basic robot kit).
Week 2	Basic Programming for AI and Robotics: Introduction to robot programming languages (Python, C++), basic algorithms for robot movement and control.
Week 3	Implementing Search Algorithms: Implementing basic AI search algorithms (DFS, BFS, A*) on a simulated environment.
Week 4	Robot Kinematics Simulation: Implementing and testing forward and inverse kinematics for robotic arms using simulation software.
Week 5	Machine Learning Algorithm Implementation: Hands-on coding of supervised and unsupervised learning algorithms (e.g., linear regression, k-NN).
Week 6	Sensor Integration in Robotics: Setting up and testing sensors (LIDAR, ultrasonic, cameras) for perception in robotic systems.
Week 7	Motion Control in Robots: Experimenting with PID controllers and testing basic motion control on mobile robots.
Week 8	ROS (Robot Operating System) Programming: Practical exercises with ROS to control robots, integrate sensors, and manage robot tasks.
Week 9	Simulating Path Planning Algorithms: Implementing and testing motion planning algorithms (A*, RRT) in simulation environments.
Week 10	Localization and Mapping: Hands-on exercises with SLAM algorithms (Simultaneous Localization and Mapping) using a mobile robot.
Week 11	Multi-Robot Systems Simulation: Coordinating and testing multiple robots in a shared workspace for task completion.
Week 12	Human-Robot Interaction (HRI): Developing and testing basic HRI techniques, including gesture or voice-based control of robots.
Week 13	AI in Industrial Automation: Simulation and programming of robotic arms for industrial tasks like

	sorting or assembly.
Week 14	Autonomous Vehicle Simulation: Testing AI algorithms for autonomous vehicle navigation in a simulated environment.
Week 15	Capstone Lab Project: Final project integrating AI, robotics, and control systems, such as a fully autonomous robot performing a specific task.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig This textbook is widely considered a definitive guide on AI and covers fundamental concepts such as machine learning, search algorithms, and reasoning. "Introduction to Robotics: Mechanics and Control" by John J. Craig A comprehensive text for understanding the mechanics and control systems of robots, including kinematics and dynamics, which is essential for robotics labs.	
Websites	ROS Wiki (Robot Operating System)	

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.

Ministry of Higher Education and Scientific Research – Iraq
Middle Technique University
Technical College - Baquba
Electromechanical Techniques Department

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Internet of Things (IoT) for Industrial Applications			**Module Delivery**	
Module Type	ELECTIVE IV			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EMTE4836				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	8	
Administering Department	EMTE		**College**	Baquba Technical College	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	20/10/2024		**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 Aims أهداف المادة الدراسية	• To introduce students to the concepts, technologies, and applications of the Internet of Things (IoT) in industrial settings. • To equip students with the knowledge required to design and implement IoT systems for smart manufacturing, predictive maintenance, and industrial automation. • To explore IoT architecture, protocols, sensors, and the integration of IoT in industrial control systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Understand the basic principles of IoT and its role in modern industrial applications. • Design IoT-based systems, integrating sensors, actuators, and communication technologies for real-time data monitoring and control. • Implement IoT protocols (e.g., MQTT, CoAP) and understand the challenges of data transmission and security in IoT systems. • Apply IoT in industrial applications such as smart factories, predictive maintenance, and supply chain management. • Develop IoT systems that integrate with cloud computing, big data, and analytics for real-time decision-making and process optimization.
Indicative Contents المحتويات الإرشادية	IoT Communication Protocols: Introduction to IoT protocols like MQTT, CoAP, HTTP, and their applications in industrial networks. Sensors and Actuators in IoT: Role of sensors (temperature, humidity, vibration, etc.) and actuators in monitoring and controlling industrial systems.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	94	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	31	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.1
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**	1	7.5%	5	
	Assignments	1	7.5%	7	
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2hr	15%	10	
	Final Exam	4hr	70%	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to IoT: Basic concepts of IoT, IoT architecture, and applications in various industries, with an emphasis on industrial environments.
Week 2	IoT Communication Protocols: Overview of IoT protocols like MQTT, CoAP, HTTP; their usage in industrial networks for efficient communication and data transfer.
Week 3	Sensors and Actuators in IoT: Role of different sensors (e.g., temperature, vibration) and actuators (e.g., valves, motors) in industrial IoT systems.
Week 4	IoT Cloud Integration: Introduction to cloud computing platforms for IoT, cloud data storage, and how cloud systems enhance industrial applications.
Week 5	IoT in Smart Manufacturing: Application of IoT in factory automation, process monitoring, and optimizing production workflows.
Week 6	Predictive Maintenance Using IoT: Use of IoT-based sensors for predictive maintenance, reducing downtime, and increasing operational reliability in industrial settings.
Week 7	Industrial IoT Networks: Study of wired and wireless IoT networks used in industries, including LPWAN, Zigbee, Bluetooth, and cellular technologies.
Week 8	IoT and Data Analytics: Leveraging big data, machine learning, and AI to analyze IoT data for optimizing industrial operations and decision-making.
Week 9	Cybersecurity in IoT: Security issues in IoT systems; challenges and solutions including encryption, authentication, and secure communication protocols.
Week 10	IoT-enabled Smart Supply Chains: Role of IoT in supply chain management, including logistics,

	inventory tracking, and real-time updates for optimal performance and decision-making.
Week 11	Energy Management with IoT: Using IoT for monitoring energy usage, optimizing consumption, and reducing costs in industrial environments.
Week 12	IoT in Industrial Safety and Security: Applications of IoT in improving safety protocols and monitoring hazardous environments or equipment for potential risks.
Week 13	Emerging Trends in IoT: New developments in IoT such as Industry 4.0, 5G networks for IoT, edge computing, and their applications in industrial IoT solutions.
Week 14	Introduction to IoT: Basic concepts of IoT, IoT architecture, and applications in various industries, with an emphasis on industrial environments.
Week 15	IoT Communication Protocols: Overview of IoT protocols like MQTT, CoAP, HTTP; their usage in industrial networks for efficient communication and data transfer.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي العملي	
	Material Covered
Week 1	Introduction to IoT: Basic concepts of IoT, IoT architecture, and applications in various industries, with an emphasis on industrial environments.
Week 2	IoT Communication Protocols: Overview of IoT protocols like MQTT, CoAP, HTTP; their usage in industrial networks for efficient communication and data transfer.
Week 3	Sensors and Actuators in IoT: Role of different sensors (e.g., temperature, vibration) and actuators (e.g., valves, motors) in industrial IoT systems.
Week 4	IoT Cloud Integration: Introduction to cloud computing platforms for IoT, cloud data storage, and how cloud systems enhance industrial applications.
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Week 11	Energy Management with IoT: Using IoT for monitoring energy usage, optimizing consumption,

	and reducing costs in industrial environments.
Week 12	IoT in Industrial Safety and Security: Applications of IoT in improving safety protocols and monitoring hazardous environments or equipment for potential risks.
Week 13	Emerging Trends in IoT: New developments in IoT such as Industry 4.0, 5G networks for IoT, edge computing, and their applications in industrial IoT solutions.
Week 14	Lab Topics: Hands-on with IoT devices, protocols, cloud integration, industrial networks, and security. Projects include predictive maintenance, energy monitoring, and IoT applications in supply chains and safety.
Week 15	Final Project: Designing an end-to-end IoT-based industrial solution, integrating sensors, cloud computing, and data analytics to solve a real-world industrial problem.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Internet of Things: A Hands-On Approach" by Arshdeep Bahga and Vijay Madisetti – A comprehensive guide to IoT, including its applications in industries such as manufacturing, healthcare, and smart cities. "Internet of Things: Architecture and Design Principles" by Rajkumar Buyya, Christian Vecchiola, and S. Thamarai Selvi – This book offers a deep dive into IoT system architectures, applications, and design principles.	
Websites	IoT For All (https://www.iotforall.com)	

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
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