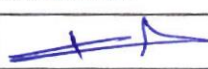


MODULE DESCRIPTION FORM

Module Information			
Module Title	Mechanics & Robotics I		Module Delivery
Module Type	B		☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☒ Practical ☒ Seminar
Module Code	AIE214		
ECTS Credits	6		
SWL (hr/sem)	150 H/Sem		
Module Level	3	Semester of Delivery	1
Administering Department	Artificial Intelligence Eng.		College
Module Leader	Omar Chasib Kaduhm		e-mail
Module Leader's Acad. Title	Asst. Lec.		Module Leader's Qualification
Module Tutor	Omar Chasib Kaduhm		e-mail
Peer Reviewer Name			e-mail
Scientific Committee Approval Date	27/9/2025		Version Number
			1.0

Relation with other Modules			
Prerequisite module	NONE	Semester	
Co-requisites module	NONE	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Definitions, Resolution of a Force in Plane, Moment of a Force, Couples, Transformation of a Couple, Resolution of a Force into a Force and a Couple, Introduction to the Resultant of Force Systems, Resultant of a Concurrent Coplanar Force System, Resultant of a Non-Concurrent Coplanar Force System, Resultant of a Parallel Non-Coplanar Force System, Resultant of a System of Couples in Space, Resultant of a Non-Concurrent Non-Parallel Non-Coplanar Force System, Introduction to Equilibrium, Equilibrium of a Concurrent Coplanar Force System, Friction, Laws of Friction, Types of Problems Involving Friction, Centroid.



Module Learning Outcomes	Knowledge	A2	A2.1 Resolve and analyze forces A2.2 Determine resultants of concurrent, non-concurrent, and parallel force systems. A2.3 Apply the conditions of equilibrium to solve static problems.
		A3	A3.1 Explain the concept of friction and its laws. A3.2 Analyze equilibrium problems involving friction in engineering systems such as wedges and screws.
	Skills	B1	B1.1 Construct and interpret free-body diagrams. B1.2 Apply vector methods to solve problems involving forces and moments.
		B2	B2.1 Work effectively in groups to analyze mechanical systems. B2.2 Communicate technical results clearly through written and graphical presentations.
	Ethics	C2	C1.1 Demonstrate responsibility and ethical behavior in engineering practice. C1.2 Respect teamwork values and maintain academic integrity.

Indicative Contents	Introduction and Basic Concepts Definition of mechanics and its branches – fundamental units and dimensions – concept of force, moment, and equilibrium – introduction to systems of units and vector representation of forces.			6 hours
	Unit 1:	Resolution of Forces Resolution of a force in a plane and in space – rectangular components – addition and subtraction of vectors – moment of a force about a point and an axis.		6 hours
	Unit 2:	Couples and Resultants Definition and characteristics of a couple – transformation of a couple – equivalent systems – resolution of a force into a force and a couple – resultant of a system of coplanar and non-coplanar forces.		8 hours
	Unit 3:	Equilibrium of Force Systems Conditions for equilibrium – free-body diagrams – equilibrium of concurrent and non-concurrent coplanar forces – equilibrium of rigid bodies – examples and problem-solving.		8 hours
	Unit 4:	Friction Nature of friction – laws of dry friction – coefficients of friction – angle of repose – applications involving wedges, ladders, belts, and screws.		6 hours
	Unit 5:			



	Centroids and Centers of Gravity Unit 6: Definition and significance – centroids of lines, areas, and composite bodies – center of gravity of solids – methods of integration and symmetry. 6 hours Review and Applications Unit 7: General review of statics principles – problem-solving involving real mechanical systems – introduction to computational tools for static analysis. 6 hours
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Learning and Teaching Strategies

Strategies	• Discussions • Presentation • Tutorial and graphics • Problem solving • Brain storming • Project • Problem Solving • Report & discussion assessment
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Student Workload (SWL)

Structured SWL (h/sem)	93	Structured SWL (h/w)	6.2
Unstructured SWL (h/sem)	57	Unstructured SWL (h/w)	5.8
Total SWL (h/sem)	150		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered	LOs
Week 1	Definitions, Resolution of a force in plane, Resolution of a force in space, Moment of a force.	A2, B1, B2, C2
Week 2	Resolution of a force in plane, Resolution of a force in space, Moment of a force.	A2, B1, B2, C2
Week 3	Couples, Transformation of a couple, Resolution of a Force into a Force and a Couple	A2, B1, B2, C2
Week 4	Introduction for the Resultant of Force Systems, Resultant of a Concurrent Coplanar Force System Resultant of a Non Concurrent Coplanar Force System,	A2, B1, B2, C2
Week 5	the Resultant of Force Systems, Resultant of a Concurrent Coplanar Force System Resultant of a Non Concurrent Coplanar Force System,	A2, B1, B2, C2



Week 6	Resultant of a Parallel Non Coplanar Force System, Resultant of a System of Couples in Space	A2, B1, B2, C2
Week 7	Resultant of a Parallel Non Coplanar Force System, Resultant of a System of Couples in Space	A5, B1, B2, C2
Week 8	Resultant of a Non concurrent Non Parallel Non Coplanar Force System, Introduction to Equilibrium, Equilibrium of a Concurrent Coplanar Force System	A5, B1, B2, C2
Week 9	Resultant of a Non concurrent Non Parallel Non Coplanar Force System, Introduction to Equilibrium	A2
Week 10	Equilibrium of a Concurrent Coplanar Force System	A5, B1, B2, C2
Week 11	Equilibrium of a Concurrent Coplanar Force System	A5, B1, B2, C2
Week 12	Friction, Laws of Friction, Types of Problems Involving Friction	A5, B1, B2, C2
Week 13	Friction, Laws of Friction, Types of Problems Involving Friction	A5, B1, B2, C2
Week 14	Centroid	A5, B1, B2, C2
Week 15	Centroid	A2, A5

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	A2,A3
	Assignments	2	10% (10)	2, 4,6,8,10,12 and 14	A2,A3
	Projects / Lab.	1	10% (10)	13	A2,A3
	Presentation	1	10% (10)	13	A2,A3



Summative assessment	Midterm Exam	1hr	10% (10)	7	A2
	Final Exam	3hr	50% (50)	15	A2,A3
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus)	
المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Arduino Platform and Basic Circuitry
Week 2	Lab 2: Getting Started with C++ Programming on Arduino Platform
Week 3	Lab 3: Hands-on Experiment with Buttons and Switches for Input Control
Week 4	Lab 4: Understanding and Implementing Analog Sensors with Arduino
Week 5	Lab 5: Controlling LED with PWM Signals on Arduino
Week 6	Lab 6: Programming and Controlling Servo Motors with Arduino
Week 7	Lab 7: Using Ultrasonic Sensors for Distance Measurement with Arduino
Week 8	Lab 8: Precise Control of Stepper Motors with Arduino Programming
Week 9	Lab 9: Integrated Projects (Combining Sensors and Motors)
Week 10	Lab 10: Integrated Projects (Combining Sensors and Motors)
Week 11	Lab 11: Integrated Projects (Combining Sensors and Motors)
Week 12	
Week 13	
Week 14	
Week 15	

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Engineering Mechanics by Meriam	Yes
Recommended Texts	Engineering Mechanics, Statics by R.C. Hibbler, 4th Edition, Macmillan publishing company, 1986.	Yes
Websites	https://eng.alayen.edu.iq/colleges/e/42	



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.				

