	Ministry of Higher Education and Scientific Research - Iraq **Al-Naji University** **College of Engineering** **AI Engineering Department**	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Introduction to mechanical Systems**			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	AIA2305				
ECTS Credits	**7**				
SWL (hr/sem)	175				
Module Level	2		**Semester of Delivery**	3	
Administering Department	Al Engineering		**College**	Engineering	
Module Leader	Dr. Mohammed Jabbar		**e-mail**	----------@alnaji-uni.edu.iq	
Module Leader's Acad. Title	Assit. Lect.		**Module Leader's Qualification**	PhD.	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Provide students with fundamental knowledge in mechanical systems for robotic applications. - Enable students to model and solve mechanical problems using analytical and computational tools. - Develop the ability to design and analyze robotic mechanical components. - Integrate mechanical components into robotic systems and validate performance.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the course, students will be able to: L1: Apply basic mechanical concepts to robotic systems. L2: Use mathematical models to describe and analyze motion and forces. L3: Select materials and evaluate their influence on performance. L4: Design basic mechanical components and evaluate their behavior. L5: Integrate components into a complete system and conduct performance testing.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The course will be delivered through **lectures** supported by **tutorial exercises** and **written reports** that reinforce theoretical concepts. In addition, **mini-projects** may be assigned to encourage independent learning, critical thinking, and the practical application of mechanical principles in robotics.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.72
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.28
Total SWL (h/sem)	**175**		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	3 , 6,9 and 12	Example LO #3, #6 and #10
	CollegeWork	4	10% (10)	Continuous	All
	Report	1	10% (10)	Continuous	All
	HomeWork	4	10% (10)	Continuous	
Summative assessment	Midterm Exam	1hr	10% (10)	7	
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Mechanical Systems in Robotics
Week 2	Levers, Linkages, and Mechanical Advantage
Week 3	Wheels, Axles, and Mobility Structures
Week 4	Springs, Damping, and Elastic Components
Week 5	Pulleys, Belts, and Cable-Driven Systems
Week 6	Introduction to Mechanical Design Principles
Week 7	Basic Stress and Strain Analysis
Week 8	Energy and Work in Mechanical Systems
Week 9	Momentum and Impulse
Week 10	Torsion and Bending in Structural Elements
Week 11	Simple Harmonic Motion and Oscillations
Week 12	Introduction to Lagrangian Mechanics
Week 13	Mechanical Design of Robotic Structures
Week 14	Fundamentals of Material Selection in Design

Week 15	System Integration and Performance Testing
Week 16	**Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	*Introduction to Robotics: Mechanics and Control* (4th Edition). Pearson. *Shigley's Mechanical Engineering Design* (11th Edition). McGraw-Hill	

	Design of Machinery: An Introduction to the Synthesis and Analysis of Mechanisms and Machines (6th Edition). McGraw-Hill.	
Recommended Texts	• **Beer, F. P., & Johnston, E. R.** – *Vector Mechanics for Engineers: Statics and Dynamics*. McGraw-Hill. • **Siciliano, B., & Khatib, O.** – *Springer Handbook of Robotics*. Springer.	
Websites	• **MIT OpenCourseWare** – Mechanical Engineering & Robotics Lectures. 🔗 https://ocw.mit.edu • **Coursera – Robotics Specialization (University of Pennsylvania)** 🔗 Covers mobility, kinematics, dynamics, and design. • **YouTube Channels:** ◦ *Robotics and AI Lab* → شروحات عملية للميكانيكا الروبوتية. ◦ *MIT Robotics* → محاضرات مفتوحة.	

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.