MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mechanics-Applied of Dynamics**			**Module Delivery**	
Module Type	**Support learning activity**			☒ **Theory** ☒ **Lecture** ☒ **Tutorial** ☐ **Lab** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU12043**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level			**Semester of Delivery**	4	
Administering Department	ATU12		**College**	PMTEC	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Assaad Alsahlani, Ph.D		**e-mail**	alsahlan@msu.edu	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/02/2024		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	Engineering Mechanics-Static	**Semester**	2

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course in vector dynamics is designed to teach solution techniques for rigid body kinematics. Conservation of momentum and energy are employed to analyze two- and three-dimensional problems. The use of vectors and free body diagrams for the analysis of dynamic mechanical systems is stressed. Analytical Thinking: This course will train you to analyze and solve problems systematically. This will be a major effort for many of you, so prepare to spend a lot of time on developing the skills every engineer is expected to have.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the course, the student should be able to do the following: 1- Create mathematical models of dynamic systems (point mass and rigid bodies) 2- Analyze the kinematics of point mass and rigid body systems. 3- Determine the motion of point mass and rigid body systems in space and time. 4- Resolve the motion of single particles in multiple coordinate systems, 5- Demonstrate the motion of multiple particles in constrained motion, 6- Use the equations of motion to compute the position, velocity, and acceleration of 7- multiple points on rigid bodies in constrained motion, 8- Apply the basic concepts of force, mass and acceleration; of work and energy; and of impulse and momentum for particles and rigid bodies. 9- Apply the knowledge and tools of dynamics to solve engineering problems, and 10- Explain your knowledge to peers through hand-written problem sets, verbalization, and writing.
Indicative Contents المحتويات الإرشادية	All course materials presented in class will also be posted on our Department website. The majority of the material will be organized by topic in the Modules and the links to lectures from a previous semester and the current semester (if available) are available on the Home page.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Conceptual Visualization: Use visual aids, diagrams, animations, and real-life examples to help students understand and visualize dynamic concepts such as motion, forces, and moments. This can assist in bridging the gap between theory and practical applications. 2- Problem-solving Approach: Focus on problem-solving exercises and provide students with a variety of practice problems. Encourage them to actively engage in solving dynamics problems, applying concepts, and analyzing the solutions. This approach helps develop critical thinking and problem-solving skills.

	3- Interactive Demonstrations: Conduct interactive demonstrations or experiments to illustrate key principles and phenomena in dynamics. These demonstrations can be conducted in the classroom or through virtual simulations to provide students with a hands-on understanding of dynamic concepts. 4- Use of Technology: Leverage technology tools and software packages to aid in dynamic analysis and visualization. Utilize simulation software, computational tools, and computer-aided design (CAD) software to demonstrate dynamic behaviors, analyze systems, and solve complex engineering problems.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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**	5	10% (10)	Bi-weekly	Every other lecture
	Assignments	10	10% (10)	Every week	Concludes the taken
	Projects / Lab.	1	10% (10)		
	Report	1	10% (10)	13	LO #10, #11 and #12
Summative assessment	**Midterm Exam**	2hr	10% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1-2	**Impulse and momentum of particles** Impulsive motion Angular momentum of a particle
Week 3-4	**Conservation of liner momentum** liner impact
Week 4-6	**Conservation of momentum** Conservation of angular momentum Impact Impulse and momentum of particles
Week 6-7	**Angular momentum** Rate of changed of angular momentum Conservation of angular momentum
Week 8	**Kinematics of rigid bodies (Midterm Exam)** Translation of rigid bodies Rotation of rigid bodies
Week 9	**Absolute motion**
Week 10	**Moment of inertia** Mass moment of inertia
Week 11	**Force/mass/acceleration** Force/mass/acceleration for rigid bodies
Week 12-13	**Work and energy** Work for rigid bodies Energy for rigid bodies
Week 14-15	**Impulse and momentum** Impulse for rigid bodies Momentum for rigid bodies
Week 16	**(Final Exam review session) & Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	ENGINEERING MECHANICS, DYNAMICS by R. C. HIBBELER	Yes
Recommended Texts	ENGINEERING MECHANICS, DYNAMICS by J. L. MERIAM	No
Websites		

Grading Scheme

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

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