Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mechanics-Dynamics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**HTCMT 101**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGI		**Semester of Delivery**		C22
Administering Department	MT		**College**	HTC	
Module Leader	Ahmed Mohammed Abbas		**e-mail**	ahmedabas@hwj_ntu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2024		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aims of the module are to 1. learn fundamental concepts and principles of particle and motion kinematics 2. Resolve the motion of single particles in multiple coordin 3. Obtain an understanding of Newton's Laws of Motion. 4. Apply analytical techniques to the solution of important e dynamics problems. 5. Apply the basic concepts of force, mass and acceleration; energy; and of impulse and momentum for particles and rig 6. Obtain an understanding of mass moment of inertia. 7. Obtain basic knowledge on mechanical vibration. 8. Obtain the equation of motion for single degree of freedo 9. Control unwanted vibration so that its adverse effects are

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of the course students should be able to: 1. Understand the basic kinematics concepts: displacement, velocity, and acceleration (and their angular counterparts). 2. Define basic kinematic quantities of rectilinear and curvilinear motion of particle such as: position, displacement, velocity and acceleration. 3. Understand how objects move and interact with one another. 4. Understand and apply Newton's laws of motion. 5. Understand and be able to apply work and kinetic energy, gravitational and elastic potential energy. 6. Understand and be able to apply impulse and momentum. 7. Apply appropriate mathematical techniques to translational motion and rotational motion for rigid bodies. 8. Determines how much torque an object needs to reach a specific angular acceleration. 9. Understand mechanical vibration and be familiar with basic terminology associated with it. 10. Model and analyze one degree of freedom mass-spring-

	damper systems. 11. Apply the theory of classically damped vibrating systems to problems of one degree of freedom.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - kinematics of particle Introduction: definition, fundamental units, International System of Units, Newton's laws of motion and law of gravitation. Rectilinear motion and basic kinematic quantities: position, displacement, velocity and acceleration. Special cases of rectilinear motion of particle: motion with constant velocity and motion with constant acceleration. Dependent rectilinear motions. Curvilinear motion of particle: position vector, velocity and acceleration. Free flight of a projectile. Tangential and 83 normal components of velocity and acceleration. Cylindrical (r-θ) coordinates components of velocity and acceleration. Relative motion. [25 hrs]. Part B - kinetics of particle

	Force and acceleration. Newton's second law, Definition of work, kinetic energy and power. Work of a gravitational force. Work of a spring force. Principle of work and energy. Potential energy: gravitational and elastic. Principle of impulse and momentum. Angular impulse and angular momentum. [15 hrs] Part C - kinematics of Rigid body Plane kinematics of rigid bodies. Types of plane motion of rigid bodies: translation, rotation, general plane motion. Relative Velocity and acceleration. Mass moment of inertia. [15 hrs] Part D – Mechanical vibration Introduction to vibration: types, mass, spring, damper. Free un-damped vibration, vibration isolation. [10 hrs] Free damped vibration, Forced damped vibration. [10 hrs]

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 discussions, while at the same time refining and expanding their critical thinking skills. This will be achieved through; 1- Lectures - aim to deliver fundamental knowledge in relation to dynamic analysis and the application to practical examples. 2- Tutorial sessions - are deployed to illustrate the application of fundamental knowledge of dynamic analysis to different practical exercises. 3- Assignments - are arranged to provide the opportunity for students to search for information, analyze machines with knowledge obtained, and present the completed tasks.

Student Workload (SWL) **الحمل الدراسي للطالب**			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem)	47	**Unstructured SWL (h/w)**	3.13

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction: definition, fundamental units, international system of units. Rectilinear motion and basic kinematic quantities: position, displacement, velocity and acceleration.
Week 2	Kinematics: Curvilinear motion of particle: position vector, velocity and acceleration. Free flight of a projectile
Week 3	Tangential and normal components of velocity and acceleration (n-t).
Week 4	Cylindrical (r-θ) coordinates components of velocity and acceleration.
Week 5	Relative motion
Week 6	Kinetics: direct application of Newton's second law (force, mass, acceleration)
Week 7	Work and Energy: Definition of work, kinetic energy and power. Work of a gravitational force. Work of a spring force. Principle of work and energy. Potential energy: gravitational and elastic
Week 8	Impulse and momentum: Principle of impulse and momentum. Angular impulse and angular momentum.
Week 9	Rigid body motion: Plane kinematics of rigid bodies. Types of plane motion of rigid bodies: translation, rotation, general plane motion.
Week 10	Relative Velocity
Week 11	Relative acceleration. Mass moment of inertia.
Week 12	Introduction to vibration: types, mass, spring, damper.
Week 13	Free un-damped vibration, vibration isolation

Week 14	Free damped vibration
Week 15	Forced damped vibration
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	Engineering Mechanics: Dynamics 5th edition by Meriam, J. L., Kraige, L. G. (2003)	Yes
Recommended Texts	Engineering Mechanics 'Dynamics" R. C. Hibbeler, 2016	No
Websites	https://www.classcentral.com/classroom/youtube-engineering-	

	mechanics-dynamics-54539

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية