	Ministry of Higher Education and Scientific Research - Iraq Northern Technical University College of Oil & Gas Techniques Engineering/Kirkuk Department of Fuel and Energy Engineering	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mechanics**			**Module Delivery**	
Module Type	**Basic**				
Module Code	**FEK104**			☒ **Theory**	
ECTS Credits	**5**			☒**Seminar**	
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	COGTEK	
Module Leader	Mohammed Qader Abdulrahman		**e-mail**	Mohammed83@ntu.edu.iq	
Module Leader's Acad. Title	The lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**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	A study of mechanics gives you the basic tools to understand how the world, both natural an if you take the time to do this carefully, you will be well prepared for more advanced studies in engineering. Knowledge of mechanics is a fundamental tool for a mechanical engineer. Our p understand what has become known as classical mechanics. The concepts of classical mech with include a study of forces, motion, energy, work, momentum and heat, how these are con these ideas can be applied to engineering problems. The ideas behind classical mechanics ch race absolutely and forever. Most historians agree that no discovery in human thought has be Students come to engineering mechanics with an elementary understanding of the basic princ acquired from introductory school physics together with their application to problem solving. T emphasis on the basic skills (see Specific Outcomes below) required to start to apply these c principles to real engineering problem solving. The class focuses on the practice of these skill content. In this class doing required background reading, coming to class and doing homewo for a football team (or musical group, using a simple analogy). The tutor/lecturer is less a sour more of a coach (or conductor) who structures practice and sets standards. Students' progres (and regurgitating) information but rather by practising their skills individually and learning to w others. The exams are like league games (or concerts) where students test their skills in a situ performance counts.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of the module the student is expected to be able to: Have understood and overcome any misconceptions about basic concepts in physics (force, energy, work etc). Restate existing problem solving skills in a form more suitable for engineering applications Interpret basic engineering applications of mechanics in more detail. Acquire four basic thinking skills: • Perceive, or resolve, contradictions involving their preconceptions about mechanics • Organise the basic ideas of mechanics in a form suitable for problem solving • Apply basic principles in mechanics to realistic engineering situations • Solve realistic engineering problems
Indicative Contents المحتويات الإرشادية	**Introduction** **Basics of Statics** Fundamental principles & concepts: Vector algebra, Newton's laws, gravitation, force (external and internal, transmissibility), couple, moment

	(about point and about axis), Varignon's theorem, resultant of concurrent and non-concurrent coplanar forces, static equilibrium, free body diagram, reactions. Problem formulation concept; 2-D statics, two and three force members, alternate equilibrium equations. **Analysis of Structures** **Trusses**: Assumptions, rigid and non-rigid trusses; Simple truss (plane and space), method of joints. Simple truss by method of sections. Compound truss (statically determinate, rigid, and completely constrained). **Analysis of frames and machines**. **Beams**: types of loading and supports; shear force, bending moment, and axial force diagrams. Shear force and bending moment diagrams and equations relating them with external load. **Cables** (coplanar): assumptions, parabolic and catenary cables. **Friction** Coulomb dry friction laws, simple surface contact problems, friction angles, types of problems, wedges. Disk friction (thrust bearing); Belt friction (flat, V). Square-threaded screw (self-locking, screw jack). Journal bearings (axle friction). Wheel friction and rolling resistance. **Moments of Inertia** First moment of mass and center of mass, centroids of lines, areas, volumes, composite bodies. Area moments- and products- of inertia, radius of gyration, transfer of axes, composite areas. Rotation of axes, principal area-moments-of-inertia, Mohr's circle. Second moment of mass, Mass moments- and products- of inertia, radius of gyration, transfer of axes, flat plates (relation between area- and mass-moments- and products- of inertia), composite bodies. Rotation of axes, principal mass-moments-of-inertia. **Basics of dynamics** Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's second law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique). **Plane kinematics of rigid bodies** Rotation; Parametric motion. Relative velocity, instantaneous center of rotation. Relative acceleration, rotating reference frames. Rotating reference frames, 3-part velocity and 5-part acceleration relations, Coriolis acceleration. Applications of rotating reference frames.

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 محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	65	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	60	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
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**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Homework.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	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	Introduction

Week 2	Basics of Statics
Week 3	Analysis of Structures
Week 4	Vector addition
Week 5	Moment
Week 6	Moment of couple
Week 7	Resultant location
Week 8	Equilibrium
Week 9	Center of gravity
Week 10	The center for more than one shape
Week 11	Moments of Inertia
Week 12	Moments of Inertia for more than one shape
Week 13	Strength of material
Week 14	Basics of dynamics
Week 15	Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	[2] J. L. Meriam and L. G. Kraige, 'Engineering Mechanics: Statics (V.1), Dynamics (V.2)', 5th edition, Wiley 2002.	Yes
Recommended Texts	[1] F. P. Beer and E. R. Johnston, 'Vector Mechanics for Engineers: Statics (V.1), Dynamics (V.2)', 3rd SI edition, TMH, 1998.	No
Recommended Texts	[3] I. H. Shames, 'Engineering Mechanics: Statics & Dynamics', 4th edition, PHI, 1996.	No
Websites	https://www.wiley.com/en-us/Engineering+Mechanics%3A+Statics%2C+9th+Edition-p-9781119392620	

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.