

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

Module Information				
معلومات المادة الدراسية				
Module Title	Engineering Mechanics		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	PE 115			
ECTS Credits	7			
SWL (hr/sem)	175			
Module Level	1	Semester of Delivery		1
Administering Department	PE	College	COENG	
Module Leader	Dhifaf Jaafer Sadeq		e-mail	dhifaf.jaafar@alnaji-uni.edu.iq
Module Leader's Acad. Title	Assist. Prof.	Module Leader's Qualification	PHD	
Module Tutor			e-mail	
Peer Reviewer Name			e-mail	
Scientific Committee Approval Date			Version Number	1.0

Relation with other Modules				
العلاقة مع المواد الدراسية الأخرى				
Prerequisite module			Semester	
Co-requisites module			Semester	

## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p><b>Module Objectives</b> أهداف المادة الدراسية</p>	<p>This module aims to provide students with a fundamental understanding of the principles of engineering mechanics, with a primary focus on statics. The course is designed to:</p> <ul style="list-style-type: none"><li>• Introduce the core concepts, principles, and laws governing the mechanics of particles and rigid bodies at rest.</li><li>• Develop the ability to analyze and solve problems related to forces, moments, and equilibrium in various engineering contexts relevant to the petroleum industry.</li><li>• Equip students with the skills to draw free-body diagrams and apply equilibrium equations to analyze simple structures such as trusses, frames, and machines.</li><li>• Provide a solid foundation for more advanced studies in engineering disciplines, including dynamics, fluid mechanics, and strength of materials.</li><li>• Foster logical thinking and problem-solving skills through the application of mathematical principles to real-world engineering challenges.</li></ul>
<p><b>Module Learning Outcomes</b> مخرجات التعلم للمادة الدراسية</p>	<p>By the end of this module, students will be able to:</p> <ol style="list-style-type: none"><li>1. <b>Define and explain</b> the fundamental concepts of forces, moments, couples, and resultants, and represent them using vector notation.</li><li>2. <b>Apply</b> the principles of equilibrium to analyze particles and rigid bodies subjected to various force systems.</li><li>3. <b>Construct</b> free-body diagrams for a range of engineering structures and apply the equations of equilibrium to determine unknown forces and reactions.</li><li>4. <b>Analyze</b> the internal forces in simple trusses using the method of joints and the method of sections and analyze forces in frames and machines.</li><li>5. <b>Determine</b> the centroid of composite areas and the center of mass for composite bodies.</li><li>6. <b>Analyze</b> the effects of dry friction on rigid bodies in equilibrium.</li><li>7. <b>Calculate</b> the moment of inertia for areas, which is crucial for future studies in the mechanics of materials.</li></ol>
<p><b>Indicative Contents</b> المحتويات الإرشادية</p>	<p>This module will follow the structure of the recommended textbook, covering key areas of engineering mechanics:</p> <ul style="list-style-type: none"><li>• <b>Chapter 1: General Principles:</b> Introduction to the fundamental concepts of mechanics, units of measurement (SI units), and the idealizations of mechanics necessary for problem-solving.</li><li>• <b>Chapter 2: Force Vectors:</b> Characteristics of scalars and vectors. Development of vector operations and their application to resolving forces into components and determining resultants.</li></ul>

	<ul style="list-style-type: none"> <li>• <b>Chapter 3: Equilibrium of a Particle:</b> Introduction to the concept of equilibrium for a particle, the free-body diagram, and the application of equilibrium equations in two and three dimensions.</li> <li>• <b>Chapter 4: Force System Resultants:</b> Analysis of moments, couples, and the simplification of force and couple systems to determine an equivalent resultant.</li> <li>• <b>Chapter 5: Equilibrium of a Rigid Body:</b> Establishing the conditions for rigid-body equilibrium. In-depth application of free-body diagrams and equations of equilibrium for two- and three-dimensional systems.</li> <li>• <b>Chapter 6: Structural Analysis:</b> Application of equilibrium principles to analyze simple trusses using the method of joints and the method of sections. Analysis of forces acting on the members of frames and machines.</li> <li>• <b>Chapter 8: Friction:</b> Introduction to the characteristics of dry friction and its application in analyzing problems involving wedges, screws, and other common engineering scenarios.</li> <li>• <b>Chapter 9: Center of Gravity and Centroid:</b> Determination of the center of gravity, center of mass, and centroid for a system of particles and for bodies of various shapes, including composite bodies.</li> <li>• <b>Chapter 10: Moments of Inertia:</b> Introduction to the definition of the moment of inertia for an area. Application of the parallel-axis theorem and calculation of moments of inertia for composite areas.</li> </ul>
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<b>Learning and Teaching Strategies</b> استراتيجيات التعلم والتعليم	
<b>Strategies</b>	<p>The module will be delivered through a combination of lectures, tutorials, and independent study, all structured around the primary textbook.</p> <ul style="list-style-type: none"> <li>• <b>Lectures:</b> Key concepts and theories will be introduced and explained in lectures, following the progression of Hibbeler's text. Worked examples, often adapted from the textbook, will be used to illustrate problem-solving techniques.</li> <li>• <b>Tutorials:</b> Tutorial sessions will provide students with the opportunity to work through problems from the end-of-chapter sections in the textbook. These sessions are interactive, allowing students to ask questions and receive guided support.</li> <li>• <b>Problem-Based Learning:</b> Students will be assigned regular problem sets, drawn from the textbook, to develop their analytical and problem-solving skills.</li> <li>• <b>Independent Study:</b> Students are expected to read the relevant chapters in the textbook before each lecture and to practice additional problems for reinforcement.</li> </ul>

### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

<b>Structured SWL (h/sem)</b> الحمل الدراسي المنتظم للطالب خلال الفصل	63	<b>Structured SWL (h/w)</b> الحمل الدراسي المنتظم للطالب أسبوعيا	4
<b>Unstructured SWL (h/sem)</b> الحمل الدراسي غير المنتظم للطالب خلال الفصل	112	<b>Unstructured SWL (h/w)</b> الحمل الدراسي غير المنتظم للطالب أسبوعيا	7
<b>Total SWL (h/sem)</b> الحمل الدراسي الكلي للطالب خلال الفصل	<b>175</b>		

### Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
<b>Formative assessment</b>	<b>Quizzes</b>	2	10%	4 and 11	LO#1 and LO#2
	<b>Assignments</b>	2	10%	2 and 13	LO#1 and LO#3
	<b>Reports</b>	1	10%	13	LO#1, LO#2 and LO#4
	<b>Group Discussions</b>	1	10%	12	LO#1, LO#2 and LO#3
<b>Summative assessment</b>	<b>Midterm Exam</b>	1hr	10%	7	LO#1, LO#2 and LO#3
	<b>Final Exam</b>	3hr	50%	16	All
<b>Total assessment</b>			100% (100 Marks)		

### Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
<b>Week 1</b>	<b>Introduction &amp; Force Vectors:</b> Fundamental Concepts, Units, Vector Operations
<b>Week 2</b>	<b>Force Vectors (Continued):</b> Addition of a System of Coplanar Forces, Cartesian Vectors
<b>Week 3</b>	<b>Equilibrium of a Particle:</b> Condition for Equilibrium, The Free-Body Diagram, Coplanar & 3D Force Systems.
<b>Week 4</b>	<b>Force System Resultants:</b> Moment of a Force, Cross Product, Principle of Moments.
<b>Week 5</b>	<b>Force System Resultants (Continued):</b> Moment of a Couple, Simplified <b>Structural Analysis: Trusses:</b> Simple Trusses, The Method of Jointstion of a Force and Couple System.
<b>Week 6</b>	<b>Equilibrium of a Rigid Body:</b> Conditions for Rigid-Body Equilibrium, Free-Body Diagrams
<b>Week 7</b>	<b>Equilibrium in 2D &amp; 3D:</b> Equations of Equilibrium in 2D, Two- and Three-Force Members, 3D Equilibrium.
<b>Week 8</b>	Midterm Exam

<b>Week 9</b>	<b>Structural Analysis: Trusses:</b> Simple Trusses, The Method of Joints
<b>Week 10</b>	<b>Structural Analysis: Trusses, Frames &amp; Machines:</b> The Method of Sections, Analysis of Frames and Machines.
<b>Week 11</b>	<b>Center of Gravity and Centroid:</b> Center of Gravity, Center of Mass, and Centroid of a Body.
<b>Week 12</b>	<b>Centroid of Composite Bodies:</b> Determining the Centroid of Composite Areas and Volumes.
<b>Week 13</b>	<b>Friction:</b> Characteristics of Dry Friction, Problems Involving Dry Friction.
<b>Week 14</b>	<b>Moments of Inertia:</b> Definition of Moments of Inertia for Areas, Parallel-Axis Theorem, Moment of Inertia for Composite Areas.
<b>Week 15</b>	<b>Module Revision and Consolidation:</b> Comprehensive review of all key topics and preparation for final assessment.

### Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
<b>Required Texts</b>	Hibbeler, R. C. (2010). <i>Engineering Mechanics: Statics</i> , 12th Edition. Pearson Prentice Hall.	Yes
<b>Recommended Texts</b>	J.L. Meriam and G. Kraige, "Engineering Mechanics – Statics", 7/e, John Wiley & sons, 2013	Yes
<b>Websites</b>		

### Grading Scheme

مخطط الدرجات

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