Module (Course Syllabus) Catalogue

2022-2023

College/ Institute	Erbil Technology College	
Department	Construction and Materials engineering Technology	
Module Name	Engineering Mechanics	
Module Code	ENM124	
Degree	Technical Diploma [v] Bachelor [x] High Diploma [ ] Master [ ] PhD [ ]	
Semester	2nd Semester	
Qualification	Bachelor in Construction and materials engineering Technology	
Scientific Title	Engineering Mechanics	
ECTS (Credits)	4.15	
Module type	Prerequisite [ ] Core [v] Assist. [x]	
Weekly hours		
Weekly hours (Theory)	(3)hr Class	(32)Total hrs Workload
Weekly hours (Practical)	(2)hr Class	(32)Total hrs Workload
Number of Weeks	16	
Lecturer (Theory)	Asst.Prof. Niyazi Rostam Maroof	
E-Mail & Mobile NO.	niaz.maroof@epu.edu.iq	
Lecturer (Practical)	Asst.Prof. Niyazi Rostam Maroof	
E-Mail & Mobile NO.	07504560108	

Websites	

Course Book

Course Description	This is your first course in Engineering Mechanics, which is the study of the interaction of matter and forces in engineering contexts. It is evident that all objects in the world around us are composed of matter, and they are all subject to forces. As such, Engineering Mechanics is the foundational tool for engineers, and forms the underlying basis for understanding more advanced fields such as Solid Mechanics, Fluid Dynamics, Rigid Body Dynamics, Aerodynamics, Structures, Control and many aspects of Advanced Design..				
Course objectives	In this course students will learn a process for analysis of static objects; concepts of force, moment, and mechanical equilibrium; how to analyze forces and moments in two and three dimensions; and how to analyze distributed forces and internal loads. They will be able to analyze forces in various systems such as frames, machines, trusses, beams and cables. The tools learned in this course will provide the basis for later courses and a career in engineering.				
Student's obligation	Missed classes will not be compensated including the quizzes and the scheduled assignments. The students will lose marks on unattended classes with quizzes unless a legal document or authorized leave is presented which should explain the excuse of the absence. However, the absent student should take the responsibility for making up the missed lecture.				
Required Learning Materials	Chapter 1 begins with an introduction to mechanics and a discussion of units. The vector properties of a concurrent force system are introduced in Chapter 2. This theory is then applied to the equilibrium of a particle in Chapter 3. Chapter 4 contains a general discussion of both concentrated and distributed force systems and the methods used to simplify them. The principles of rigid-body equilibrium are developed in Chapter 5 and then applied to specific problems involving the equilibrium of trusses, frames, and machines in Chapter 6, and to the analysis of internal forces in beams and cables .				
	Task	**Weight**	**Due**	**Relevant Learning**	

			(Marks)	Week	Outcome
Evaluation	Paper Review				
	Assignments	Homework	10%		
		Class Activity	2%		
		Report	8%		
		Seminar	8%		
		Essay			
		Project			
	Quiz		8%		
	Lab.				
	Midterm Exam		24%		
	Final Exam		40%		
	Total		100%		
Specific learning outcome:	The subject of Engineering Mechanics is that branch of Applied Science, which deals with the laws and principles of Mechanics, along with their applications to engineering problems. As a matter of fact, knowledge of Engineering Mechanics is very essential for an engineer in planning, designing and construction of his various types of structures and machines. In order to take up his job more skillfully, an engineer must peruse the study of Engineering Mechanics in a most systematic and scientific manner.				
Course References:	**1-** Engineering Mechanics R. C. HIBBELER *SI Conversion by* Jun Hwa Lee **2-** Engineering Mechanics By R S Khurmi **3-** Engineering mechanics statics sharma kumar Baruaole 2018				

Course topics (Theory)	Week	Learning Outcome
1		
General Principles 25	1	
Chapter Objectives 25		
1.1 Mechanics 25		
1.2 Fundamental Concepts 26		
1.3 The International System of Units 29		
1.4 Numerical Calculations 32		
1.5 General Procedure for Analysis 34		
2		
Force Vectors 39	2	
Chapter Objectives 39		
2.1 Scalars and Vectors 39		
2.2 Vector Operations 40		
2.3 Vector Addition of Forces 42		
2.4 Addition of a System of Coplanar		
Forces 54		
2.5 Cartesian Vectors 65		
2.6 Addition of Cartesian Vectors 68		
2.7 Position Vectors 76		
2.8 Force Vector Directed Along a Line 78		
2.9 Dot Product		

ontents		
3		
Equilibrium of a	3	
Particle 103		
Chapter Objectives 103		
3.1 Condition for the Equilibrium		
of a Particle 103		
3.2 The Free-Body Diagram 104		
3.3 Coplanar Force Systems 107		
3.4 Three-Dimensional Force Systems 120		
4		
Force System	3	
Resultants 135		
Chapter Objectives 135		
4.1 Moment of a Force—Scalar		
Formulation 135		
4.2 Principle of Moments 137		
4.3 Cross Product 145		
4.4 Moment of a Force—Vector		
Formulation 148		
4.5 Moment of a Force about a		
Specified Axis 158		
4.6 Moment of a Couple 167		

4.7 Simplification of a Force and Couple		
System 179	**Week**	**Learning Outcome**
4.8 Further Simplification of a Force and		
Couple System 190		
4.9 Reduction of a Simple Distributed		
Loading 202		
5		
Equilibrium of a Rigid Body 217	3	
Chapter Objectives 217		
5.1 Conditions for Rigid-Body		
Equilibrium 217		
5.2 Free-Body Diagrams 219		
5.3 Equations of Equilibrium 230		
5.4 Two- and Three-Force Members 240		
5.5 Free-Body Diagrams 253		
5.6 Equations of Equilibrium 258		
5.7 Constraints and Statical Determinacy 259		
6		
Structural Analysis 279	3	
Chapter Objectives 279		
6.1 Simple Trusses 279		
6.2 The Method of Joints 282		

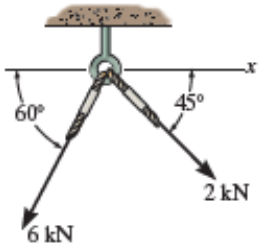
6.3 Zero-Force Members 288		
6.4 The Method of Sections 296		
6.5 Space Trusses 306		

Questions Example Design

FUNDAMENTAL PROBLEMS

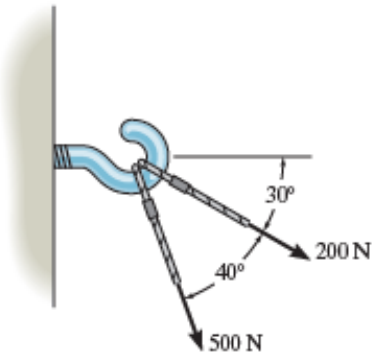
Partial solutions and answers to all Fundamental Problems are given in the back of the book. Video solutions are also available for select problems on the companion website.

F2–1. Determine the magnitude of the resultant force and its direction measured clockwise from the positive x axis.



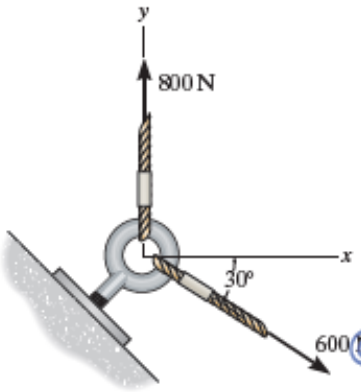
Prob. F2–1

F2–2. Two forces act on the hook. Determine the magnitude of the resultant force.



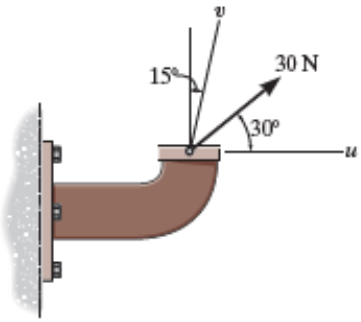
Prob. F2–2

F2–3. Determine the magnitude of the resultant force and its direction measured counterclockwise from the positive x axis.



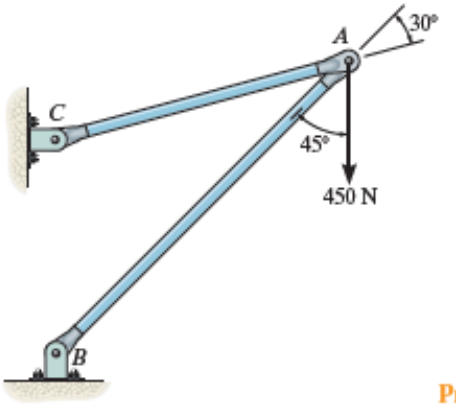
Prob. F2–3

F2–4. Resolve the 30-N force into components along the u and v axes, and determine the magnitude of each of these components.



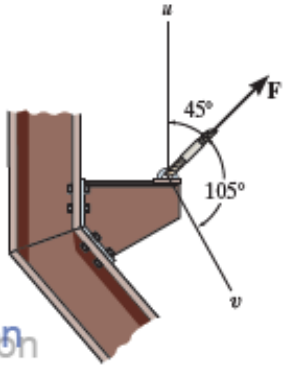
Prob. F2–4

F2–5. The force $F = 450$ N acts on the frame. Resolve this force into components acting along members AB and AC, and determine the magnitude of each component.



Prob. F2–5

F2–6. If force **F** is to have a component along the u axis of $F_u = 6$ kN, determine the magnitude of **F** and the magnitude of its component F_v along the v axis.



Prob. F2–6

Extra notes:
External Evaluator