Module (Course Syllabus) Catalogue

2022-2023

College/ Institute	**Erbil Technical Engineering College**	
Department	**Highway & Bridges Engineering Department**	
Module Name	**Engineering Mechanics-2**	
Module Code	**ENM202**	
Degree	**Technical Diploma** ☐ **Bachelor** ■ **High Diploma** ☐ **Master** ☐ **PhD** ☐	
Semester	**2nd**	
Qualification		
Scientific Title	**Assistant Lecturer**	
ECTS (Credits)	**7**	
Module type	**Prerequisite** ☐ **Core** ■ **Assist.** ☐	
Weekly hours		
Weekly hours (Theory)	**(4)hr Class**	**(6) hrs Workload**
Weekly hours (Practical)	**-**	**-**
Number of Weeks	**16**	
Lecturer (Theory)	**Hana Sherzad Aziz**	
E-Mail & Mobile	**Hana.aziz@epu.edu.iq** **07504918619**	
Lecturer (Practical)	**-**	
E-Mail & Mobile	**-**	
Websites	**https://academicstaff.epu.edu.iq/faculty/hana.aziz**	

Course Book

Course Description	Mechanics is a branch of the physical sciences that is concerned with the State of rest or motion of bodies that are subjected to the action of forces. In general, this subject can be subdivided into three branches: rigid-body mechanics, deformable-body mechanics, and fluid mechanics. In this course, we will study rigid-body mechanics since it is a basic requirement for the study of the mechanics of deformable bodies and the mechanics of fluids. Furthermore, rigid-body mechanics is essential for the design and analysis of many types of structural members, mechanical components or electrical devices encountered in engineering. Rigid-body mechanics is divided in lo two areas: statics and dynamics. Statistics deals with the equilibrium of bodies, that is, those that either are at rest or move with a constant velocity; whereas dynamics is concerned with the accelerated motion of bodies. We can consider statics as a special case of dynamics, in which the acceleration is zero; however, statics deserves separate treatment in engineering education since many objects are designed with the intention that they remain in equilibrium.
Course objectives	• To know fundamentals of structures and how they act • To recognize load types acting on structures • To understand how structures react to external loads • To know how important structures to stay in equilibrium • To be familiar with some types of structure such as trusses, towers and pulleys. • To deal with different types of structure supports • To strengthen students for the upcoming subjects in 2nd, 3rd and 4th year
Student's obligation	All students are required to fulfil the following requirements: ➢ Attendance ➢ Participation in problem solving and class activities ➢ Doing homework ➢ Participation in quiz ➢ Participation in exams ➢ Conducting projects ➢ Presenting seminars ➢ Preparing reports
Required Learning Materials	lecture halls with data show equipment for lecture presentations, white board, overhead projector, posters

			Task	Weight (Marks)	Due Week	Relevant Learning Outcome
Evaluation		Paper Review		0	0	
	Assignments	Homework		10	2nd & 6Th	
		Class Activity		2	All	
		Report		8	5th	
		Seminar		0	0	
		Essay		0	0	
		Project		8	9th	
	Quiz			8	4th & 10th	
	Lab.			0	0	
	Midterm Exam			24	8th	
	Final Exam			40	14th	
	Total			100	16	

Specific learning outcome:	1. To state the importance and principles of trusses 2. To show how to use the method of sections to determine the internal loadings in a member. 3. To introduce the concept of dry friction and show how to analyze the equilibrium of rigid bodies subjected to this force. 4. To discuss the concept of the center of gravity, center of mass, and the centroid. 5. To show how to determine the location of the center of gravity and centroid for a system of discrete particles and a body of arbitrary shape. 6. To develop a method for determining the moment of inertia for an area. 7. To introduce the product of inertia and show how to determine the maximum and minimum moments of inertia of an area.
Course References:	➢ Engineering Mechanics (Statics) by R.C. Hibbeler ➢ Engineering Mechanics (Dynamics) by R.C. Hibbeler ➢ Engineering Mechanics by F.L. Singer ➢ Introduction to Statics & Dynamics by Andy Ruina & Rundra Pratap ➢ Engineering Mechanics by Higdon & Stiles ➢ Vector Mechanics for Engineers (statistics & Dynamics) by Beer, Johnston, Mazurek and Cornwell

Course topics (Theory)	Week	Learning Outcome
Structural analysis/Trusses Method of joints Method of sections Structural analysis/Frames	1 2 3 4	• The importance and principles of trusses are stated. • The forces in the members of a truss using the method of joints and the method of sections determined. • The forces acting on the members of frames

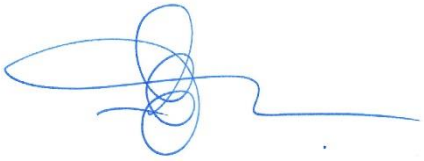
		composed of pin-connected members are analyzed.
Center of gravity and Centroid (line and area) Composite bodies	5 6	• The concept of the center of gravity, center of mass, and the centroid discussed • The location of the center of gravity and centroid for a system of discrete particles and a body of arbitrary shape determined.
Moment of inertia Parallel axis theorem of an area Radius of gyration of an area Moment of inertia of composite areas	7 8 9	• A method for determining the moment of inertia for an area developed. • The product of inertia and show how to determine the maximum and minimum moments of inertia for an area introduced
Friction Characteristics of dry friction Problems involving dry friction	9 10	• The concept of dry friction and show how to analyze the equilibrium of rigid bodies subjected to this force introduced. • Some specific applications of frictional force analysis presented.
Introduction to dynamics Kinematics of a particle	11 12	• To investigate particle motion along a curved path using different coordinate systems. • To present an analysis of dependent motion of two particles. • To examine the principles of relative motion of two particles using translating axes.
Practical Topics	**Week**	**Learning Outcome**
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
Questions Example Design All questions are numerical and problem solving types. An example of a question paper and its solutions		

are attached at the end of this file.

Extra notes:

External Evaluator

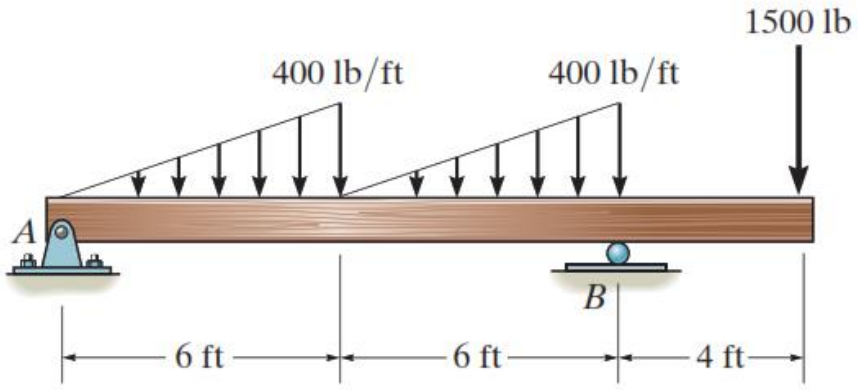
As an Assistant lecturer at Highway Department, I have revised the course-book regarding the subject of Engineering Mechanics for 1st stage (2nd semester), Department of Highway Engineering, Erbil Technical Engineering College. I found that the course-module catalogue has described well enough the aim and objectives of the subject. Moreover, it covers all the required syllabus and contents of the course and describes satisfactorily the aspects related to the course.



Ali Jamal Nouri
MSc Civil Engineering
Assistant Lecturer/Highway Engineering Department

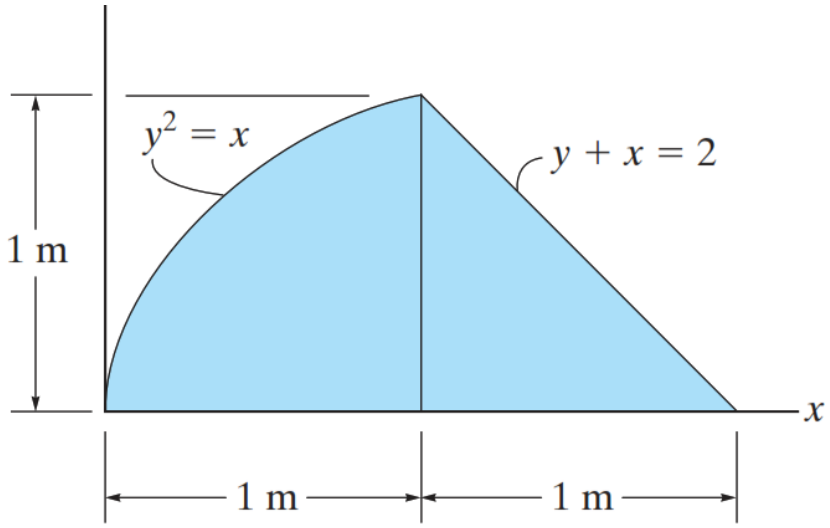
Ministry of Higher Education & Scientific Research **Erbil Polytechnic University** **Erbil Technical Engineering College** **Highway & Bridges Eng. Dept.** **Note: Answer all questions**	**Academic Year 2021 – 2022** **Final Exam – 1st Trail**	**Class: First** **Subject: Engineering Mech.** **Code: ENM202** **Date: 15/05/2022** **Time: 120 min.** **Second Semester**

Q1/ Determine the normal force, shear force and bending moment of the beam shown below as functions of x. **(25 Marks)**



Q2/ Locate the centroid of the area. **Note:** Choose elements of thickness (d_y)

(20 Marks)



Q3) A train starts from rest at station A and accelerates at 0.5 m/s^2 for 60 s. Afterwards it travels with a constant velocity for 15 min. It then decelerates at 1 m/s^2 until it is brought to rest at station B. Determine the distance between the stations.

(15 Marks)

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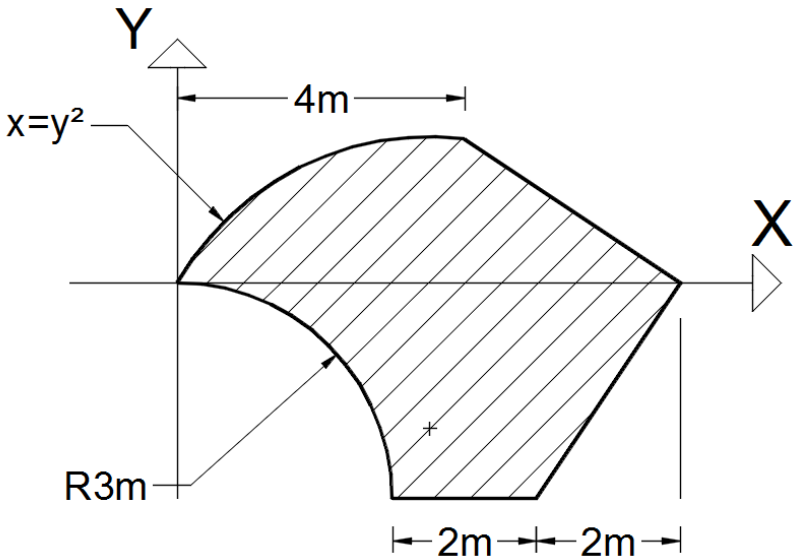
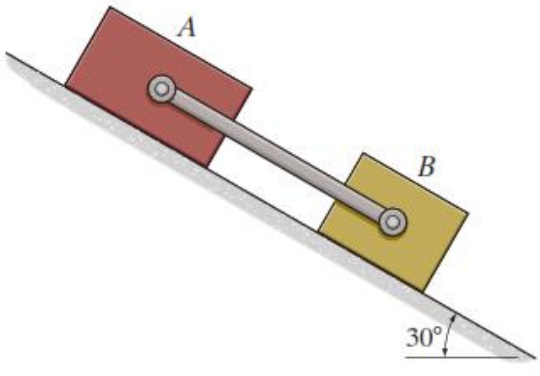
Q4/ Determine the moment of inertia of the shaded area with respect to x and y axes. **(25 Marks)**



Q5) If blocks A and B of mass 10 kg and 6 kg, respectively, are placed on the inclined plane and released, determine the force developed in the link between the blocks. The coefficients of kinetic friction between the blocks and the inclined plane are $\mu_A = 0.1$ and $\mu_B = 0.3$. Neglect the mass of the link. **(15 Marks)**



Good Luck

Assistant Lecturer: Hana Sherzad Aziz