Module(Course Syllabus)Catalogue

2022-2023

College/ Institute	Erbil Technology College	
Department	Automotive Engineering technology	
Module Name	Mechanics I	
Module Code		
Degree	Technical Diploma [ ] Bachelor [*] High Diploma [ ] Master [ ] PhD [ ]	
Semester	6th Semester	
Qualification	Ph.D. in Mechanical Engineering	
Scientific Title	Lecturer	
ECTS (Credits)	6	
Module type	Prerequisite [ ] Core [*] Assist. [ ]	
Weekly hours	2	
Weekly hours (Theory)	(2)hr Class	(162)Total hrs Workload
Weekly hours (Practical)	( )hr Class	()Total hrs Workload
Number of Weeks	12	
Lecturer (Theory)	Dr. Lizan Mahmood Zangana	
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Lecturer (Practical)	Dr. Lizan Mahmood Zangana	
E-Mail & Mobile NO.	Lizan.khorsheed@epu.edu.iq 07511220401	
Websites		

Course Description	The Engineering Statics course provides the basic concepts and skills that form the foundation for structural and mechanical design. The class is a problem-focused engineering science class that helps engineering students develop the ability to understand and analyze static forces on a variety of structures and engineering applications. The course begins with an introduction that covers the fundamental concepts and principles of Statics. The equilibrium of particles is then introduced along with the rules of adding and subtracting of force vectors. The course then proceeds to cover the equilibrium of rigid bodies in two and three dimensions and the analysis of different types of structures and machines. Determination of the moment of a force about an arbitrary point and/or axis, the equivalence of a system of forces and/or couples to the Resultant Force and/or Couple will also be introduced. The final part of the course will cover frictional forces and the structural properties of areas. Topics to be covered include equivalent systems of forces, resultants and distributed forces, equilibrium of rigid bodies, centroids, centers of gravity, fluid statics, moments of inertia, friction and virtual work. Analysis of frames and machines, forces in beams, internal stresses, and stability will also be considered. Vector algebra will be used throughout.
Course objectives	▪ After successfully completing this course the student should be able to: ▪ 1. Use both conceptual and numerical techniques to solve engineering problems. ▪ 2. Analyze and develop free-body diagrams for any system of forces in two and three dimensions. ▪ 3. Understand and use the general idea of equilibrium of a particle. ▪ 4. Understand and use the general ideas of force system resultants. ▪ 5. Determine the moment of a force about an arbitrary point and/or axes ▪ 6. Analyze the equilibrium of rigid bodies under any system of forces. ▪ 7. Analyze trusses, beams, frames, and machines. ▪ 8. Understand and use the general ideas of internal forces and draw shear and moment diagrams. ▪ 9. Apply friction forces and analyze their different applications. ▪ 10. Calculate center of gravity, centroids, and moments of inertia.

<table>
<tr><td>Student's obligation</td><td colspan="5">

The student must attendance the hall 2 hour the lecturer instruction wherein early attendance and bringing requisite tools and keep the hall clean and protect furniture.
The student submits a weekly sheet solution about what have done in the section. For examination, there are semester exam and final exam for the theory parts. During the class hours there will be some quizzes.

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<tr><td>Required Learning Materials</td><td colspan="5">

To avoid student bared in the hall lecturer uses several tools, whiteboard, data show and other demonstrate tools to interest student.

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<tr><td>Evaluation</td><td colspan="2">Task</td><td>Weight (Marks)</td><td>Due Week</td><td>Relevant Learning Outcome</td></tr>
<tr><td></td><td colspan="2">Paper Review</td><td></td><td></td><td></td></tr>
<tr><td></td><td rowspan="6">Assignments</td><td>Homework</td><td>5</td><td></td><td></td></tr>
<tr><td></td><td>Class Activity</td><td>2</td><td></td><td></td></tr>
<tr><td></td><td>Report</td><td>5</td><td></td><td></td></tr>
<tr><td></td><td>Seminar</td><td>5</td><td></td><td></td></tr>
<tr><td></td><td>Essay</td><td></td><td></td><td></td></tr>
<tr><td></td><td>Project</td><td></td><td></td><td></td></tr>
<tr><td></td><td colspan="2">Quiz</td><td>8</td><td></td><td></td></tr>
<tr><td></td><td colspan="2">Lab.</td><td>10</td><td></td><td></td></tr>
<tr><td></td><td colspan="2">Midterm Exam</td><td>25</td><td></td><td></td></tr>
<tr><td></td><td colspan="2">Final Exam</td><td>40</td><td></td><td></td></tr>
<tr><td></td><td colspan="2">Total</td><td>100</td><td></td><td></td></tr>
<tr><td>Specific learning outcome:</td><td colspan="5">

The course on mechanics I is devised to introduce fundamental aspects of static and dynamics.
Students will learn force, momentum, equilibrium.
Estimate all forces system, couple, center of pressure, Basic Concepts • Systems of Units and Conversion • 2-D and 3-D Forces: Equilibrium and Vector Operations

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Course References:	1. Mechanical engineering design / Joseph E. Shigley, Charles R. Mischke, Richard G. Budynas **By: Shigley, Joseph Edward** 2. Mechanics of materials / R. C. Hibbeler. **By: Hibbeler, R. C** 3. Mechanics of materials / Ferdinand P. Beer ... [et al.]

Course topics (Theory)	**Week**	**Learning Outcome**
Introduction to Statics of Particle	1	
Basic Concepts	2	
Systems of Units and Conversion • 2-D and 3-D Forces: Equilibrium and Vector Operations	3	
External and Internal Forces	4	
Moment	5	
Equilibrium of Rigid Bodies • Equilibrium in 2-D • Equilibrium in 3-D	6	
Centroids and Centers of Gravity • Areas and Lines • Volumes	7	
Moments of Inertia • Moment of Inertia of Areas • Moment of Inertia of Masses	8	
Structural Analysis • Trusses • Frames • Beams • Cables	9	
• Forces in Beams • Shear and Moment Diagrams	10	
Friction • Coefficients of Friction • Angle of Friction • Wedges • Types of Frictions: Axle, Disk, Wheel, and Belt	11	

Virtual Work and Energy Methods • Principle of Virtual Work and its Applications • Potential Energy and Equilibrium	12	
Practical Topics	**Week**	**Learning Outcome**

Questions Example Design

Q Q1:

10 Marks

1. **Which of the following is not a vector quantity?**

Possible Answers:

Acceleration

Velocity

Force

Speed

2. **You drive your car from your house all the way to your school which is 50km away. After you are done with classes you drive back through the same route and park exactly where you had your car at the beginning of the day. By the end of the day, what were the distance and displacement of your motion?**

Possible Answers:

Distance=100km, Displacement=0km

Distance=0km, Displacement=−100km

Distance=0km, Displacement=100km

Distance=−50km, Displacement=50km

Distance=50km, Displacement=50km

3. **An object travels North along a straight line at a constant rate of** 10ms**. What are the object's speed and velocity?**

Possible Answers:

Speed=10ms, Velocity=10ms North

Speed=10ms, Velocity=10ms

Speed=10ms, Velocity=0ms

Speed=10ms North, Velocity=10ms

Speed=0ms, Velocity=10ms

Q2/ (Thornton Example 2.3) Same as Example 1.1, but now assume the block is moving (i.e., its initial velocit nonzero) and that it is subject to sliding friction. Determine the acceleration of the block for the angle θ = assuming the frictional force obeys Ff = μk FN where μk = 0.3 is the coefficient of kinetic friction.

Extra notes:

Student must be any time ready for quizzes.

External Evaluator

I have read the terms of this article and acknowledge that it meets the required purpose.

Ramzi Barwari

Asst. Prof

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