

# ENGINEERING MECHANICS (BIE 1138)

Manisa Celal Bayar University - Department of Bioengineering  
Spring 2025

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## Course Time:

Tuesday 09:55-12:30

## Course Credit:

3,00(Theo) : 4,00(ECTS)

## Course Room:

C-104 (Engineering)

## Office Hours:

After class or by appointment via email or Microsoft Teams.You may visit me at any time during the week days if I am available.

## Textbook:

Not a specific book is suggested. A large number of books on engineering mechanics are available. Following books are recommended.

- Hibbeler,R.C., Engineering Mechanics: Statics, Pearson, 2015.
- Hibbeler,R.C., Engineering Mechanics: Dynamics, Pearson, 2017.
- Beer,F.B.,Johnston,E.R., DeWolf,J.T., Mazurek,D.F., Mechanics of Materials, McGraw Hill, 2015.
- Çengel,Y., Cimbala,J.M., Fluid Mechanics Fundamentals and Applications, McGraw Hill, 2017.

## Course Information:

Engineering Mechanics is an area of study wherein the knowledge and methods of mechanics are applied to the structure and function engineering mechanical systems. This course introduces the principles required to solve engineering mechanics problems. The course includes a combination of the fundamental topics on statics, dynamics, strength of materials and fluid mechanics. With the basic knowledge of material properties. To master this course, you should have a background in basic calculus and physics covering classical mechanics. Concepts will be applied in this course from previous courses you have taken in basic math and physics.The objectives of the course include:

- To provide fundamental concepts of mechanics .
- To give an ability to describe position, forces, and moments in terms of vector components
- To give an ability to select suitable reference coordinate axes, construct free body diagrams, and understand the relation between constraints imposed by supports and support forces.

- To give an ability to formulate static equilibrium equations for a rigid body and evaluate forces and moments in structures by using mathematical and physical principles.
- To organize FBDs in the solution of impeding motion problems
- To provide an introduction to the science, skill, and art involved in modeling mechanical systems to analyze their motion
- To calculate internal forces and moments in structures

### Course Outcomes:

By the end of this course, students will be able to:

- Analyze basic mechanics (statics, dynamics and strength of materials) problems.
- Describe how mechanics plays a role in an engineering approach and basic physiological processes.
- Use the abilities gained from fundamental mechanics for understanding the behaviors of mechanical systems.
- Calculate internal forces and moments in truss and beam structures.
- Analyze basic fluid mechanics problems.

### Prerequisites:

- An undergraduate-level understanding of physics covering classical mechanics, and mathematics (calculus)
- Motivation to learn.

### Tentative Course Outline:

- Week 1 :Introduction: Course Overview, Preliminaries, Introduction to Mechanics Science.
- Week 2 :Basic Concepts of Mechanics, Dimensions, SI units, analysis procedure, Scalars and Vectors.
- Week 3 :Vectors: forces and positions, vector algebra, inner (dot) product
- Week 4 :Particle Equilibrium, Equilibrium equations
- Week 5 : Force system resultants: moment of a force, cross product, principle of moments, reduction to equivalent loads, Interconnections (constraints)
- Week 6 :Equilibrium of rigid bodies: Equilibrium equations, Free-Body Diagrams,
- Week 7 : Concepts of Dynamics, Kinematics, Kinetics,
- Week 8 :Work, Energy, Momentum.
- Week 9 :Mechanics of Materials, Stress and Strain, Deformations.
- Week 10 : Deformations.
- Week 11 : Torsion, Bending, Buckling
- Week 12 :Material Properties
- Week 13 :Fluid Mechanics, Basic Concepts
- Week 14 :Mechanics of Flow, Eulerian and Lagrangian Approaches

### Grading Policy:

Midterm (40%), Final (60%).

### Important Dates:

Midterm Exam ..... to be announced.  
 Final Exam ..... to be announced.

**Course Policy:**

Every student is expected to come to class prepared and to actively participate in learning environment.

**Class Policy:**

Regular attendance is essential and expected.

**Academic Honesty:**

Lack of knowledge of academic honesty is not a reasonable explanation for a violation.