# CE 205 Statics

**USC | SONNY ASTANI DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING**

## ABET Course Syllabus

### Course Information, Textbook and Supplementary Materials

**Course Description:** This course will present the theory and applications of basic engineering mechanics, including a review of vectors, the computation of resultant forces, the equations for equilibrium of particles and rigid bodies, the computation and diagramming of internal shear and moment forces, and dry friction.

**Required for:** All Civil and Environmental Engineering undergraduate degree programs

**Prerequisite:** PHYS 151L Fundamentals of Physics I

**Co-requisite:** Mechanics and Thermodynamics - 4 units


**Reference:** None

## Topics Covered | Learning Outcomes
---|---
Basic knowledge of forces and moments on and between components of a structure. Emphasis on the fundamental steps (e.g., setup, analysis, solution, discussion) of engineering problems. | Students will understand forces and moments and analysis in the following areas of study:
1. Forces and vectors, Cartesian vector notation and operations
2. Particle equilibrium
3. Moments and force system resultants
4. Rigid body equilibrium
5. Structural analysis of trusses and frames/machines
6. Internal forces, shear/moment diagrams
7. Dry friction
8. Express force and position vectors in Cartesian vector form, determine unit vectors, vector sums, dot products, and cross products.
9. Draw and label free-body diagrams
10. Determine the resultant force acting on a particle
11. Determine the forces necessary for a particle to remain static using equations of equilibrium.

Analyzing forces and moments on a static rigid body | 12. Determine the moments of forces in two or three dimensions
13. Determine force and moment resultants
14. Determine point loads statically equivalent to distributed loads
15. Replace supports with equivalent reaction forces
16. Write and solve equations of equilibrium of a rigid body

Analyzing forces and moments on/between multiple static rigid bodies | 17. Use the methods of joints and sections to analyze truss structures
18. Determine the forces acting between members of frames and machines composed of pin-connected members
Analyzing internal forces/moments in a static rigid body

19. Use the method of sections to determine internal forces
20. Determine internal shear and bending moments using loading equations
21. Understand and draw shear / bending moment diagrams

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Lecture and Lab Schedule

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sessions per Week</td>
<td>Duration per Session</td>
</tr>
<tr>
<td>2</td>
<td>1 hour</td>
</tr>
</tbody>
</table>

Relation of Course Objectives to Program Outcomes

The Civil Engineering program is designed to teach beyond the technical content of the curriculum and prepare the students to utilize what they learn in a professional setting.

This course contributes to the program outcomes as outlined in the adjacent table.

<table>
<thead>
<tr>
<th>Course Contribution to Program Outcomes (a-k)</th>
<th>Key</th>
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<tbody>
<tr>
<td>a. An ability to apply knowledge of mathematics, science, and engineering.</td>
<td>✓</td>
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<tr>
<td>e. An ability to identify, formulate and solve engineering problems.</td>
<td>✓</td>
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