

PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
COLLEGE OF ENGINEERING
DEPARTMENT OF MECHANICAL AND METALLURGICAL ENGINEERING
ABET COURSE SYLLABI

ICM 2028 MECHANICS OF MATERIALS

Credits and contact hours: 10 UC credits / 10 hours (3 hours in lectures and 7 individual work hours per week)

Instructor's name: Diego Celentano

Course coordinator's name To be defined

Textbook: Crandall, S., Dahl N. and Lardner T. An Introduction to the Mechanics of Solids (2nd Edition), McGraw-Hill, 1999

Course Catalog Description: Mechanics of materials (also known as strength of materials or solid mechanics) is a subject from applied mechanics which studies the behavior of solid bodies in balance, not subject to acceleration, under stress or strain. The main objective of this discipline is to set the internal forces and deformation produced by external loads, in order to design any type of structure so it fulfills its function without failure. The main three concepts of this course are balance of forces and moment, geometric compatibility of deformation, and internal forces and deformation relationship. This course ends with an introduction to the method of finite elements and its application using commercial software.

Prerequisite Courses: ING1024 Properties and Strength Of Materials

Co-requisite Courses: None

Status in the Curriculum: Minimum course

Course Learning Outcomes:

1. To build mathematical models to represent physics of mechanical systems.
2. To understand and apply balance equations, geometric compatibility equations and internal forces and deformation relation, to analyze the behavior of simple structures subject to diverse solicitations.
3. To obtain the state of tensions and deformation of slender elements subject to axial efforts, moments and shear.
4. To understand the concept of element instability subject to compression.
5. To understand the basic concepts of finite elements methods approach and application to solve problems of complex geometry.
6. To apply experimental methods to measure movement.

**Relation of Course to ABET
Criteria:**

- b. Design and conduct experiments: analyze and interpret data
- c. Design a system, component, or process
- e. Identify, formulate, and solve engineering problems
- f. Professional and ethical responsibility
- g. Effective communication
- i. Recognition of the need for, and an ability to engage in life-long learning
- j. Knowledge of contemporary issues

Topics covered:

1. Basic principles of mechanics: forces, moments and balance.
2. Static determinacy and indeterminacy.
3. Slender elements subject to distributed loading.
4. Stresses and strains: Mohr circles
5. Force and deformation
6. Torsion of circular shafts and thin-walled elements.
7. Bending beams
8. Column buckling
9. Finite elements method
10. Experimental methods to determine deformation and forces.

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