

PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
SCHOOL OF ENGINEERING
DEPARTMENT OF STRUCTURAL AND GEOTECHNICAL ENGINEERING
ABET COURSE SYLLABI

ICE2633 STRUCTURAL GEOLOGY AND TECTONICS

Credits and contact hours: 10 UC credits /10 hours (3 h Lecture, 1,5h Laboratory, 5,5h Independent Learning Experiences and visit field)

Instructor's name: Jose Cembrano/ Gloria Arancibia

Course coordinator's name Gloria Arancibia

Textbook:

- Fossen, H (2010) *Structural geology*. Cambridge University Press (eds)
- Ragan, D. (2009) *Structural geology, an introduction to geometrical techniques*. Cambridge University Press. UK

Course Catalog Description: This is a fundamental course of Geosciences that addresses the nature of deformation of the crustal at different space and time scales. In order to understand this, students will learn techniques for field and laboratory work oriented to identify, comprehend and analyze fundamental geological elements such as faults, folds, foliations, joints, hydrothermal veins. Students will be able to integrate this theoretical and practical knowledge in order to establish the architecture of the units of rock in a local and regional scale and building models of their evolution in space and time.

Prerequisite Courses: ICE2623 Introduction to physical geology o IMM2003 Mining Geology

Co-requisite Courses: None

Status in the Curriculum: Required

Course Learning Outcomes:

1. Describe, analyze and map geological structures.
2. Establish the 3D architecture of geological elements and their evolution in time.
3. Identify and relate the key parameters involved in fragile and ductile deformation of rocks.
4. Apply the concepts of structural geology and tectonics to the identification of variables, evaluation and design of projects related to Geosciences.
5. Understand the geological processes that control the continental deformation in long and short term in convergent margins.

Relation of Course to ABET a. Knowledge of mathematics, science and engineering

Criteria:

- b. Design and conduct experiments: analyze and interpret data
- e. Identify, formulate, and solve engineering problems
- k. Techniques, skills, and modern tools for engineering practice.

Topics covered:

- 1. Introduction and basic concepts.
 - 1.1. Structural geology and tectonics.
 - 1.2. Stress vs strain
 - 1.3. Progressive deformation, finite deformation.
 - 1.4. Fragile and ductile deformation.
 - 1.5. Geometry, kinematics and dynamics of deformation.
 - 1.6. Scale concept.
- 2. Ductile Deformation.
 - 2.1. Folds.
 - 2.2. Foliations and lineations of deformed rock
 - 2.3. Strain
 - 2.4. Formation mechanisms of ductile structures.
- 3. Fragile Deformation.
 - 3.1. Fractures, joints and seams.
 - 3.2. Faults
 - 3.3. Stress
 - 3.4. Mechanics of fractures and faults.
- 4. Global Tectonics
 - 4.1. Tectonics of convergent margins.
 - 4.2. Tectonics and intra-arc faults.
 - 4.3. Tectonics and magmatism.
 - 4.4. Tectonics and fluid transportation.
 - 4.5. Andean tectonics.
- 5. Neo-tectonics.
 - 5.1. Tectonic rise and mountain construction.
 - 5.2. Tectonics and its influence on relief formation.
 - 5.3. Andean earthquakes, tectonic segmentation and paleoseismology.
 - 5.4. Active faults of the Andean margin.