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

ICE2623 INTRODUCTION TO PHYSICAL GEOLOGY

Credits and contact hours: 10 UC credits /10 hours (3 h. Lectures, 3 h. Labs, 4 h. Independent learning experiences and visit field)

Instructor's name: Gloria Arancibia

Course coordinator's name Gloria Arancibia

Textbook: Tarbuck, E.; Lutgens, F. (2008) Earth: an introduction to physical geology. 9th edition. Pearson Prentice Hall eds.

Course Catalog Description: The course provides an introduction to the fundamentals of Physical Geology (Plate tectonics, geologic time, rocks and minerals, seismicity, volcanism, surface processes, minerals, energy and hydric resources) in understanding the relevance of geological processes in the development sustainable human communities.

Prerequisite Courses: QIM100A General Chemistry II

Co-requisite Courses: None

Status in the Curriculum: Required

Course Learning Outcomes:

1. Explaining the overall functioning of the Earth system, and its main internal and external processes.
2. Recognize and characterize materials and geological elements.
3. Identify the characteristic processes of different geological environments, through relief, rock type, etc.
4. Apply the scientific method in the approach to geological problems (questions).
5. Explain and prioritize the importance of fundamental geological processes in the formation and/or occurrence of mineral, water and energy resources, geological hazards, environmental pollution, etc.
6. Identify, describe and explain the materials and geological structures, as revealed (show) in nature.
7. Formulate hypotheses about the origin of materials and geological structures, from field observations.

Relation of Course to ABET Criteria:

a. Knowledge of mathematics, science and engineering
b. Design and conduct experiments: analyze and interpret data
d. Multidisciplinary teams
f. Professional and ethical responsibility
g. Effective communication
h. Broad education necessary for global, economic, environmental and

societal context
j. Knowledge of contemporary issues

Topics covered:

1. Introduction to Earth Science and Geology.
   1.1. Origin of the Earth. Applications of Geology and Earth Sciences.
   1.2. Theoretical Framework. Global Tectonics. Geological processes and products: Minerals, Rocks, Structures, Mountains.
   1.3. Minerals. Silicates. Physical properties of minerals.
   1.4. Geological time. Evolution of the Earth.
2. Rocks and minerals
   2.1. Plutonism and Volcanism.
   2.2. Igneous rocks classification.
   2.3. Erosion, Transport and Deposition. Sedimentary Rocks classification
   2.4. Structural and Chemical transformation. Metamorphic Rocks classification
   2.5. The rock Cycle
3. Notions of Structural Geology
   3.1. Faults, fractures and fold.
   3.2. Fault systems in the Chilean Andes (orogeny and earthquakes).
   3.3. Representation of lines and planes. Stereographic projection.
4. Notions of Geotechnical Engineering.
   4.1. Rock Mass Classification.
   4.2. Geology applied to civil engineering.
5. Geological Resources.
   5.1. Metallic resources.
   5.2. Non-metallic resources.
   5.3. Water and energy resources.
   5.4. Andean deposits and resources.
6. Surface Processes.
   6.1. Notions of Geomorphology.
   6.2. Hydrogeology. Surface and groundwater.
7. Notions of Environmental Geology.
   7.1. Geologic Hazard and Risk, Aquifer Pollution.
   7.2. Land use for human requirement.
8. Geologic maps
   8.1. Basic concepts. Representation of geological units. Geocoding data.
   8.2. Geological profiles.
   8.3. Stratigraphic columns.
   8.4. Horizontal sights and sections. 3D model. Estimated geological resources
9. Evolution of the Andean margin (mountains formations, continents evolution)
   9.1. Geology of pre-Andean basement
   9.2. Evolution of the Andean margin