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

ICE2029 SURFACE PROCESSES AND GEOLOGICAL HAZARDS

Credits and contact hours: 10 UC credits / 10 hours (3 h. Lectures and 7 h. Independent learning experiences and site visit)

Instructor's name: To be defined

Course coordinator's name To be defined

Textbook:

- Anderson, R.; Anderson, S (2010) Geomorphology: The mechanics and chemistry of landscapes. Cambridge University Press.
- William, B.; Bull, W. (2007) Tectonic geomorphology of mountains: a new approach to paleoseismology. John Wiley and sons.

Course Catalog Description: This course is planned to be taught in 2015. It will enable students to develop tools to perform quantitative and qualitative analysis of supergene and endogen processes that participate on ground modeling. These tools incorporate the cause-effect relation of these processes with natural hazards. Particularly examine the dynamic interaction of the Andean subduction margin with the seismic, volcanic, climate and mass transfer activity: erosion, deposition on alluvial, colluvial, fluvial, glacial and littoral media.

Prerequisite Courses: ICE2633 Structural geology and tectonics

Co-requisite Courses: None

Status in the Curriculum: Required

Course Learning Outcomes:

1. Understand the evolution of landscape and the genesis of fluvial, alluvial, glacial, and littoral and eolic forms, both arid and humid climate.
2. Analyze the erosion processes on Earth's Surface, denudation rates and the role of water, wind and gravity.
3. Identify qualitatively a variety of landscapes and associated hazards on topographic maps, aerial pictures and satellite images.
4. Understand the role of volcanic and seismic activity on the landscape formation process.
5. Analyze the hazards and geological risks arising of the landscape formation processes on different environments, their impact on engineering projects, environment, exploration and exploitation of natural resources.

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
i. Recognition of the need for, and an ability to engage in life-long learning
j. Knowledge of contemporary issues

Topics covered:

1. Introduction to the study of superficial processes: geomorphology, geological hazards, basic principles, climatic context.
2. Large-scale topography: spheroid and hypsometry, plate tectonic, oceanic basins, mountain range, mantle flow.
3. Tectonic and geomorphology: fault morphology, paleoseismology, accumulated strain.
4. Atmospheric processes and geomorphology.
5. Landscape dating methods: relative, absolute, evolution rates.
6. Weathering: Surface degradation, erosion, soil profile, chemical meteorization, regolith.
7. Glacial and periglacial geomorphology: types, mass balance, ice deformation, processes and erosion methods, deposition methods.
8. Dynamics of slopes: stability of mountains, mass balance, diffusion and deformation, alluvial cones and fans.
9. Fluvial Processes: geometry and dynamics of watercourses, transportation and fluvial deposition, streams and rivers.
10. Eolic forms and deposition: geometry and dynamics of dunes, eolic erosion.
11. Coastal Geomorphology: geometry and dynamics of sandy and rocky shores, relative changes of sea level, emerged and submerged continental platforms.
12. Volcanic Geomorphology: tectonics, magmatism, volcanism, volcanic eruption types and their products, geometry, dynamics.
13. Geological hazards: earthquakes, tsunamis, landslides, flooding, volcanic, risk analysis and mitigation