UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Geomorphology

2223-3-E3401Q057

Aims

The student who successfully completes the course will get a broad knowledge of the scope and main areas of Geomorphology, a solid knowledge for describing, characterizing, and interpreting landscape features of endogenous and exogenous origin, including the recognition of basic geomorphologic features, their development, and their spatial distribution (with ability to classify and describe landforms in a variety of environmental settings). Furthermore, he/she will obtain the ability to distinguish active, inactive, quiescent, and relict geomorphologic features. Basic criteria for applying geochronological tools (relative- and absolute- dating of landform features) and elementary techniques of photointerpretation will also be acquired.

Contents

Principles of geomorphology: basic concepts for the study of landforms with respect to processes that produce and modify them at a variety of scale in space and time. Endogenic landforms originated by processes acting within the Earth; exogenic landforms originated by processes acting at the earth-atmosphere-water interface. Geological, climatic and other factors conditioning landforms origin and their evolution. Spatial and temporal scales in geomorphology; basic principles of geochronology for defining relative- and absolute- age of landform and surficial deposits. Structural geomorphology. Landforms originated by weathering and slope processes; mass wasting; soils and their origin; soil erosion; paleosoils and their relevance for landscape analysis. Karst landforms and speleogenesis. Landforms of fluvial, glacial, periglacial, eolic and marine origin. Models of landscape evolution. Basic principles of photointerpretation. Geomorphological maps and their structure.

Detailed program

Introduction to Geomorphology

Structural, climatic, dynamic, quantitative, regional and historical geomorphology; study methods; endogenous and exogenous processes; geomorphological agents and factors that condition them; zonal, azonal and plurizonal processes; main morphoclimatic systems; theories on the evolution of the survey. Structural geomorphology, Morpholithology, differential and selective erosion; main forms of endogenous origin; reliefs with a horizontal structure and monoclinal reliefs; folded reliefs (Jurassic, Appalachian relief and mountain ranges with complex structure); tectonic activity and geomorphological evidence; relationships between hydrographic network and geological structure; polycyclic reliefs; neotectonics.

Processes and forms of exogenous origin. Meteoric weathering and regolith; soils: notions of pedology, pedogenetic processes, classification; relationships between morphology and soil development; relict, polycyclic and paleosols soils.

The karst phenomenon: solution processes of carbonate rocks; macro and microforms of karst origin; the caves; hints of karst hydrology; karst and speleogenesis; karst landscapes.

Modeling of the slopes and resulting forms; degradation processes; action of gravity; debris cones and aquifers, soliflow and reptation; landslides, mass transport; pediment and glacis; morphology of the slopes.

Action of waterways; the balance profile; riverbeds and river paths; valleys, fans, alluvial plains, fluvial terraces. Evolution of the hydrographic network.

Forms of glacial origin: erosion, transport and deposit processes; forms of glacial erosion; moraines, subglacial and glacial contact deposits, classification; geomorphological evidence of glacial variations.

Periglacial forms: cryoclastic processes, surface and depth action; permafrost and its distribution; structured soils; pingo and palsa; rock glaciers; snow action: avalanches, nivomorene, niches and nivation steps.

Coastal morphology: shore line and sea level; types of coasts and their evolution; beaches, lagoons and river mouths, cliffs, inherited coasts. Main forms of wind origin.

Dating of the relief shapes. Active, quiescent, inactive forms; relict and fossil forms; morphostratigraphic units: their paleoenvironmental and paleoclimatic significance. The "time" parameter and hints on the dating methods of the relief shapes.

Exercises

Cartography: legend and structure of geomorphological maps; stages of implementation; examples of geomorphological maps. Characteristics of stereoscopic aerial photographs and hints of photointerpretation for the recognition of geomorphological elements.

Field activity

Ground exits are planned for on-site lessons relating to direct knowledge of some geomorphological peculiarities of the territory.

Prerequisites

None

Teaching form

The course includes lectures, laboratory and practical ground exercises (6 CFU)

Part of the frontal hours are carried out on the ground

If the teaching is given in a mixed or remote mode, the necessary variations with respect to what was previously stated may be introduced, in order to respect the program envisaged and reported in the syllabus.

Textbook and teaching resource

The lessons will be uploaded to the elerning.unimib.it website and will be available to students. There will also be links to specific in-depth sites and, if present, videos.

Books:

- Castiglioni G.B., 1979: *Geomorfologia*. UTET, Torino.

- Selby M.J., 1989: *Earth's Changing Surface*. Clarendon Press, Oxford.

- Summerfield M.A., 1991: *Global Geomorphology*. Longman.

- Bartolini C. Peccerillo A., 2002: *I fattori geologici delle forme del rilievo.* Pitagora, Bologna.

- Ciccacci S., 2010, Le forme del rilievo. Atlante illustrato di Geomorfologia. Mondadori Università.

- NASA – *Geomorphology from space*. Online:

    - D'Orefice, Graciotti, 2021, Rilevamento Geomorfologico e Cartografia. Flacovio Editore.

Semester

Seconda Semestre (March - June)

Assessment method

The exam consists of an oral test during which the student must demonstrate knowledge of the basic concepts and topics covered during the course.

Office hours

Write to the teacher fo define the colloquium (valter.maggi@unimib.it)

Sustainable Development Goals

SUSTAINABLE CITIES AND COMMUNITIES