UAB
Universitat Autònoma de Barcelona

Current Geological Areas

2026/2027

Code: 101071
Credits: 4

Degree programme	Type	Course
Geology	OP	3

Contact lecturer

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Group languages

You can consult this information at the end of the document.

Prerequisites

It is recommended to have basic knowledge in Stratigraphy, Sedimentology and a good level of comprehension of writings in English.

Objectives

The course Ambients Geologics Actulas provides fundamental training in a field of sedimentary geology that is currently experiencing significant growth and has established itself as a well-defined discipline in response to contemporary societal needs, namely Environmental Sedimentology. This branch of Stratigraphy and Sedimentology, which may also be regarded as a branch of applied sedimentology, addresses the functioning and dynamics of modern sedimentary systems, focusing on how these systems respond to changes resulting from both natural processes and disturbances caused by anthropogenic activities.

The course aims to enable students to move beyond the knowledge acquired in previous subjects related to sedimentary geology, which have primarily focused on developing a fundamental understanding of Earth history. By addressing the relationships between Geology and the Environment, the course seeks to ensure that students are able to identify the distinctive factors that characterize modern sedimentary environments in comparison with fossil systems and, taking into account the main sources and the dynamics of sediment production and accumulation (whether geogenic or anthropogenic), to investigate the impact of a broad range of disturbances in different present-day environments, both natural and artificial.

Competencies

- Analyze and use information critically
- Learn and apply acquired knowledge in practice and solve practical problems
- Demonstrate interest in quality and quality practices
- Become familiar with different types of geogenic and anthropogenic sediments,study their formation environments and their distribution in current sedimentary systems
- Integrate physical, chemical, and biological evidence with theory to solve practical cases of present-day environments under natural and anthropogenic pressures
- Recognize current sedimentary processes and their impact on the inhabited surface of the Earth
- Communicate information effectively, both verbally, in writing, and graphically, using available communication and information technologies

- Work independently and in teams

Learning Outcomes

- Critical thinking
- Learn and apply acquired knowledge in practice and solve practical problems
- Demonstrate interest in quality and quality practices
- Recognize the main geogenic and anthropogenic sediments and the main current sedimentary environments
- Relate each type of sedimentary environment to the characteristic risks derived from excess or lack of sediments
- Integrate observations of sediments, and their physical, chemical, and biological properties, into their behavior in current sedimentary environments
- Propose mitigation strategies related to excess or lack of sediments
- Communicate information effectively, both verbally, in writing, and graphically, using available communication and information technologies
- Work independently and in teams

Learning outcomes

- CM39 (Design studies on the availability of hydrogeological resources based on future models on variation in rainfall due to climate change.) Design studies on the availability of hydrogeological resources based on future models on variation in rainfall due to climate change.
- CM40 (Evaluate areas of geological risk for the planning and environmental and urban management of the territory, contributing to a sustainable and safe management of the environment.) Evaluate areas of geological risk for the planning and environmental and urban management of the territory, contributing to a sustainable and safe management of the environment.
- KM46 (Identify the extent of different disciplines of geology that are related to environmental sciences.) Identify the extent of different disciplines of geology that are related to environmental sciences.
- KM49 (Explain the main concepts and techniques related to protecting, preventing and mitigating contamination in reservoirs and soils.) Explain the main concepts and techniques related to protecting, preventing and mitigating contamination in reservoirs and soils.
- SM44 (Use specific instruments designed to assess the environmental geological risk of a specific place following the established protocols.) Use specific instruments designed to assess the environmental geological risk of a specific place following the established protocols.
- SM45 (Participate in the resolution of problems related to the environmental impact of actions in the field of geology.) Participate in the resolution of problems related to the environmental impact of actions in the field of geology.

Contents

Contents
Introduction

Concept and scope of Environmental Sedimentology. Sediment production and supply to sedimentary environments. Mechanisms of sediment transport and accumulation. Distinctive characteristics of modern environments relative to fossil environments.

Mountain Environments

Types of mountain environments. Sediment cascades. Sediment production and sediment budget reconstructions. Sediment transfer processes. Processes and impacts of natural and anthropogenic disturbances. Management and remediation of mountain environments.

Fluvial Environments

Sedimentary processes and the impact of natural and anthropogenic activities. Methods for determining the provenance of modern fluvial sediments. Controls on sediment supply, accumulation, and transport. Management and restoration of fluvial systems.

Lacustrine Environments

Types of lakes, lacustrine depositional environments, and lacustrine sediments (geogenic and anthropogenic). Controls on sediment transport and accumulation. Processes and impacts of natural and anthropogenic disturbances, including lake pollution.

Temperate Coastal Environments

Sedimentary processes, sediment sources, and accumulation processes. Impacts of human activities. Structural and non-structural strategies for coastal management.

Deltaic and Estuarine Environments

Sedimentary processes and impacts associated with natural and anthropogenic changes. Sediment sources in deltaic and estuarine settings. Controls on sediment accumulation and transport. Remobilization of contaminants.

Tropical Coastal Environments

Nature and distribution of coral reefs. Sediment sources and sediment accumulation processes. Processes and impacts of natural and anthropogenic disturbances.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Theoretical lessons	18	0.72	
Report on a study case	9	0.36	
Theory study, Report performance	45	1.8	
Practices	16	0.64	

Methodology

The course is structured around three types of activities: (a) face-to-face activities, (b) supervised activities, and (c) autonomous learning activities.

Directed Activities
Theory

Lectures delivered by the instructor covering the course topics, with the possibility of incorporating gamified activities at the end of classes to reinforce and consolidate key concepts. Active participation in class is essential and will be taken into consideration.

Practical Sessions

Laboratory analysis of sediments from selected modern environments. Reading and synthesis of studies based on case examples dealing with the evolution of contemporary sedimentary environments. Practical exercises focusing on different sedimentary settings, in which the processes and products formed under natural and anthropogenic disturbances are analysed.

Supervised Activities

Students will undertake the study of a present-day sedimentary environment. They will prepare a report based on English-language scientific literature identified independently through tools such as Google Scholar. The report must be submitted in PDF format and presented orally before the entire class, attendance at these presentations being mandatory for all students.

Autonomous Activities

In addition to studying the conceptual contents of the course, students are expected to complete laboratory exercises, prepare summaries of videos, and write synthesis reports on the assignments proposed during the course.

Seminar at the ICGC (Voluntary Activity)

A seminar will be organized at the Cartographic and Geological Institute of Catalonia (ICGC) (Montjuïc, Barcelona), delivered by geologists with expertise in sediment-related geological hazards. The speakers will discuss the day-to-day activities of professional geologists involved in hazard assessment, prevention, and mitigation. Although this activity will not be assessed, its purpose is to provide students with an overview of potential career opportunities associated with the subject.
Annotation: within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Practices evaluation	20	0	0	CM40, SM44, SM45
Evaluation of theoretical contents	40	4	0.16	CM39, CM40, KM46
Report on a sedimentary environment	40	8	0.32	CM39, CM40, KM46, KM49, SM44

Assessment
Assessment of Theoretical and Practical Content

Assessment will be based on the marks obtained in the midterm examinations. Examinations may include the following types of questions: definitions, development of ideas and concepts covered in lectures or group assignments, and problem-solving exercises framed within practical case studies. No midterm examinations will be scheduled outside the officially established dates. Failed midterm examinations will not be averaged with passed examinations (a passing grade being defined as 5.0 or above). This component must be passed in order to pass the course and accounts for 40% of the final grade.

Assessment of Practical Work

Attendance, engagement during laboratory sessions, and the grades obtained in submitted practical assignments may be considered. This component constitutes the continuous assessment element. Assignments will only be accepted if submitted through the Virtual Campus within the established deadlines. This component accounts for 20% of the final grade.

Assessment of the Paradigmatic Case Study

Questions, consultations, and the overall development of the project will be considered as part of this assessment and within the continuous assessment framework. Assignments will only be accepted if submitted through the Virtual Campus within the established deadlines. This component accounts for 40% of the final grade.

Resit Examination

Failed midterm examinations (defined as grades below 5.0) may be retaken in a final examination scheduled on the date established in the general course calendar. No resit examinations will be held outside the officially designated dates. The mark obtained in the resit examination will automatically replace the mark originally obtained in the failed examination.

Plagiarism

Plagiarism is considered a serious academic offence and may result in the invalidation of the assignment in which it is detected.

Use of Artificial Intelligence

The use of artificial intelligence tools is permitted in the preparation of the paradigmatic case study, provided that students clearly specify how such tools have been used and identify the software employed. This information must be explicitly reported in the Methodology section.

Bibliography

Arche, A. (2010). Sedimentología: del proceso físico a la cuenca sedimentaria. Publicaciones del Consejo Superior de Investigaciones Científicas; *Colección Textos universitarios*, Ref. CSIC 11761, 1287p

Bird, E. C. (2011). *Coastal geomorphology: an introduction*. John Wiley & Sons.

Bridge, J., & Demicco, R. (2008). Earth surface processes, landforms and sediment deposits. Earth Surface Processes. *Cambridge University Press*. Doi: https://doi.org/10.1017/CBO9780511805516

Burt, T. P., & Allison, R. J. (2010). Sediment cascades in the environment: An integrated approach. Sediment cascades: An integrated approach, 1-15. Wiley-Blackwell.

Lewis, S. L., & Maslin, M. A. (2015). Defining the anthropocene. *Nature*, 519(7542), 171-180.

Lovejoy, T.E. and Hannah, L. (2005). Climate Change and Biodiversity. *Yale University Press*.

Masselink, G., Hughes, M., & Knight, J. (2014). *Introduction to coastal processes and geomorphology*. Routledge. https://doi.org/10.4324/9780203785461 .

Patsch, K., Griggs, G. (2006). LITTORAL CELLS, SAND BUDGETS, AND BEACHES: UNDERSTANDING CALIFORNIA S SHORELINE. Institute of Marine Sciences, University of California, Santa Cruz, USA.

Perry, C.T. and Taylor. K.G. (2007). Environmental Sedimentology, (C. Perry and K.G. Taylor, eds.) *Blackwell Scientific Publications*.

Roberts, H., Brooks, T. (2018). Sediment budget analysis: practitioner guide. Environment Agency, Horizon House, Deanery Road, Bristol.

Smerdon, J. (2018). Climate change: the science of global warming and our energy future. Columbia University Press.

Solomon, S., Quin, D., Manning, M., Marquis, M., Averyt, k., Tichnor, M. Lery-Miller, H. Eds. (2008). *Climate Change*. Cambridge University Press. The Physical Science Basis. Working Group I to the 4th assesment report of the Intergornmental Pannel on Climate Change.

Walker, R. (1984). Facies models. Geosciences Canada, Reprint Series 1 (2nd. Ed. Revised). *Geol. Assoc. Canada,* 317 pp.

Waters, C. N., Zalasiewicz, J. A., Williams, M., Ellis, M. A., & Snelling, A. M. (2014). A stratigraphical basis for

the Anthropocene? *Geological Society, London, Special Publications*, 395(1), 1-21.

Waters, C. N., Zalasiewicz, J., Summerhayes, C., Barnosky, A. D., Poirier, C., Gałuszka, A., & Wolfe, A. P. (2016). The Anthropocene is functionally and stratigraphically distinct from the Holocene. *Science*, 351(6269).

Wagner, M., & Lambert, S. (2018). Freshwater microplastics: emerging environmental contaminants? (p. 303). Springer Nature.

Zalasiewicz, J., Waters, C. N., Williams, M., & Summerhayes, C. P. (Eds.). (2019). *The Anthropocene as a geological time unit: A guide to the scientific evidence and current debate.* Cambridge University Press.

Webs:

IPCC Sixt Assessment Report on Climate Change: https://www.ipcc.ch/report/ar6/wg1/

The Working Group on Anthropocene: http://quaternary.stratigraphy.org/working-groups/anthropocene/

The Anthropocene Info: https://www.anthropocene.info/index.php

The Encyclopedia of the Anthropocene: https://www-sciencedirect-com.are.uab.cat/referencework/9780128135761/encyclopedia-of-the-anthropocene

National Oceanographic and Atmospheric Administration (NOAA): https://www.noaa.gov/

Global MonitoringLaboratory NOAA: https://gml.noaa.gov/ccgg/carbontracker/

Ocean and Coastal Hazards NOAA: https://oceanservice.noaa.gov/hazards/

The Inter-Sectoral Impact Model Intercomparison Project https://www.isimip.org/

Unlocking the secrets of mangroves: mapping and tracking mangrove forests to safeguard these ecological treasures :https://www.fao.org/interactive/remote-sensing-mangroves/en/

The GAR atlas: Unveiling global disaster risk (United Nations Office for Disaster Risk Reduction): https://www.undrr.org/publication/gar-atlas-unveiling-global-disaster-risk

Nature-Based Solutions for Coastal Hazards: The Basics (NOAA): https://coast.noaa.gov/digitalcoast/training/nbs-basics.html

United Nations Office for Disaster Risk Reduction (UNDRR) http://www.undrr.org/

Costal Regions: people living along the coastline, integration of NUTS 2010 and latest population grid. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:Coastal_regions_-_population_statistics

Al Campus Virtual s'aniran afegint les referències dels articles que els alumnes han de cercar i sobre els quals han de fer un treball

A list with references will be uploaded in Campus Virtual. Students will search for these references to build up a report on them.

Software

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Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this link. To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TE) Theory	1	Catalan	first semester	afternoon
(PLAB) Practical laboratories	1	Catalan	first semester	afternoon