VNIVERSITAT DE VALÈNCIA

Course Guide
33086 Continental and marine hydrology

COURSE DATA

Data Subject	
Code	33086
Name	Continental and marine hydrology
Cycle	Grade
ECTS Credits	4.5
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1104 - Degree in Environmental Sciences	Faculty of Biological Sciences	2	First term

Subject-matter

Degree	Subject-matter	Character
1104 - Degree in Environmental Sciences	124 - Marine and continental hydrology	Obligatory

Coordination

Name	Department
RENAU PRUÑONOSA, ARIANNA	356 - Botany and Geology

SUMMARY

The continental and marine hydrology course forms part of the CC.AA (Environmental Sciences) degree and has a direct and close relationship with environmental issues as a natural science. The course consists of two clearly separated parts as they are two disciplines within the Earth Sciences with contents and methods of study and research well differentiated, although the common element that joints them is “the water”. The part corresponding to surface hydrology is connected to the nature and structure of geological materials. In physical processes (fluid mechanics) and chemicals (reactions between water and rock minerals). In this sense the subject exposes the presence of water in geological enviroments, the relationship with them, the geochemistry derived from this relationship and in relation to its meaning as natural resource, the issues derived from the impact on its exploitation or anthropic activities that could influence their degradation. Regarding the marine environment, this subject links the emerged and submerged reliefs, compare the physical and chemical characteristics of the sea water and relate the factors and processes that determine the development of the different species of organisms in the marine environment. It also introduces the study of the importance of the conservation of biodiversity and marine protected areas and the use of energy resources derived from marine dynamics.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

Required have taken the Geology course (Code 33079)

OUTCOMES

1104 - Degree in Environmental Sciences

- Have capacity for analysis and synthesis and for critical reasoning.
- Be able to communicate orally and in writing.
- Be able to learn independently and to adapt to new situations.
- Be able to work in a team.

LEARNING OUTCOMES

Is intended to achieve the following objectives:
- Knowledge of the chemical principles related to the geochemistry of the rocks in the natural environment.
- Know the physicochemical mechanisms that provide the chemicals to groundwater.
- Identification and description of the main types of rocks and recognition of physicochemical properties of the different layers of the Earth.
- Evaluation and interpretation of geological information about the terrain and geological maps (stratigraphy, structures, and graphs).
- Identify different seafloor relay related to the dynamics of the crust.
- Identify the different types of materials in the deep ocean, its composition and origin.
- Know the physical and chemical properties of sea water, its variations * latitudinals and depth.
- Know the relay coastal marine dynamics determined by both the coasts with cliffs and in the sand.
- Main groups of organisms and their adaptation to coastal marine dynamics, with special mention of these on the shores of the Mediterranean.

DESCRIPTION OF CONTENTS

1. BLOCK 1: CONTINENTAL HIDROLOGY (Surface and groundwater)

Topic 1. Hydrosphere. Water in nature. The water cycle. Precipitation Evapotranspiration. Surface runoff. Infiltration. Surface water. Groundwater

Topic 2. Surface hydrology. The importance of surface water at different scales. Lotic waters (rivers) and lentic waters (lakes). Watersheds. Hydrograms Extreme events: Floods and droughts.

Topic 3. Water in geological formations. Importance of groundwater at different scales. Unsaturated zone. Saturated zone Porosity. Types of aquifers. Energy status: piezometry. Direction of the flow. Darcy's Law (permeability, transmissivity, saturated thickness and hydraulic gradient). Storage coefficient. Groundwater-surface water relations. Springs Flow models. Hydric balance.

Topic 4. Hydrogeochemistry and pollution. Hydrochemistry and hydrogeochemistry. Water: components and characteristics. Chemical characteristics of groundwater. Transport and mass transfer. Pollution of agricultural, industrial and urban origin. Salinization.

Topic 5. Acquisition and data processing in Hydrogeology. Field techniques. Piezometric maps. Pumping tests. Sampling and analysis. Representation techniques (ionic relations, diagrams). Statistical techniques (cluster, multivariate analysis). Mathematical models of flow.

Topic 6. Water management. Reservations and resources. Exploitation and overexploitation. Vulnerability of aquifers. Decontamination of aquifers. Water footprint and virtual water. Protection perimeters. Desalination. Artificial recharge Legislation. The water in the Valencian Community.

2. BLOCK 2: OCEANOGRAPHY (MARINE HYDROLOGY)

Item 7. - The Geology of the oceans. Continental drift and ocean floor. Current source oceans. Methods of study of the ocean floor. Submarine canyons, ridges and abyssal plains. Other reliefs seafloor.

Item 8. - Seafloor sediments. Origin and chemical and biological composition.
The process of sedimentation in the oceans. Chemistry of seawater. Origin and current chemical composition. Salinity measurement. Dissolved gases. Nutrient cycling. Physics of the oceans. Penetration of sunlight. Thermal characteristics of seawater. The temperature of the oceans. Temperature measurement. The density of seawater. Relations between temperature and density. The pressure in the oceans. Sound propagation. Other features of the sea water: viscosity and surface tension.

Item 9. - The waves. Wave characteristics. Surface waves and deep. Wind-generated waves. Effects caused by the refraction of the waves. Seismic waves and storms. Tides. Ideal Origin tides. Measurement and prediction, Tidal. Harnessing tidal energy. Ocean currents. Atmospheric circulation and surface currents, these currents influence the climate of coastal areas. Deep ocean currents. Measuring the direction and strength of the currents.

Item 10. - Coastal Oceanography. Beaches. Ideal profile of a beach. Materials. Structures originating from the coast by ocean currents and wind. Artificial structures. Semi-enclosed marine basins. Main physical, chemical and biological. Particular study on the Mediterranean sea. Principles of Biological Oceanography. Classification of the marine environment. Biological structure of the littoral zone, sublittoral and deep benthic region. Sampling procedures.

3. HYDROGEOLOGY / OCEANOGRAPHY PRACTICES

Rocky coasts: Genesis of the relief. Morphology of the cliff coast. Erosion and sedimentation processes. Adaptations to hard substrates, measurement of physical and chemical parameters. Recent natural processes and evaluation of the environmental impact on coastal organisms.
- Coastal Practice. Coastal Classification according to Shepard. Primary costs, secondary costs. Form of the coasts. Beaches. Coasts formed by biological activity. Estuaries

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	24,00	100
Laboratory practices	18,00	100
Tutorials	3,00	100
Development of individual work	15,00	0
Study and independent work	15,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	5,00	0
Preparation of practical classes and problem	15,00	0
TOTAL	**110,00**	

TEACHING METHODOLOGY

The knowledge that students must acquire in this course will get them throughout the course by developing various activities, such as:
• Lectures
• Labs
• Field practices
• Video projection
• Reading books
• Tutoring

EVALUATION

Continuous evaluation as follows:

• Learning evaluation through written exam, reasoning questions, practical questionnaire and mandatory work of the practice of costs. It counts between 80% -90% of the final grade. The practical and theoretical contents of the subject will be evaluated in this section.

• The practices are compulsory and to pass the subject must be approved both the theory and the practice.

• Course-work implementation and deffence will count 10-20% of the final grade.

REFERENCES

Basic

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