

Biosphere Sciences

Code: 100820
ECTS Credits: 6

Degree	Type	Year	Semester
2500251 Environmental Biology	OB	3	2

Contact

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Use of languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Teachers

Antoni Rosell Mele
María Ángeles Pérez Navarro

Prerequisites

Those of the degree.

Objectives and Contextualisation

The main objective is to know and analyze the processes that determine the functioning at a global scale of the biosphere, with a particular emphasis on the mutual interaction between the biota and the geophysical components, and on the alterations that human activity is producing in this functioning. It will also deal with the environmental history of the Earth as a tool to understand the processes that currently govern the functioning of the planet.

This implies a conception of the Earth as a system with different interconnected compartments (atmosphere, oceans and continental environments) through the energy balance and flow, the climate system, the atmospheric and ocean circulation, the primary production, the distribution and functionalism of the biomes, and the fluxes of the main chemical elements and compounds.

Content

Part I

1- Global balance of energy

Planetary energy balance. Atmospheric composition and greenhouse effect. Climatic feed-backs. Energy transport across the Earth.

2- Atmospheric circulation

Cells of atmospheric circulation. Wind regime. Global distribution of temperatures and precipitation: climatic regions.

3- Hydrosphere

Light gradients, temperature and salinity in oceans. Ocean surface circulation. Ocean deep circulation. Cryosphere. Freshwaters.

4- The atmosphere-ocean system

General Circulation Models. El Niño, La Niña and ENSO. Climate teleconnections.

5- Lithosphere

Internal Earth structure of. History of the Earth. Plate tectonics and continental drift. Weathering and sedimentation. Volcano activity.

6- Environmental history of the Earth.

Techniques of environmental reconstruction of the past. History of climate, atmospheric composition and continents. Evolution of the biological diversity along the Earth history.

Part II

7- Distribution of primary production

Measurement of primary production. Limiting factors in terrestrial and aquatic ecosystems. Changes induced by human activity.

8- Terrestrial biomes functioning

Tropical rainforest, tropical deciduous forests, savannahs, warm deserts, Mediterranean forests and shrublands, cold deserts, deciduous forests, temperate rainforests, prairies, boreal forests, tundra.

9- Effect of biota on the atmosphere and climate

Climate-vegetation feed-backs at global and regional scales: albedo, evapotranspiration, chemical composition of the atmosphere. Control of the concentration of atmospheric gases: oxygen, N₂O, CO₂, methane, DMS.

10- Carbon balance

The cycles of organic and inorganic carbon in the short and long term. Sources and sinks. Anthropogenic modifications of the carbon cycle.

11- Global nutrient cycles

Global cycle of N in terrestrial and marine ecosystems: atmospheric flows, recycling and anthropogenic modifications. Global cycle of P: sedimentation and long-term return. S global cycle: atmospheric fluxes and anthropogenic modifications.

12- Global change and climate change

History and causes of global change. Recent climate change. Global circulation patterns and scenarios of global change. Changes in atmospheric chemistry: ozone layer - origin, effects and anthropogenic alteration. Impacts of global change in biota and human systems. Land use changes. Strategies for mitigation and adaptation. Geoengineering.