

# The Earth system and its interactions

## Lecturers

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## Course mnemonic

GEOG-F400

## ECTS credits

5 credits

## Language(s) of instruction

English

## Course period

First term

## Campuses

Solbosch and Plaine

## Course content

This course presents the overall functioning of the earth system, as well as its main components (i.e., atmosphere, ocean, cryosphere, biosphere) and their interactions. In the first part of the course, we will review the different phenomena involved in the radiative energy balance of the Earth, as well as the processes that control the transport and storage of energy. In the second part, the dynamics of the atmosphere will be approached (structure, stability, forces involved, etc.), and will be illustrated with a description of the global atmospheric circulation as well as the mid-latitude weather systems. The dynamics of the ocean will be described in Part Three, focusing on the physical properties of seawater, air-sea interactions, and the forces involved. We will review the wind-driven upper ocean circulation and the "thermohaline" circulation, the latter concerns the exchange between the deep and surface ocean. The fourth part of the course deals with the study of the cryosphere. We will successively review the dynamics of snow cover, glaciers, and sea ice. The last chapter is devoted to the terrestrial and marine biosphere, with particular attention to the carbon cycle.

The practical works associated with this course will present practical applications of concepts introduced in the theoretical course, using digital tools, as well as complementary concepts: Interpretation of aerological diagrams, study of typical temperature/salinity/density profiles in the ocean and deduction of hydrodynamic conditions, time series analysis, use of geographic information system for the study of the cryosphere, and analysis of the carbonate chemistry in the oceans.

## Objectives (and/or specific learning outcomes)

Give a global view of the main characteristics of the Earth system's components, and of the complex interactions that govern their behavior.

Learning numeric tools during practical exercises.

## Teaching method and learning activities

Ex-cathedra course and exercises. Powerpoint presentation and written support. Files available on the virtual university.

Participation in practical work is mandatory.

## Course notes

Université virtuelle

## Other information

### Place(s) of teaching

Solbosch and Plaine

### Contact(s)

Laboratoire de Glaciologie - Mme Lelouchier 02-650 22 27

## Evaluation method(s)

Oral examination and written examination

### Determination of the mark (including the weighting of partial marks)

- > Weighting of the scores for the theoretical exam (2/3) and the practical exam (1/3), provided that the two scores are greater than or equal to 8/20.
- > If the student has a score lower than 8/20 in one of these two parts, the final score will be equal to the lower score of the two.
- > If the student has a score lower than 8/20 in both parts, the final score will be a weighting of the scores for the theoretical (2/3) and practical (1/3) exams

The TROPIMUNDO students are only concerned by the theoretical exam (3/3).

## Main language(s) of evaluation

English

## Other language(s) of evaluation, if applicable

French

## Programmes

### Programmes proposing this course at the faculty of Sciences

MA-ENVI | **Master in Environmental Science and Management** | finalité Environmental Science/unit 1, MA-GEOG | **Master in Geography : General** | finalité Teaching/unit 1,

finalité Teaching/unit 2 and finalité territorial Development/unit 2, MA-GEOL | **Master in Geology** | finalité Research - 1st year/unit 1 and finalité Research - 1st year/unit 2 and MA-IRBE | **Master in Environmental Bioengineering** | finalité Professional/unit 1

### Programmes proposing this course at the Brussels School of Engineering

MA-IRBE | **Master in Environmental Bioengineering** | finalité Professional/unit 1

