GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Oceanography (C003807)

Course size *(nominal values; actual values may depend on programme)*

Credits 4.0 **Study time 120 h**

Course offerings and teaching methods in academic year 2026-2027

A (semester 1)	English	Gent	lecture

Lecturers in academic year 2026-2027

Neukermans, Griet	WE11	lecturer-in-charge
Brion, Natacha	VUB	co-lecturer

Offered in the following programmes in 2026-2027	**crdts**	**offering**
Master of Science in Marine and Lacustrine Science and Management	4	A

Teaching languages

English

Keywords

Physical characteristics of oceans, marine biogeochemical cycles, primary production, heterotrophic processes, plankton and benthos, benthic pelagic coupling

Position of the course

To get insight in the main oceanographic processes and characteristics.

Contents

First an introduction will be given to the main physical processes responsible for the most important biological and chemical features and processes in oceans and seas as they take place in present times. Seafloor characteristics such as topography and bathymetry but also substrate features will be introduced together with the responsible geological and water column processes. Marine sedimentation, major ocean circulation systems but also waves and tides will be covered in this introductory part.

The main focus of the second part of the course will be on chemical and biological oceanography. In the biological part first the main processes and drivers that affect ecological patterns, including aspects of habitat characterization, biogeochemical processes and gradients, structural and functional biodiversity, food web interactions, productivity and adaptations will be introduced on a variety of spatial and temporal scales. The fundamental global processes of primary and microbial production that fuel marine ecosystems will be discussed to understand their control mechanisms as well as their importance as driving force for both pelagic and benthic ecosystems from shallow to deep. Processes of benthic-pelagic coupling, phyto- and zooplankton distribution and interactions as well as benthic biodiversity and processes of ecosystem functioning will be illustrated based on specific case studies from a variety of ecosystems from the tropics to the poles, and from shallow to the deep.
The chemical part consist of four modules: the first module will address overview of global change (esp. P,N,C) and drivers of oceanic change, and properties of water and seawater specific to chemical processes in the sea (not covered earlier). The second module will focus on major ions and conservative/trace elements in SW, and how these may are viewed in light of ocean sources circulation; global C cycle, CO_2 in the sea and the carbonate system and alkalinity (case study on ocean acidification). The third module will focus on oceanic box models and mass balance

approach, tracers of oceanic water movement and particle transport, the nutrient P, N cycles and use of chemical tracers such as radionuclides and stable elements. The fourth module involves examples of chemical sources, sinks and processes in the sea with case studies of the oceanic Fe cycle and biogeochemistry, the global Hg cycle and biogeochemistry, and anthropogenic organic pollutants, and their distribution, biogeochemistry and impact in the global oceans (examples may include PCBs, DDT, PAHs).
A practical exercise will illustrate how nutrient deliveries from rivers to seas can be quantified. Practically students will learn a simple method to perform a nutrient budget study, and apply it to the Scheldt River. Interpretation of results will include: identifying dominant transformation processes and estimating estuarine filtering capacity.

Initial competences

General knowledge in ecology and chemistry.

Final competences

Insights in main oceanographic processes including physical chemical and biological aspects.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture

Extra information on the teaching methods

Lectures and practical exercise. Also online tools can be used to support the study

Study material

None

References

1 Pinet, last edition: Invitation to Oceanography.
2 Kaiser, last edition: Marine Ecology: processes, systems and impacts
3 (Recommended): Aquatic chemistry, W. Stumm and J.J. Morgan, J.Wiley & Sons, 1981
4 (Recommended): Seawater: its composition, properties and behaviour, The Open University, Pergamon Press, 1989
5 (Recommended): Chemical oceanography, F.J. Millero, CRC Press, 1996
6 Handbook (Recommended): An introduction to marine biogeochemistry, S.M. Libes, J. Wiley & Sons, 1992
7 Handbook (Recommended): Tracers in the sea, W.S. Broecker and T.-H. Peng, Eldigio Press, 1982

Course content-related study coaching

After the lectures and on organized moments upon request of the students; interactive support using Ufora, email and lectures

Assessment moments

end-of-term assessment

Examination methods in case of periodic assessment during the first examination period

Written assessment with open-ended questions

Examination methods in case of periodic assessment during the second examination period

Written assessment with open-ended questions

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

not applicable

Calculation of the examination mark

- 80% theory
- 20% exercise