

The Global Coastal Ocean on a Changing Planet

Titulaires

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Mnémonique du cours

GEOL-F436

Crédits ECTS

5 crédits

Langue(s) d'enseignement

Français

Période du cours

Deuxième quadrimestre

Campus

Solbosch, Plaine et Hors campus ULB

Contenu du cours

This course is taught in English.

Coastal oceans provide valuable goods and services for society and are strongly affected by human activities. Globally, coastal waters represent over half of the ocean's economic value (>2500 billion USD annually). However, 70% of this production depends on the ocean's health status, which is currently threatened by a plethora of anthropogenic perturbations. In particular, coastal environments suffer from the detrimental effects of these perturbations (e.g. hypoxia, acidification, eutrophication, harmful algal blooms, fish death, and biodiversity loss). However, the coastal ocean is an integral part of the complex and dynamic land-ocean aquatic continuum that spans a connected chain of aquatic environments from rivers to the shelf break. Understanding the structure and functioning of the coastal ocean, especially its response to projected global change, thus necessarily requires consideration of the entire continuum on different scales, from streams to oceans. This course first provides an introduction to the role of the coastal ocean, its physical and biogeochemical characteristics and its response to anthropogenic perturbations. It then offers hands-on experience in investigating this complex and the rapidly changing environment through an excursion with the BELGICA along the Belgian land-ocean continuum from Zeebrugge to Antwerp, as well as onshore laboratory analysis and student-led research projects.

Objectifs (et/ou acquis d'apprentissages spécifiques)

- > In-depth understanding of dynamics along coastal transition systems, the impact of global change on these systems and their role in the climate system
- > Introduction to and practical hands-on learning in proposing, planning and undertaking independent field and research work

- > Effective communication of the results of such studies in written form
- > Research and transferable skill development

Pré-requis et co-requis

Connaissances et compétences pré-requises

- > good understanding of global biogeochemical cycles
- > basics of lab work
- > basic scientific communication skills

Méthodes d'enseignement et activités d'apprentissages

This course focuses on developing the student's research and project planning skills through an **project based teaching style** simulating the design, planning, execution and communication of a real research project that involves a research cruise on the BELGICA. Specifically,

- 1 The course starts with a series of **theoretical, lecturer-led courses** that provide the scientific background for the course.
- 2 Following the theory block, the **students research (based on provided reading material and with the guidance of the academic staff) and present in a student-led seminar the scientific principles, analytic protocol and accuracy of every sampling and analyzes method** we use during BELGICA research cruise and later in the lab. As a result, students become familiar with the work that will be carried out on board and thus gain confidence and take ownership of the research cruise.
- 3 Students then design (guided by academic staff) their own group research projects around a central research hypothesis based on the gained knowledge (and recommended reading) and informed by our practical constraints. Each group submits a short 2 page **research project proposal** that includes all parts of a standard research proposal. Proposals are then peer-reviewed in a **mock funding panel session**. Each group receives written "reviewer" feedback on their proposal and has the opportunity to adapt their research project accordingly.
- 4 We then embark on a **1-2 day research excursion with the Belgian research vessel BELGICA** (including a few short trips with the zodiac) to sample and analyze water samples along the Belgian land-ocean transition zone.
- 5 The research cruise is then followed by a **lab day** to process the samples that cannot directly be measured on board. Here again, students are required to work in groups and pro-actively plan and execute their analytic work under the guidance of staff.
- 6 Following the lab day, a **data camp** is organized to introduce the students to the importance and basics of data management; identify a data manager that collates all data conducts quality checks; discuss results, and design efficient ways of visualization.

⁷ In addition, a **scientific writing workshop** introduces/reiterates the basics of scientific writing, structuring research articles, referencing on the basis of examples and discussions

⁸ The proposed research projects are then carried out using the collected data, our internal student database, national databases and published literature. Research results are disseminated through a **research report in form of a short scientific paper** that includes a common group (methods, results), as well as individual parts (abstract, introduction, discussion, conclusion).

Contribution au profil d'enseignement

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Références, bibliographie et lectures recommandées

Bianchi, T. S. Biogeochemistry of Estuaries. Oxford University Press (2007).

<https://www.nature.com/scitable/knowledge/library/estuaries-where-the-river-meets-the-sea-102734157/>

Sarmiento & Gruber. Ocean biogeochemical Dynamics. Princeton University Press

Support(s) de cours

Université virtuelle

Autres renseignements

Lieu(x) d'enseignement

Solbosch, Plaine et Hors campus ULB

Contact(s)

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Méthode(s) d'évaluation

Autre, Travail de groupe, Travail personnel et Rapport écrit

Méthode(s) d'évaluation (complément)

The project report may be carried out individually or in a group. In the latter case, the report consists of a common group part including the abstract, introduction, methods and results section, as well as an individual part, including the discussion of the results, limitations/future work and the conclusions. The group part of the report is not restricted by a page or word limit, while the individual part is restricted to 2 DIN A4 pages.

The overall mark is a qualitative summary of your ability to:

- design (and carry out) a research project, using the methods and techniques acquired during the excursion and lab day as well as in related courses,
- write scientifically in a clear and concise manner,
- present your results clearly,
- understand your results and relate them to what you have learned during the course,
- critique your own work and identify limitations/future directions.

Construction de la note (en ce compris, la pondération des notes partielles)

The proposal (20%) and the project report (80% of which 40% group part + 60% individual part) constitute 100% of the total unit mark.

The lab days, the data camp, as well as all seminars are mandatory and attendance is required to submit the final report.

The excursion is facultative.

Langue(s) d'évaluation principale(s)

Anglais

Autre(s) langue(s) d'évaluation éventuelle(s)

Français

Programmes

Programmes proposant ce cours à la faculté des Sciences

MA-ENVI | Master en sciences et gestion de l'environnement | finalité Sciences de l'environnement/bloc 2 et MA-GEOL | Master en sciences géologiques | finalité Approfondie/bloc 1