

## Major Challenges in Polar Oceans: from Biogeochemistry to Ecosystems (C004299)

Due to Covid 19, the education and assessment methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

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

**Credits 6.0**

**Study time 150 h**

**Contact hrs**

50.0h

**Course offerings in academic year 2021-2022**

A (semester 1)

English

Gent

**Lecturers in academic year 2021-2022**

Cardinal, Damien

PARIS64 lecturer-in-charge

Blain, Stéphane

PARIS64 co-lecturer

Koubbi, Philippe

PARIS01 co-lecturer

Ridame, Céline

PARIS64 co-lecturer

**Offered in the following programmes in 2021-2022**

[International Master of Science in Marine Biological Resources](#)

**crdts**

6

**offering**

A

**Teaching languages**

English

**Keywords**

global warming, acidification, paleo-oceanography, sea ice, macro and micronutrients, biodiversity, polar marine resources, bioregionalisation

**Position of the course**

The main goal of the course is to introduce students to the theory and characterization of the processes that regulate, control and affect marine communities. This course will emphasis on both theoretical and practical approaches. Understanding communities' dynamics is a fundamental step in understanding Future Seas biodiversity changes.

**Contents**

This course will show the importance of the polar oceans at the global scale. It will describe the main characteristics features of the Arctic and Southern Oceans with highlights on both their common and different mode of functioning. Their importance for the carbon cycle at geological and human time scales will be particularly studied and how polar oceans are highly impacted by acidification. Their responses to global warming will also be explained with the potential impacts on ecosystems and macro and micro nutrient cycles. The role of sea ice on circulation, biogeochemistry and ecosystems will be discussed. The assessment of marine biodiversity (mainly pelagic and top predators) and the consequences of Global change on polar biodiversity will be studied. This will include potential changes on species diversity from invertebrates to top predators, species habitats, trophic webs and species phenology and how it is considered for establishing Marine Protected Areas.

**Initial competences**

Good knowledge in marine ecology and oceanography.

**Final competences**

- 1 Explain the polar oceans specific functioning and their association to global challenges such as climate, biodiversity, marine resources, thermohaline circulation and carbon cycle.
- 2 Evaluate the different methods to study the past changes of polar oceans and their role in the carbon cycle.
- 3 Propose and implement marine strain cultures experiments in the lab to study phytoplankton response to global changes.

- 4 Identify the main phytoplankton groups encountered in the different Southern Ocean provinces.
- 5 Evaluate Marine Protected Areas proposals in the Southern Ocean.

#### **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**

Seminar, Lecture

#### **Extra information on the teaching methods**

This course will use a variety of teaching methods with preference for active pedagogy. More particularly the Problem-Based Learning (PBL) which "is a student-centered pedagogy in which students learn about a subject through the experience of solving an open-ended problem (Wikipedia)" based on real case-studies. Several practical labs with hand-on will be associated to PBL using advanced analytical techniques (e.g. Scanning Electron Microscope, isotopic labelling and mass spectrometers, cultures of phytoplankton strains). Some traditional courses will also be given to provide basic knowledge of polar oceans

#### **Learning materials and price**

#### **References**

Polar Regions, Chapter 3 of IPCC Special Report on Ocean and Cryosphere in a Changing Climate (2019), freely available on <https://www.ipcc.ch/srocc/home/>  
De Broyer C., Koubbi P., Griffiths H.J., Raymond B., Udekem d'Acoz C. d', et al. (eds.). Biogeographic Atlas of the Southern Ocean. Scientific Committee on Antarctic Research, Cambridge (2014) biodiversity.aq

#### **Course content-related study coaching**

#### **Assessment moments**

end-of-term and continuous assessment

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

Written examination

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

Written examination

#### **Examination methods in case of permanent assessment**

Report, Oral examination

#### **Possibilities of retake in case of permanent assessment**

examination during the second examination period is possible

#### **Extra information on the examination methods**

- Written examination
- Oral presentation in small group of the project
- Written Reports from lab work and Case study on Marine Protected Area

#### **Calculation of the examination mark**

- 20% Written Exam
- 25% Oral
- 55% Written reports