Master Océanographie et Environnements Marins

Msc Oceanography and Marine Environment

www.obs-vlfr.fr/oem

Presentation of the Oceanography option

Marine ecosystems cover about 70% of the earth's surface and comprise 90% of the biosphere. They play an essential role in the regulation of the major biogeochemical cycles of the terrestrial planet and of climate systems. They also make a major contribution to economic prosperity, social well-being and the quality of life of a large number of human societies. More than 60% of the world population lives close to a coast, and this figure is constantly rising, consequently marine environments are confronted with an increasing number of threats such as climate change, habitat destruction, pollution and the overexploitation of natural ressources.

It is in this context that the objectives of **the multidisciplinary masters course of the « Oceanography and Marine Environment » option have been designed to provide theoretical and methodological tools to train highly qualified scientists in the fields of biological oceanography, ecology and marine biogeochemistry.**
This taught course is for students with a first degree in biology, environmental sciences or chemistry, and content will first include common introductory modules in basic oceanography. The second part of the course will then focus on the most recent developments in both fundamental and applied research in the field.

At the end of the course the expected theoretical and operational skills and knowledge of the students will include:

1. An understanding of the mechanisms which govern the **structure and function of marine ecosystems** for a range of spatial and temporal scales.

2. An understanding of the physical, chemical and biological processes which regulate the **major biogeochemical cycles**.

3. A command of the **methods necessary for the study and analysis of the marine environment.**

4. A grasp and evaluation of the **impact of man on marine ecosystems**.

This option is taught by lecturers from a number of research units sited on the Jussieu campus and at the three Université de Pierre et Marie Curie oceanological observatories (Banyuls/mer, Roscoff, Villefranche/mer). They will cover the main subjects and scientific fields under study , and will provide students with an opportunity to gain direct experience in high class research laboratories, provide focused and dedicated resources and access to direct and essential contact with the marine environment.

The Masters course is programmed over 4 semesters organised into Taught Modules (Unités d'Enseignement – UE) each of 3 to 12 ECTS (European Credit Transfer System); each semester will represent a minimum of 30 ECTS.

The taught course will enable a number of students to go on to do a PhD, with the subsequent possibility of a research career in one of the major French fundamental research institutions (universities, CNRS[1], IFREMER[2], IRD[3], MNHN[4] ...). in addition, the methodological know-how together with the taught modules on the impact of man on marine ecosystems and environmental management will make students strong candidates to apply for a wide range of careers (consultancy work, community planning, and environment departments in various public and private organisations and companies.)

International scope

The « Oceanography and Marine Environment » option is supported by the European Erasmus-Mundus masters 'Master of science in Marine Biodiversity and conservation' (http://embc.marbef.org). This is a joint Masters programme run by six European Universities :
University of Ghent (Belgium), University of Bremen (Germany), University of Algarve (Portugal), University of Pierre et Marie Curie (France), University of Oviedo (Spain) and the University of Klaipeda (Lithuania).

In the second year courses are jointly offered to the Oceanography and Marine Environment Masters students and to the European Erasmus -Mundus students. This implies that:
- Semester 3 courses will be given in English;
- the organisation of the taught courses will be such as to give students the necessary time to acquire knowledge and know-how of value to future employers (team work, project management....). To this effect there is a dedicated taught module (UE) of 6 ECTS which will be conducted over a three week period.

1 - CNRS : Centre National de la Recherche Scientifique [nationalCentre for Scientific Research]
2 - IFREMER : 'Institut Francais de Recherche pour l'Exploitation de la Mer [French institute for exploitation of the ocean]
3 - IRD : L'Institut de recherche pour le développement, [National development research institute]
4 - MNHN : Museum National d'Histoire Naturelle [National Natural History Museum].

Course Organization

First year :

The **first semester** of year 1 (M1-S1) will be identical for all students taking the Oceanography and Marine Environment option. It will be entirely taught at the Jussieu (Paris) campus. It will include taught modules common to all the Universe, Environmental and Ecological Sciences (SDUEE) Masters courses and three dedicated fundamental oceanography taught modules (UE).

Organization of the taught module (M1-S1) [Paris Jussieu campus]

MU001- Data, statistics, and data treatment 1 (3 ECTS)
MU002- Major environmental questions (3 ECTS)
MU012 Geomatic, GIS, remote sensing (3 ECTS)
Foreign language : English, Spanish, German, French, (3 ECTS)
MU301- Introduction to oceanography (6 ECTS)
MU302- Introduction to ocean dynamics - physical properties (6 ECTS)
MU303- Biogeochemical cycles and productivity of ecosystems (6 ECTS)

The **second semester** of year 1 (M1-S2) will offer the beginnings of specialisation to the students depending on their own preferences for different themes such as oceanographic biology or other different environments. In addition to the taught modules common to all the SDUEE masters courses, these will include a choice of:

(i) one general oceanography module of the two offered at UPMC,
(ii) one module on organsim and habitat diversity out of three offered in the various UPMC marine oceanological observatories.
(iii) An internship in a laboratory;

The taught modules offered at the university's different observatories can be considered fundamental inasmuch as they provide direct contact with the marine environment and permit concrete illustration of the different theoretical concepts previously covered on the course at the UPMC campus.

Organization of the taught module (M1-S2)

<table>
<tr><td colspan="3">MU511- Data, statistics, and data treatment 2 (3 ECTS) [Paris]</td></tr>
<tr><td colspan="3">Professional skills training (3 ECTS) [Paris]</td></tr>
<tr><td colspan="2">MU401- Structure and functioning of marine ecosystems (6 ECTS) [Paris]</td><td>MU408- Advanced biogeochemistry (6 ECTS) [Paris]</td></tr>
<tr><td>MU416- Concepts and practices in oceanography and marine biology (12 ECTS) [Banyuls/mer]</td><td>MU417- Biodiversity of marine organisms and coastal ecology (12 ECTS) [Roscoff]</td><td>MU418- Diversity and ecology of marine ecosystems (12 ECTS) [Villefranche/mer]</td></tr>
<tr><td colspan="3">MU420- Research project : 2 months (6 ECTS)</td></tr>
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Second year :

In **semester 3** (M2-S3) there are four different reference speciality paths, the specific skill and knowledge objectives of which are detailed below :

- speciality 1 : **Ocean environment**
- speciality 2 : **Coastal environment**
- speciality 3 : **Anthropisation, management and conservation of the marine environment**
- speciality 4 : **Modelling and data analysis**

After an initial core course, these four different speciality paths in S3 enable the students to specialise sufficiently in different aspects of oceanography which should help them get funding for a PhD thesis and/or improve their chances of getting a good job. Consequently the first three specialities are conducted along the broad lines of the way research is structured in these fields in the main national and international programmes;

All the S3 modules will be conducted in one of the university's three oceanological observatories in order to maximise the contact between the research benig conducted in these research labs, the student's research project per se and the student's training. In addition the organisation of these modules is such that in order to complete them the student ends up studying at 2 or even 3 of these observatories, benefiting thus of UPMC's major wealth in this research field.
The speciality courses will take the form of two 12 ECTS fundamental modules (group 1) and one or two 6 ECTS speciality modules chosen by the students from those available in groups 2 and 3.
This semester is also offered to the European Erasmus -Mundus "Marine Biodiversity and conservation" ,masters students. (EMBC), these courses are taught in English.

Organization of the taught module (M2-S3)

Group 1 (September to November), Choice of two taught modules (UE) in any speciality course:

Ocean environment	**Coastal Environment**	**Anthropisation, management and conservation of marine environments**	**Modelling and data analysis**
NU193 -Response of pelagic ecosystems to environmental changes (12 ECTS) [Villefranche/mer]	NU183- Functioning of coastal Mediterranean Ecosystems (12 ECTS) [Banyuls/mer]	NU185- Marine biodiversity : measurements, patterns, human threats and conservation (12 ECTS) [Roscoff]	Choose a taught module in one of the 3 specialities
NU191- methods and instrumentation in Oceanography (12 ECTS) [Villefranche/mer]	NU188- Functioning of tidal littoral and coastal ecosystems (12 ECTS) [Roscoff]	NU184- Ecological quality of coastal ecosystems (12 ECTS) [Banyuls/mer]	NU192- Modelling of marine environments (12 ECTS) [Villefranche/mer]

One taught module from the choice in group 2 (end of November to December)

NU181- Bacterial diversity and ocean biogeochemistry (6 ECTS) [Banyuls/mer]
NU195 Extreme environments and deep-sea ecosystems (6ECTS) [Banyuls/mer]
NU186- Merging of genetics and ecology to study natural populations (6 ECTS) [Roscoff]
NU196 Scientific communication: writing a proposal for a research project (6 ECTS) [Banyuls/mer]
NU190- Chemical contaminants (6 ECTS) [Villefranche/mer]
NU 194- Geographic information systems and remote sensing of the environment (6 ECTS) [Villefranche/mer]

One taught module from the choice in group 3 (January).

NU187- Phytoplankton evolution and ocean biogeochemistry (6 ECTS) [Roscoff]
NU182- Diversity in physiological constraints and adaptations in marine ecosystems (6 ECTS) [Banyuls/mer]
NU180- Modelling applications and marine conservation (6 ECTS) [Banyuls/mer]
NU189- Multivariate analyses for marine ecosystems (6 ECTS) [Villefranche/mer]

Semester 4 of year 2 (M2-S2) MSc thesis consists of a five month internship in a laboratory or company and is credited 30 ECTS.