OCEANUS- NET

MARINE SCIENCES SYLLABUS

The Oceanus-Net, a network of Laboratories from the Departments of Biology and Geology of Patras University, Greece, offers high level lectures, seminars, laboratory practical and sea-training in the fields of oceanography, fisheries and aquaculture within the framework of their geology and biology Bachelor of Science (B.Sc) and Master of Science (M.Sc) degree programmes.

The syllabus in Marine Sciences at B.Sc level offered by the Oceanus-Net partners of the two departments, gives a comprehensive training in the aforementioned fields. It also gives Erasmus students the opportunity to obtain skills outside their core disciplines offered by their home universities.

GEOLOGY DEPARTMENT

B.Sc Degree in Geology (4 yrs)

MARINE SCIENCE SYLLABUS,

The marine science syllabus offered by the department of Geology within the basic core for obtaining a B.Sc in geology, provides the students with the essential scientific and technological knowledge needed to find a place in the job market related to the exploration and sustainable management of the seas. The following modules, listed in the table below, are included in the syllabus.
<table>
<thead>
<tr>
<th>MODULES TITLE</th>
<th>CREDITS</th>
<th>PROGRAMME</th>
<th>SEMESTER</th>
<th>LECTURES</th>
<th>PRACTICALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamentals of Ocean of Mechanics</td>
<td>5</td>
<td>Winter</td>
<td>1 of 2 hours weekly</td>
<td>1 of 2 hours weekly</td>
<td></td>
</tr>
<tr>
<td>Remote sensing in the Management of Seas</td>
<td>4</td>
<td>Winter</td>
<td>1 of 2 hours weekly</td>
<td>1 of 2 hours weekly</td>
<td></td>
</tr>
<tr>
<td>Biomarkers</td>
<td>3</td>
<td>Winter</td>
<td>1 of 2 hours weekly</td>
<td>1 of 2 hours weekly</td>
<td></td>
</tr>
<tr>
<td>Operational Oceanography in the management of Seas</td>
<td>3</td>
<td>summer</td>
<td>1 of 2 hours weekly</td>
<td>1 of 2 hours weekly</td>
<td></td>
</tr>
<tr>
<td>Environmental Oceanography</td>
<td>3</td>
<td>summer</td>
<td>1 of 2 hours weekly</td>
<td>1 of 2 hours weekly</td>
<td></td>
</tr>
<tr>
<td>Coastal Processes and Management</td>
<td>3</td>
<td>summer</td>
<td>1 of 2 hours weekly</td>
<td>1 of 2 hours weekly</td>
<td></td>
</tr>
</tbody>
</table>

**FUNDAMENTALS OF OCEAN MECHANICS**

**OBJECTIVES**
This module introduces the students to the complex processes operating in the ocean, the importance of the ocean to mankind, the growing importance of ocean resources, the growing human activity and its impact on the ocean and the importance of ocean studies in the sustainable management.

**MODULE CONTENT**
History and importance of ocean studies
Evolution of the ocean floor
Ocean sediments
REMOTE SENSING IN THE MANAGEMENT OF THE SEA

OBJECTIVES
This module introduces the students to marine geophysics principals and their use in the mapping and monitoring of the seafloor. The module also teaches the students to acquire the necessary skills in the operation of high resolution marine geophysics acquisition systems and, in becoming familiar with the processing and interpretation of data. The students are also trained to make bathymetric, seafloor, benthic habitat and geological maps.

MODULE CONTENT:
1. High Resolution Marine Geophysics Acquisition Systems
   - Single Beam Echo Sounders
   - Swath Bathymetry
   - Sea-bed Classification Systems
   - Side Scan Sonars
   - Single frequency Sub-bottom Profilers
   - Chirp
   - Marine Magnetometry
2. Processes and Interpretation of High Resolution Data
   - Navigation- Datum Reference
   - Echo-Sounder and Swath Bathymetry Processing
   - Side Scan Sonar Processing and Interpretation
   - Sub-bottom Seismic Processing
   - Seismic Stratigraphy
3. Mapping
   - Bathymetry mapping
   - Seafloor and benthic Habitat mapping
   - Geological hazards mapping
   - Site investigation mapping
Object detection
Quaternary seascape reconstruction

OPERATIONAL OCEANOGRAPHY

OBJECTIVE
This module presents the students with the current state of the art in Operational Oceanography for predicting and assessing the state of the ocean and the surrounding enclosed seas, estuaries, fjords and gulfs. The module also: (i) introduces the student to the essential measurements, tools and methods used in operational oceanography and (ii) teaches them the use of such knowledge for improving safety at sea, enabling the sustainable exploration of ocean resources, supporting safe and essential efficient offshore energy related activities and mitigating the effect of environmental hazards and pollution to society.

MODULE CONTENT
How to plan and carry out an oceanographic survey
Water column observing and monitoring techniques
1. Profiling in the water column by vertically lowering instruments packages from a stationary vessel:
   - Temperature, salinity, density measurement
   - DO₂, pH, Eh
2. Under way towed instrument packages with the above mentioned sensors
3. Drifting buoys at pre-determined depths
To analyze and interpret oceanographic data
Current measurements using current meters and ADCP’s fixed in the seabed or the in the hull of a vessel
Preparing Oceanographic maps with the use of GIS

ENVIRONMENTAL OCEANOGRAPHY

OBJECTIVES
This module introduces the students to the bio-geo-chemical processes operating in the marine environment. Furthermore, the module teaches the students to: (i) the essential measurements, tools and methods used in environmental oceanography for sampling and monitoring the marine environment and (ii) experience and skills in laboratory analytical techniques
MODULE CONTENT
Pollution and pollutants
Oxygen budget
Eutrophication
Physico-chemical and biological behaviour of pollutants in the sea
Impact of pollutants in the marine environment: case studies
Oceanographic and geological criteria for outfall site selection
Oceanographic and geological criteria for dumping solid wastes
Radioactive wastes and disposal
Pollution assessment methods and studies

COASTAL PROCESSES AND MANAGEMENT
OBJECTIVES
This module introduces the students to: (i) the long and short term changes that occur in the coastal environment, which are induced by natural forces but also by human intervention, (ii) the importance of the coastal zone to societal well-fare and (iii) the concept of the sustainable management of the of the coastal zone

MODULE CONTENT
The coastal environment (cliffs, beaches, deltas, estuaries, fjords)
Physical factors affecting coastal landscape
Waves and tides
The influence of sea-level changes on coastal geomorphology
The use of remote sensing in the monitoring and management of the coastal environment
Physical properties, hydraulic behavior and transport of sediments
Coastal engineering techniques for studying beach erosion
Coastal sediment budget
People and coasts; current coastal issues

PRACTICALS
During each module the students will become familiar to analyze and interpret data sets from current research in different marine environments
WORK AT SEA
At the end of each module the student will experience in surveying at sea for a minimum period of five days and learn how to plan an oceanographic survey and to operate a variety of tool systems for acquiring data for the mapping of the water column and the seafloor.

BIOLOGY DEPARTMENT

B.Sc Degree in Biology (4 yrs)

MARINE SCIENCE SYLLABUS,
The marine science syllabus offered by the department of Biology within the basic core for obtaining a B.Sc in Biology, provides the students with the essential scientific and technological knowledge needed for finding a place in the job market related to the exploration and sustainable management of the seas. The following modules, listed in the table below, are included in the syllabus