



SANT'ANNA
INSTITUTE
SORRENTO

Introduction to Marine Biology – MSC 101 with Lab (lecture hours: 45; lab hours: 45; 4 credits)

COURSE DESCRIPTION

This course focuses on the biology of organisms residing in the sea, from the diversity of planktonic communities to marine megafauna, taking into consideration the ecological principles that govern marine life. The course aims to provide a solid educational background in basic and applied marine biology. Emphasis will be placed on marine environment issues and the adaptive and evolutionary mechanisms of organisms that allow them to occupy marine habitats. In particular, the Mediterranean Sea and the conservation of marine environment will play a central role in the course subjects, profiting from the availability of unique ecosystems and a nearby renown marine protected area to conduct thematic field trips and practical tutorials.

REQUIREMENTS: bring a mask and a snorkel for Marine Bio field trips.

STUDENT LEARNING OUTCOMES

At the conclusion of this course, the student will be able to do the following:

1. Interpret how marine fauna and flora interact and identify their role in marine systems.
2. Describe the structure of marine communities and the transfer of energy and matter through marine food webs.
3. Describe the ways that oceans are created and destroyed.
4. Classify the various elements of the marine environment.
5. Analyze the factors adversely impacting marine ecosystems and possible ways to overcome them.
6. Critically evaluate evidence, arguments and ideas from different sources in a self-directed manner, leading to coherent and logical analysis.

TOPICS

Module One: The Marine Environment

This module sets the scene by looking at how the oceans are created and destroyed by sea floor spreading and plate tectonics and provides some basic information on the oceanography and the structure of the physical ocean from the continental shelf to the abyssal plain. The chemistry of seawater, the physics of light and sound propagation in the ocean, the dynamics of tides and major currents and the large-scale movements of seawater in the ocean basins are examined.

- A. Origin and geology of the ocean
- B. Properties of sea water
- C. The ocean in motion
- D. Classification of the marine environment

Lecture hours: 10 hrs

Laboratories (6 hrs)

1. Geo & Geo – 3h, indoor and outdoor – Ocean geography, geology and topography, analysis of different bottom floors, substrates and sediments' composition

2. Water properties – 3h, indoor and outdoor – water properties, salinity, surface tension, heat and salinity dependence, sample collection, analysis inf wind and waves

Module Two: Marine organisms

In module two, students look at the evolution of life in the ocean and the peculiar flora and fauna that inhabit the various marine habitats from the tiniest one-celled organisms to the largest marine mammals. The primary productivity and the trophic food webs which support all life in the sea will be examined. Students will learn the extraordinary evolutionary adaptation of the marine vertebrates as they evolved from bland animals, 200 million years ago to the fully adapted marine creatures we see today. This module includes a visit to the Marine Protected Area of Punta Campanella with a special program to study benthic primary producers on-field, with marine excursion (snorkeling with mask and fins) and microscope laboratory.

- A. Life in a fluid medium
- B. Marine organisms' classification (spatial, taxonomic and trophic)
- C. The microbial world
- D. Primary producers: phytoplankton, seaweeds, plants
- E. Marine invertebrates
- F. Marine fishes

G. Marine reptiles-birds

H. Marine mammals

Lecture hours: 16 hrs

Laboratories (18 hrs)

3. Intertidal zone – 3h, outdoor – Analysis of different tide pools, measures of temperature and

salinity, organisms' survey

4. First field trip – 6h, outdoor – Snorkeling excursion and analysis on spotted organisms

5. Into the blue – 3h, outdoor – Discovery Scuba Diving

6. Organisms' anatomy – 3h, indoor – Organisms' anatomy, different

phylums/Classes and different

Structures/Strategies

7. Primary production – 3h, Analysis, biometric measures and sketching of seagrass (Posidonia

oceanica), seaweed (samples of algae) and associated fauna to identify with microscopes and guides

- Mid-term Evaluation

Module Three: Marine ecosystems

In module three, students will deepen their knowledge of the various marine ecosystems and the peculiar relationships among the different species that inhabit these environments.

A. Introduction to marine ecology

B. Intertidal communities

C. Estuaries

D. Coral Reefs

E. Continental shelf and neritic zone

F. Open sea

G. Deep ocean

H. Polar Environments

Lecture hours: 10 hrs

Laboratories (12 hrs)

8. Spatial distribution and migration – 3h, indoor – Analysis of organisms' behavior with photos/maps and ecosystems/biomes

9. 2nd field trip – 6h, outdoor – Snorkeling and kayaking trip in Ieranto Bay – marine protected area, analysis of organisms' behavior, underwater photography and sketching
10. Ecological index – 3h, indoor – data analysis of flora and fauna spotted during the field trip

Module Four: Human and the Sea

The final module looks at fisheries and the food we obtain from the sea and discusses the main food species along with the impacts of over-fishing. Students will learn about ocean pollution, toxic pollutants, sewage and marine debris which are degrading the ocean and how the animals of the sea are coping with the circumstances. This module includes a case study on a threatened species with the visit to the Sea Turtle Rescue Center of the Zoological Station Anthon DOhrn, where students will meet the team of biologists and veterinaries that have are daily dealing with human impacts on marine megafauna.

- A. Harvesting of the ocean's resources
- B. Pollution and coastal development
- C. Biological invasion and global warming
- D. Case study: Mediterranean loggerhead turtle population

Lecture hours: 9h

Laboratories (15 hrs)

11. 3rd field trip – 6h, outdoor – Excursion to the Marine Protected Area visitor center, meeting with fishermen in Marina della Lobra
12. Street activity – 6h, outdoor – Delivering interviews and questionnaires about marine conservation, data analysis
13. Case study: Sea turtles of the Mediterranean Sea – 3h, indoor – Visit to the Sea Turtle Rescue Center at the “Anthon Dohrn Zoological Station

- Final Exam

TEXTS

- J. Morrissey, J. Sumich, Introduction to the Biology of Marine Life, Jones and Bartlett Publishers, Inc, latest edition.
- E. Norse, L. Crowder, Marine Conservation Biology: The Science of Maintaining the Sea's Biodiversity, Island Press, latest edition.
- M. Speight, Martin, P. Henderson, Marine Ecology: Concepts and Applications, Wiley-Blackwell, latest edition.

Assessment

20%: Mid Term Evaluation

25%: Presentations

25%: Attendance and Participation

30%: Final Exam

Grading System

A 95%-100%

A- 90%-94%

B+ 87%-89%

B 83%-86%

B- 80%-82%

C+ 77%-79%

C 73%-76%

C- 70%-72%

D+ 67%-69%

D 63%-66%

D- 60%-62%

F under 60

Attendance:

You are allowed two unexcused absences. Documentation for any other absence MUST be produced and APPROVED by the professor or the Director. For absences due to illness, please provide the professor with a doctor's note upon returning to class as well as inform them and/or the school the first day of illness. Each unexcused absence after the second will reduce your grade by 3 percentage points. Late submissions: Assignments not submitted by the due date will receive a penalty of 10% for the first 24 hours, 20% for a 48-hour delay. No submissions will be accepted more than 3 days after the deadline, unless arrangements have been made with the instructor (for extensions under exceptional circumstances, apply to the course instructor).

Note: when the missed lesson is a field-trip, it counts as two absences.

Personal Technology:

Please turn cell phones off during class. Laptops may be used to take notes, however social networking, e-mailing, surfing the Internet, playing games, etc. are absolutely forbidden during class. Any student caught doing the aforementioned activities during class will be asked to turn off their cell phones and/or

computers. Repeated violations of this rule after the first warning will result in the student being marked absent for the day and permanently losing their laptop privileges. Be respectful; the use of personal electronic devices during class is limited to academic purposes.

Contesting a grade:

If students wish to contest a grade, they must make an appointment to do so in person. The student should contact the instructor with any concerns within ONE week of receiving the grade. The student must also demonstrate that they have read the comments accompanying the grade by presenting a brief written statement specifying why the grade does not reflect the quality of the work. It is at the discretion of the instructor to decide whether the work and the student's request warrant any increase or decrease in the grade. Students should retain a copy of all submitted assignments and feedback (in case of loss) and should also retain all of their marked assignments.

Academic Honesty Statement:

Academic dishonesty is NOT tolerated in this course. Academic honesty is not only an ethical issue but also the foundation of scholarship. Cheating and plagiarism are therefore serious breaches of academic integrity. If you refer to someone else's work, appropriate references and citations must be provided.