



METHODS AND TECHNIQUES OF UNDERWATER ECOLOGY

Enrollment year	2018/2019
Academic year	2019/2020
Regulations	DM270
Department	DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES
Course	NATURAL SCIENCES
Curriculum	PERCORSO COMUNE
Year of study	2°
Period	2nd semester (02/03/2020 - 12/06/2020)
ECTS	6
Language	Italian
Prerequisites	<p>MODULE 1: Basic ecological knowledge on the main factors regulating the distribution and abundance of organisms in aquatic environments. Basic zoological knowledge on the main marine taxonomic groups.</p> <p>MODULE 2: Basic knowledge of physics (force, pressure, density, volume, speed)</p> <p>Basics water skills are required (floating without external supports, crawl, breaststroke)</p>
Learning outcomes	The specific objectives of the two modules are reported in the corresponding forms
Course contents	The content of the two modules is reported in the specific forms
Teaching methods	<p>MODULE 1: Lessons: 16h Lab practice: 12h</p> <p>MODULE 2: Lessons: 16 h Practical activities: 14 h</p>

Reccomended or required readings

CMAS P1-Manual

Supplementary material and power point presentations will be available on the moodle platform KIRO.

Assessment methods

The exam is composed by a written text (multiple choice + open-ended questions).

Improvements done during the practical activity in water will be subject to continuous evaluation

The activity is split

509046 - **METHODS AND TECHNIQUES OF UNDERWATER ECOLOGY MOD 1**

509047 - **METHODS AND TECHNIQUES OF UNDERWATER ECOLOGY MOD 2**



METHODS AND TECHNIQUES OF UNDERWATER ECOLOGY MOD 1

Enrollment year	2018/2019
Academic year	2019/2020
Regulations	DM270
Academic discipline	BIO/07 (ECOLOGY)
Department	DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES
Course	NATURAL SCIENCES
Curriculum	PERCORSO COMUNE
Year of study	2°
Period	(02/03/2020 - 12/06/2020)
ECTS	3
Lesson hours	28 lesson hours
Language	Italian
Activity type	WRITTEN TEST
Teacher	FERRARIO JASMINE - 3 ECTS
Prerequisites	Basic knowledge of Ecology and Zoology is required, in particular on the following topics: main factors that regulate the abundance and distribution of organisms in aquatic environments; main marine taxonomic groups.
Learning outcomes	<p>KNOWLEDGE AND UNDERSTANDING:</p> <p>The course aims to explain the different sampling techniques used to understand ecological phenomena in marine environments and their application for the conservation of the seas and oceans (Goal 14 of the UN AGENDA 2030 for Sustainable Development).</p> <p>APPLIED KNOWLEDGE AND UNDERSTANDING:</p> <p>One of the aims of the course is to train students in developing a sampling design, recognizing the most common species of benthic macroinvertebrates and fish, applying different sampling techniques in the field, as well as learning the use of a software for the analysis of images for the evaluation of the covering of benthic populations.</p>

In addition, this course aims to make students more aware about the UN AGENDA 2030 for Sustainable Development goals, with particular regard to Goal 14: "Conserve and sustainably use the oceans, seas and marine resources for sustainable development".

AUTONOMY OF JUDGMENT:

The autonomy of judgment will be developed through laboratory and field activities, learning the organization of a sampling from the beginning to the end, evaluating the critical issues and finally analyzing the data collected.

COMMUNICATION SKILLS:

During the course, attention will be paid to the student's ability to communicate a case study in the ecological field, starting from the aim of the work up to the discussion of the results.

ABILITY TO LEARN:

Given the practical purpose of this course, students will manage to operate directly in the water, learning the most efficient sampling techniques for a specific case study.

Course contents

The course is composed by theoretical lectures, laboratory activities and one final field survey at the sea, in co-presence to the Module 2.

The theoretical lectures, which will illustrate the main underwater sampling methods, will address the following topics:

- Introduction to marine ecology: benthos, plankton and necton; marine habitats and zonation in the Mediterranean Sea; main adaptations of marine organisms in rocky and soft bottoms
- Identification of marine invertebrates
- Elaboration of an experimental design and analysis of hypotheses in ecology
- Benthos underwater sampling techniques
- Underwater sampling techniques of marine phanerogams
- Visual census of fish fauna
- Underwater sampling techniques in geology
- Presentation of the objectives of the UN AGENDA 2030 with particular reference to Goal 14; Volunteering and citizen science.

The laboratory activities will allow the students to learn how to recognize target species, in order to facilitate that sampling in the field.

Furthermore, laboratories will be also dedicated to data analysis: assessment of the percentage coverage of benthic sessile species and statistical analysis on marine community's data.

During the field work it will be possible to try different sampling techniques in snorkeling.

Teaching methods

Theoretical lectures (hours/year): 16

Laboratory activities (hours/year): 12

Attendance at the theoretical lectures is strongly recommended, while for the laboratory activity is mandatory.

Reccomended or required readings

The material will be provided on the KIRO platform: presentations (in pdf), chapters of books, scientific papers and other material.

Suggested books for consultation:

- "Biologia Marina" - Castro & Huber, Mcgraw-Hill Editore
- "Manuale di metodologie di campionamento e studio del benthos marino" - Gambi & Dappiano 2003, Biologia Marina Mediterranea 10(1):

	<p>638 pp.</p> <p>- "L'immersione scientifica - Tecniche di indagine subacquea" - Colantoni, La Mandragora Editrice, 144 pp.</p>
Assessment methods	<p>The exam is composed by a written test, composed by both open-ended questions and multiple choice.</p>
Further information	
Sustainable development goals - Agenda 2030	<p>\$bl legenda sviluppo sostenibile</p>



METHODS AND TECHNIQUES OF UNDERWATER ECOLOGY MOD 2

Enrollment year	2018/2019
Academic year	2019/2020
Regulations	DM270
Academic discipline	FIS/03 (MATERIAL PHYSICS)
Department	DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES
Course	NATURAL SCIENCES
Curriculum	PERCORSO COMUNE
Year of study	2°
Period	(02/03/2020 - 12/06/2020)
ECTS	3
Lesson hours	30 lesson hours
Language	Italian
Activity type	WRITTEN TEST
Teacher	MINZIONI PAOLO (titolare) - 3 ECTS
Prerequisites	<p>Basic knowledge of physics (force, pressure, density, volume, speed)</p> <p>Basics water skills are required (floating without external supports, crawl, breaststroke)</p>
Learning outcomes	<p>KNOWLEDGE AND UNDERSTANDING: The course will explain how the water influences different physical phenomena as wave propagation, heat transmission and gas behavior</p> <p>APPLYING KNOWLEDGE AND UNDERSTANDING: One of the course targets is to develop students ability to apply the theoretical concepts explained during the lessons to scuba-diving.</p> <p>MAKING JUDGEMENTS:</p>

	<p>Students will develop the ability to analyze pros and cons of different behaviours in theoretical scenarios. Additionally they will also be asked to continuously self-evaluate their performance during the in-water practical activities</p> <p>COMMUNICATION: Specific attention will be paid to the use of proper terms in verbal communication, and at the same time the importance of clear gestural communication underwater will be highlighted</p> <p>LIFELONG LEARNING SKILLS: A fundamental target of the course is making the students able to adapt their behavior according to the events and to the possible changes of underwater conditions.</p>
Course contents	<p>The course is divided in three parts: lessons which will be carried out in the classroom, practical activities in the swimming pool, practical activities in the sea.</p> <p>Theoretical lessons will be dedicated to explain new concepts, while stressing their consequences for the practical activities.</p> <p>On the other side, practical activities will focus on two objectives: 1) Experimental demonstration of previously described phenomena 2) Giving the students all the information required to carry out underwater surveys in safety conditions</p>
Teaching methods	<p>Lessons: 16 h/year Practical activities: 14 h/year</p>
Recommended or required readings	<p>CMAS P1-Manual</p>
Assessment methods	<p>The exam is composed by a written text (multiple choice + open-ended questions). Improvements done during the practical activity in water will be subject to continuous evaluation</p>
Further information	
Sustainable development goals - Agenda 2030	<p>\$Ibl legenda sviluppo sostenibile</p>