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1. Course guide and organization

The 18-month duration MSc curriculum in Applied Ecology - Management of Ecosystems and Biological Resources consists of six (6) compulsory courses that are divided into two (2) semesters (Table 1), as well as the implementation and evaluation of the MSc thesis (corresponding to 40 ECTS) during the second and third semester.

Table 1. Course allocation in semesters, including teaching stuff, hours and ECTS.

<table>
<thead>
<tr>
<th>No</th>
<th>Course</th>
<th>Teaching stuff (including scientific area of interest)</th>
<th>Number of hours</th>
<th>Credits (ECTS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st semester</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Sampling Design, Environmental Data Analysis and Ecological Models</td>
<td>Koutsikopoulos K. (Professor in Marine Ecology and Fishery Resources) Giokas S. (Professor in Biodiversity and development of terrestrial organisms) Tzanatos E. (Assistant Professor in Marine Ecology and Fisheries Management)</td>
<td>30</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>Biodiversity assessment and monitoring of species and habitats</td>
<td>Giokas S. (Professor in Biodiversity and development of terrestrial organisms) Dimopoulos P. (Professor in Herbal and Ecology) Panitsa M. (Associate Professor in Flora and Phytogeography) Dimitrellos G. (PhD, Laboratory Teaching stuff, in Ecology and Forestry) Mitsainas G. (Lecturer in Mammal Biodiversity) Spanou S. (PhD, Laboratory Teaching stuff, in Herbal and Ecology)</td>
<td>30</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>Environmental Planning and Management of Natural Areas</td>
<td>Papastergiadou E. (Professor, in Plant Ecology and Inner Water Habitat Management) Dimopoulos P. (Professor in Herbal and Ecology) Panitsa M. (Associate Professor in Flora and Phytogeography) Mitsainas G. (Assistant Professor in Mammal Biodiversity) Dimitrellos G. (PhD, Laboratory Teaching stuff, in Ecology and Forestry) Spanou S. (PhD, Laboratory Teaching stuff, in Herbal and Ecology)</td>
<td>30</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>Fish population Dynamics and Management of Marine Biological Resources</td>
<td>Koutsikopoulos K. (Professor in Marine Ecology and Fishery Resources) Makridis, P. (Associate Professor, in Aquaculture) Tzanatos E. (Assistant Professor in Marine Ecology and Fisheries Management)</td>
<td>30</td>
<td>8</td>
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<tr>
<td>2nd semester</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Assessment and management of aquatic ecosystems</td>
<td>Papastergiadou E. (Professor, in Plant Ecology and Inner Water Habitat Management) Makridis, P. (Associate Professor, in Aquaculture) Dailianis S. (Associate Professor, in Aquatic Toxicology)</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>The Impact of Environmental Stresses on the Mediterranean Plants</td>
<td>Grammatikopoulos G. (Associate Professor, in Plant Physiology) Petropoulou G. (Associate Professor, in Plant Physiology) Adamidis G. (Assistant Professor, in Functional Plant Biology)</td>
<td>30</td>
<td>10</td>
</tr>
</tbody>
</table>

The 1st semester is implemented from the beginning of November to the middle of February of the next year, including exams in each course, followed by the 2nd semester till April. During the curriculum, seminars will be scheduled by invited instructors from different national and international institutes.

Repeat exams in each course are commonly performed in September, after the completion of both semesters.
After the completion of teaching courses, all MSc students are asked to implement their diploma thesis in order to complete their studies (duration 12 months), after consultation with a member of the teaching stuff (supervisor).

2. Description and Content of Courses

2.1 Sampling Design, Environmental Data Analysis and Ecological Models


2.2 Biodiversity assessment and monitoring of species and habitats


**Syllabus:** Basic concepts and principles, at different levels (from genes to ecosystems), biodiversity patterns with emphasis on plant diversity. World, Mediterranean and Greek biodiversity centers. Directive 92/43 / EU and the ecological network of protected areas Natura 2000. The National Biodiversity Strategy and Action Plan for Greece. Methods and techniques for sampling and measuring Biodiversity. Methods and techniques for analyzing Biodiversity parameters. Methodology and results of monitoring and assessment of habitats’ conservation status. Methodology and results of monitoring and assessment of plant species conservation status. Species and habitat types databases, Geographic databases. Case studies from the Greek territory and Mediterranean area / Biodiversity and monitoring of plant taxa in island ecosystems. IUCN Criteria, Red Data Lists. Field sampling protocols to monitor and assess flora and fauna species conservation status. Field sampling protocols to monitor and assess habitat types’ conservation status.

2.3 Environmental Planning and Management of Natural Areas


**Syllabus:** Principles, goals and methodology for the organization of management plans. Monitoring of protected areas. Organization and effectiveness of management plans for natural areas, habitats and

2.4 Fish population Dynamics and Management of Marine Biological Resources


2.5 Assessment and management of aquatic ecosystems


2.6 The Impact of Environmental Stresses on the Mediterranean Plants

**Abstract:** Functional adaptations of plants to the Mediterranean environment. Main factors of environmental stress and methods for assessing their impact. The impact of climate change on the Mediterranean plants.

3. Course outlines

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>NATURAL SCIENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACADEMIC UNIT</td>
<td>BIOLOGY</td>
</tr>
<tr>
<td>LEVEL OF STUDIES</td>
<td>POSTGRADUATE</td>
</tr>
<tr>
<td>COURSE CODE</td>
<td>GBIO_OKYA1</td>
</tr>
<tr>
<td>SEMESTER</td>
<td>1st</td>
</tr>
<tr>
<td>COURSE TITLE</td>
<td>Sampling Design, Environmental Data Analysis and Ecological Models</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INDEPENDENT TEACHING ACTIVITIES</th>
<th>WEEKLY TEACHING HOURS</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures, Laboratory Exercises</td>
<td>10 (3 lectures + 7 laboratory exercises)</td>
<td>7</td>
</tr>
</tbody>
</table>

| COURSE TYPE | Specialised general knowledge, 2) skills development |
| PREREQUISITE COURSES | NO. Formally, there are no prerequisite courses. Nevertheless, a good knowledge of ecology and some expertise of basic statistics is recommended |
| LANGUAGE OF INSTRUCTION and EXAMINATIONS | Greek |
| IS THE COURSE OFFERED TO ERASMUS STUDENTS | NO |
| URL | |

Learning outcomes

At the end of the course, students should be able to: (1) formulate valid scientific questions and hypotheses about the ecology of organisms, (2) understand sampling methods and strategies, (3) to design ecological experiments and sampling, (4) to analyze ecological data according to query and data type, (5) understand the concepts and types of ecological models, (6) to construct ecological models.

General Competences

At the end of the course, students will have developed the following skills: (1) ability to design simple yet valid experiments to study the ecology of organisms, (2) ability to analyze primary ecological data, (3) ability to evaluate and present ecological analyses.

Teaching and Learning methods-Evaluation

DELIVERY | Face to Face |
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY | (1) Use of computers and special software during the course by the instructors and the students.  
(2) Support of educational procedure with use of the e-class electronic platform. |

<table>
<thead>
<tr>
<th>TEACHING METHODS</th>
<th>Activity</th>
<th>Semester workload</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures (3 weeks x 3 hours per week)</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Laboratory Exercises (3 weeks x 7 hours per week)</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Home study</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>Course total (25 hours per one ECT)</td>
<td>175</td>
<td></td>
</tr>
</tbody>
</table>
### STUDENT PERFORMANCE EVALUATION

Preparation and Presentation of Laboratory Exercises (at the end of the semester)

Grading scale: 1-10. Passing grade: 5
Grading: 3 correspond to ECTS grade F. Grade 4 corresponds to ECTS grade FX.

Passing grades correspond to ECTS grades as follows: 5=E, 6=D, 7=C, 8=B, 9=A

### Attached bibliography


<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>NATURAL SCIENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACADEMIC UNIT</td>
<td>BIOLOGY</td>
</tr>
<tr>
<td>LEVEL OF STUDIES</td>
<td>POSTGRADUATE</td>
</tr>
<tr>
<td>COURSE CODE</td>
<td>G BIO_OKYA2</td>
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<tr>
<td>SEMESTER</td>
<td>1st</td>
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<tr>
<td>COURSE TITLE</td>
<td>Biodiversity Assessment and biomonitoring of species and habitats</td>
</tr>
<tr>
<td>INDEPENDENT TEACHING ACTIVITIES</td>
<td></td>
</tr>
<tr>
<td>Lectures, Laboratory Exercises</td>
<td>30</td>
</tr>
<tr>
<td>COURSE TYPE</td>
<td>1) Specialised general knowledge, 2) skills development</td>
</tr>
<tr>
<td>PREREQUISITE COURSES</td>
<td>NO. Formally, there are no prerequisite courses. Nevertheless, a basic knowledge of General Biology, Botany and Zoology, Mapping of species and habitats is recommended.</td>
</tr>
<tr>
<td>LANGUAGE OF INSTRUCTION and EXAMINATIONS</td>
<td>Greek</td>
</tr>
<tr>
<td>IS THE COURSE OFFERED TO ERASMUS STUDENTS</td>
<td>NO</td>
</tr>
<tr>
<td>URL</td>
<td><a href="https://eclass.upatras.gr/courses/BIO334/">https://eclass.upatras.gr/courses/BIO334/</a></td>
</tr>
</tbody>
</table>

### Learning outcomes

At the end of the course, the student will be able to: 1) understand the basic concepts of surveillance, monitoring of species and habitat types in the context of implementing the relevant European Union Directives, 2) have the knowledge of the methodologies for implementing monitoring plans for species and habitats in different types of ecosystems; 3) understand the methods of assessing the conservation status of species and habitat and collect data in the field based on standardized protocols for the assessment of pressures/threats and structures and functions regarding habitat types, as well as for the assessment of population parameters and pressures/threats for plant and animal species, 4) strengthen his/her efficiency to compile information in a coherent system/unit.

### General Competences

At the end of the course, the student will have developed the following skills: 1) Ability to demonstrate knowledge and understanding of essential data, concepts and theories of monitoring and assessment of species’ and habitats’ conservation status, 2) Ability to apply this knowledge and understanding of the results of the assessment of conservation status and their link to management issues for the conservation of species and habitats within the targeted integrated nature conservation in protected areas 3) Ability to collaborate with others on interdisciplinary environmental issues; 4) Research and study skills needed for continuous professional development.

### Teaching and Learning methods-Evaluation

#### DELIVERY

Face to Face

#### USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

(1) Use of computers and special software during the course by the instructors and the students.
(2) Support of educational procedure with use of the e-class electronic platform.
### TEACHING METHODS

<table>
<thead>
<tr>
<th>Activity</th>
<th>Semester workload</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>35</td>
</tr>
<tr>
<td>Laboratory Exercises</td>
<td>10</td>
</tr>
<tr>
<td>Literature study</td>
<td>55</td>
</tr>
<tr>
<td>Writing project</td>
<td>55</td>
</tr>
<tr>
<td>Home study</td>
<td>45</td>
</tr>
<tr>
<td><strong>Course total</strong></td>
<td><strong>200</strong></td>
</tr>
</tbody>
</table>

**Course total (25 hours per one ECT)**

### STUDENT PERFORMANCE EVALUATION

Elaboration & Presentation of Laboratory Exercises (at the semester’s end)
- Grading scale: 1-10. Passing grade: 5
- Grading: 3 correspond to ECTS grade F. Grade 4 corresponds to ECTS grade FX.
- Passing grades correspond to ECTS grades as follows: 5=E, 6=D, 7=C, 8=B, 9=A

### Attached bibliography


## SCHOOL

**NATURAL SCIENCES**

## ACADEMIC UNIT

**BIOLOGY**

## LEVEL OF STUDIES

**POSTGRADUATE**

## COURSE CODE

**GBIO_OKYA3**

## SEMESTER

| 1st |

## COURSE TITLE

Environmental Planning and Management of Natural Areas

### INDEPENDENT TEACHING ACTIVITIES

<table>
<thead>
<tr>
<th>Lectures, Laboratory Exercises</th>
<th>WEEKLY TEACHING HOURS</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

## COURSE TYPE

1) Specialised general knowledge, 2) skills development

## PREREQUISITE COURSES

NO. Formally, there are no prerequisite courses. Nevertheless, a basic knowledge of General Biology, Botany and Zoology is recommended.

## LANGUAGE OF INSTRUCTION and EXAMINATIONS

Greek

## IS THE COURSE OFFERED TO ERASMUS STUDENTS

NO

## URL

https://eclass.upatras.gr/courses/BIO317/

### Learning outcomes

By the end of the course each student will be able: (1) Understand the basic principles of organization and management of protected areas, the policy for nature and the Directives of European Union, 2). Gain knowledge for environmental strategic plan, the national conservation and management for nature and biodiversity, as well as the new qualifications for the implementation of Management Plans, 3). Apply the sustainable management principles in the implementation of Management Plans in NATURA 2000 sites and management of natural resources, 4). Strengthen their efficiency to compile information in a coherent system/unit.

### General Competences

At the end of the course each student will be able: (1) Ability to demonstrate knowledge and understanding of essential facts, concepts, principles and theories of Ecology and Management of Natural ecosystems and areas.
2. Ability to apply such knowledge and understanding to the solution of environmental conservation and Management issues, 3). Ability to interact with others on environmental multidisciplinary problems e.g. as a staff of Management Bodies of protected areas, 4). Study skills needed for continuing professional development.

### Teaching and Learning methods-Evaluation

<table>
<thead>
<tr>
<th>DELIVERY</th>
<th>Face to Face</th>
</tr>
</thead>
</table>
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** | (1) Use of computers and special software during the course by the instructors and the students.  
(2) Support of educational procedure with use of the e-class electronic platform. |
| **TEACHING METHODS**         | Activity          | Semester workload |
|                               | Lectures          | 24               |
|                               | Laboratory Exercises | 6              |
|                               | Literature study   | 50               |
|                               | Writing project    | 50               |
|                               | Home study         | 45               |
|                               | **Course total (25 hours per one ECT)** | **175**         |

### STUDENT PERFORMANCE EVALUATION

- Elaboration & Presentation of Laboratory Exercises (at the semester's end)
- Grading scale: 1-10. Passing grade: 5
- Grading: 3 correspond to ECTS grade F. Grade 4 corresponds to ECTS grade FX.
- Passing grades correspond to ECTS grades as follows: 5=E, 6=D, 7=C, 8=B, 9=A

### Attached bibliography

- Οδηγία 79/409/ΕΟΚ. «Περί διατηρήσεως των αγρίων πτηνών».
- Οδηγία 92/43/ΕΟΚ. «Για τη διατήρηση των φυσικών οικοτόπων καθώς και της άγριας πανίδας και χλωρίδας».
- Παπαστεργιάδου Ε., Τσιαούση Β., Ντάφης Σ., και Γκατζογιάννης Σ. 1995. Προδιαγραφές σύνταξης ολοκληρωμένων διαχειριστικών σχεδίων προστατευόμενων περιοχών. Ελληνικό Κέντρο Βιοτόπων Υγροτόπων (ΕΚΒΥ), 51 σελ.
EVALUATION
STUDENT PERFORMANCE
TEACHING METHODS
COMMUNICATIONS
USE OF INFORMATION AND DELIVERY
Teaching and Learning methods
environment
metadata
management
At their affect assessments fisheries protocols the regarding an " 
Learning outcomes
By the end of the course each student will be able: (1) to know the structure and the functioning of the system "fisheries" (fishing gears, technical characteristics, relevant administration structures and scientific bodies) with an emphasis on Mediterranean and Greek fisheries, (2) to set and to make reasonable scientific questions regarding fish stock dynamics and state hypotheses regarding the effects of human exploitation, (3) to understand the methods of sampling for fisheries data and to be able to design sampling strategies and prepare sampling protocols, (4) to analyze fisheries data as well as study and answer questions regarding fish stock dynamics and fisheries management, (5) to understand the concepts and the different approaches used in fish stock assessments, (6) to be familiar with the various types of fisheries management measures and how they may affect fish stocks and the entire system of fisheries and (7) to comprehend basic principles of fish ethology and their applications in aquaculture.

General Competences
At the end of the course each student will be able: (1) to design and manage projects (related with the study and management of fisheries), (2) to work independently and in a team, (3) to search for, analyse and synthesize data, metadata and information, with the use of the necessary technology and (4) to work in an interdisciplinary environment.

Teaching and Learning methods-Evaluation
DELIVERY
Face to Face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
(1) Use of computers and special software during the course by the instructors and the students.
(2) Support of educational procedure with use of the e-class electronic platform.

TEACHING METHODS
Activity Semester workload
Lectures (3 weeks x 8 hours per week) 24
Laboratory exercises (3 weeks x 2 hours per week) 6
Home study 170
Course total (25 hours per one ECT) 200

STUDENT PERFORMANCE EVALUATION
Elaboration & Presentation of Laboratory Exercises (at the semester's end)
Grading scale: 1-10. Passing grade: 5
Grading: 3 correspond to ECTS grade F. Grade 4 corresponds to ECTS grade FX.
Passing grades correspond to ECTS grades as follows: 5=E, 6=D, 7=C, 8=B, 9=A
### Learning outcomes
The main objective of the course is to acquire the necessary knowledge as well as the appropriate methodological approaches related to the rational assessment and management of aquatic ecosystems. At the end of the course, the student will be able to (a) assess the risks posed by aquatic ecosystems, (b) use appropriate tools to deal with ecological risks, (c) apply the legislative framework (WFD 2000/60EE Framework Directive), (d) to implement appropriate methodological approaches for assessing the health status of aquatic ecosystems, and (e) to propose solutions and strategies for ensuring the sustainable development/management of aquatic ecosystems.

### General Competences
At the end of the lesson, the degree-holder will have developed the following General Skills:
- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Decision-making
- Working independently
- Team work
- Working in an international environment
- Working in an interdisciplinary environment
- Project planning and management
- Respect for the natural environment
- Criticism and self-criticism
- Production of free, creative and inductive thinking.

### Teaching and Learning methods-Evaluation
DELIVERY
Face to Face

USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
(1) Use of computers and special software during the course by the instructors and the students.
(2) Support of educational procedure with use of the e-class electronic platform.

<table>
<thead>
<tr>
<th>TEACHING METHODS</th>
<th>Activity</th>
<th>Semester workload</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lectures</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Laboratory practice</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Literature study</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Writing project</td>
<td>50</td>
</tr>
</tbody>
</table>
STUDENT PERFORMANCE EVALUATION

Written exams or project presentation (at the semester's end), in Course theory, accounting for the 100% of the Final Grade.

Grading scale: 1-10. Passing grade: 5
Grading: 3 correspond to ECTS grade F. Grade 4 corresponds to ECTS grade FX. Passing grades correspond to ECTS grades as follows: 5=E, 6=D, 7=C, 8=B, 9=A

Attended bibliography


Learning outcomes

At the end of the course the student is expected to have assimilated (1) the basic functional adaptations of plants to the stresses of the Mediterranean climate, (2) the main environmental stressors and methods for their assessment, (3) the effects of climate change on the Mediterranean plants. In addition, upon the course completion he / she will be able to analyze and present a research topic of the course subjects as well as to design a research project for its approach.

General Competences

At the end of the lesson, the degree-holder will have developed the following General Skills:

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently

Scientific journals of interest:

Aquatic Ecology
Freshwater biology
Hydrobiologia
Science of Total Environment
Water
Water Resources Management
- Production of free, creative and inductive thinking

### Teaching and Learning methods-Evaluation

<table>
<thead>
<tr>
<th>DELIVERY</th>
<th>Face to Face</th>
</tr>
</thead>
</table>
| USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY | (1) Use of computers and special software during the course by the instructors and the students.  
(2) Support of educational procedure with use of the e-class electronic platform. |
<table>
<thead>
<tr>
<th>TEACHING METHODS</th>
<th>Activity</th>
<th>Semester workload</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Independent study and analysis of bibliography</td>
<td>102</td>
<td></td>
</tr>
<tr>
<td>Study, preparation, presentation of independent project</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td><strong>Course total (25 hours per one ECT)</strong></td>
<td>250</td>
<td></td>
</tr>
</tbody>
</table>

### STUDENT PERFORMANCE EVALUATION

Evaluation language: Greek  
Methods of evaluation:  
- written examination with multiple choice questions  
- oral examination of individual work  
Grading scale: 1-10. Passing grade: 5  
Grading: 3 correspond to ECTS grade F. Grade 4 corresponds to ECTS grade FX.  
Passing grades correspond to ECTS grades as follows: 5=E, 6=D, 7=C, 8=B, 9=A

### Attached bibliography

- Plant Growth and Climate Change James I. L. Morison, Michael D. Morecroft. *Willey 2008*  
- Selected papers