# COURSE OUTLINE

## (1) GENERAL

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| **SCHOOL** | NATURAL SCIENCES | | |
| **ACADEMIC UNIT** | BIOLOGY | | |
| **LEVEL OF STUDIES** | UNDER GRADUATE | | |
| **COURSE CODE** | BIO_HE15 | **SEMESTER** | 6/8 |
| **COURSE TITLE** | ENVIRONMENTAL POLLUTION | | |

| **INDEPENDENT TEACHING ACTIVITIES** *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits* | **WEEKLY TEACHING HOURS** | **CREDITS** |
|---|---|---|
| Lectures and laboratory exercises (interactive teaching; problem-based learning) | 3 | 6 |
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| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).* | | |

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| **COURSE TYPE** *general background, special background, specialised general knowledge, skills development* | *General background, specialised general knowledge, skills development* |
| **PREREQUISITE COURSES:** | Students with basic knowledge in the fields of Ecology, Organic and Inorganic Chemistry, Plant and Animal Physiology. |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes |
| **COURSE WEBSITE (URL)** | https://eclass.upatras.gr/courses/BIO210/ |

## (2) LEARNING OUTCOMES

**Learning outcomes**

*The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.*

*Consult Appendix A*

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

Elective undergraduate course that aims to acquire general knowledge on environmental pollution management issues.

**Within the course the students will acquire the necessary knowledge related to:**

→ the most important categories of pollutants/contaminants
→ the entrance of chemical substances/pollutants into the environment
→ the effects of pollutants on different levels of organism function (cellular, biochemical, molecular).

**The aim of the course is to inform students about:**

→ the current knowledge about the environmental status of ecosystems both in Mediterranean area and Greece
→ the strategies that should be performed for assessing the health status of aquatic ecosystems (e.g. chemical and biological monitoring)
→ the different stages/processes of urban and industrial wastes treatment
→ the Renewable Energy Sources (RES) as well as their role as alternative and environmentally friendly energy saving solutions
→ the basic principles of (eco)-toxicology, via students' involvement in the implementation of simulation exercises (e.g. toxicity tests, using microalgae and organisms-bioindicators, water quality analysis, etc.).

**The current course will enable students to:**

→ interpret various phenomena related to the presence of pollutants in the environment (eutrophication, greenhouse effect, ozone hole, etc.)

→ understand basic phenomena, commonly related with the presence and the effects of environmental pollutants (e.g. bioaccumulation, etc.)
→ understand and apply water quality analysis methods
→ know the main processes commonly performed in Waste Water Treatment Plants (WWTPs)
→ suggest solutions and strategies for assessing environmental issues commonly related with the presence of pollutants

acquire the appropriate skills for conducting inter-scientific collaborations for assessing environmental pollution issues.

## General Competences

*Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?*

*Search for, analysis and synthesis of data and information, with the use of the necessary technology*
*Adapting to new situations*
*Decision-making*
*Working independently*
*Team work*
*Working in an international environment*
*Working in an interdisciplinary environment*
*Production of new research ideas*
*Project planning and management*
*Respect for difference and multiculturalism*
*Respect for the natural environment*
*Showing social, professional and ethical responsibility and sensitivity to gender issues*
*Criticism and self-criticism*
*Production of free, creative and inductive thinking*
*……*
*Others…*
*…….*

**After the end of the current course, the degree-holder will be able to:**

→ search, analyze and synthesize biological data, using the necessary technologies
→ make the appropriate decisions, regarding the scientific approach of environmental issues
→ work in international and interdisciplinary environment
→ plan and manage environmental projects
→ respect and protect and natural sources

produce free. Creative and inductive thinking.

## (3) SYLLABUS

Environmental pollution; Pollutants and xenobiotic compounds; Environmental transport and fate of pollutants; Pollutants' effects on biota (organism behavior, cellular, biochemical and molecular effects); Environmental status of Mediterranean area and Greece (socio-economic effects of pollution); Monitoring strategies of pollution (chemical monitoring and biomonitoring); Wastewater Treatment Plant processes; Renewable Energy Sources (RES) and Environment.

## (4) TEACHING and LEARNING METHODS - EVALUATION

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|---|---|
| **DELIVERY**<br>*Face-to-face, Distance learning, etc.* | Face-to-face and interactive teaching (problem-based learning teaching method/PBL). |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY**<br>*Use of ICT in teaching, laboratory education, communication with students* | Using information and communication technologies (powerpoint presentations and video animation) during the teaching process. |
| **TEACHING METHODS**<br>*The manner and methods of teaching are described in detail.*<br>*Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.*<br><br>*The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS* | See table below |
| **STUDENT PERFORMANCE EVALUATION**<br>*Description of the evaluation procedure*<br><br>*Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other*<br><br>*Specifically-defined evaluation criteria are given, and if and where they are accessible to students.* | Student evaluation is implemented in Greek language. Specifically, the evaluation includes:<br>→ Students' participation in interactive teaching courses and preparation of final report in each case<br>→ the evaluation of review papers, optionally assigned by students<br>→ written exams at the end of the semester (including short growth, development, combining questions and exercises).<br><br>Grading scale: 1-10. Passing grade: 5<br>Grading: 3 correspond to ECTS grade F. Grade 4 corresponds to ECTS grade FX.<br>Passing grades correspond to ECTS grades as follows: 5=E, 6=D, 7=C, 8=B, 9=A. |

| *Activity* | *Semester workload* |
|---|---|
| Lectures (13 x 2 hours) | 26 |
| Interactive teaching courses (PBL; 4 x 1 hours) | 4 |
| Preparation of PBL final report | 12 |
| Preparation and presentation of selected environmental issues/problems (optional)* | 4 |
| Home study | 108 |
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| Course total | **150 (154*)** |

## (5) ATTACHED BIBLIOGRAPHY

*- Suggested bibliography:*


→ Biological effects of environmental Pollutants – Ecotoxicology: experimental approaches and outcomes (university notes; Ass. Prof. Stefanos Dailianis, in Greek).

→ Hill MK 2004. Understanding Environmental Pollution: A Primer (2nd Edition). CUP.

→ Rana SVS 2006. Environmental Pollution: Health and Toxicology. Alpha Science International Ltd.

→ Freedman B 1995. Environmental Ecology, Second Edition: The Ecological Effects of Pollution, Disturbance, and Other Stresses. Academic Press.


*- Related academic journals:*

*Environmental Pollution, Chemosphere, Aquatic Toxicology, Environmental International, Environmental Research.*