## 1. Environmental Pollution

# COURSE OUTLINE

*GENERAL*

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| **SCHOOL** | Maritime and Industrial Studies | | |
| **ACADEMIC UNIT** | Maritime Studies | | |
| **LEVEL OF STUDIES** | Postgraduate | **SEMESTER** | |
| **COURSE CODE** | | 1 | |
| **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 Practical seminars | 3 | 7.5 |

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| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).* | |
| COURSE TYPE *general background, special background, specialised general knowledge, skills development* | GENERAL BACKROUND |
| PREREQUISITE COURSES: | NONE |
| **LANGUAGE OF INSTRUCTION and** EXAMINATIONS: IS THE COURSE OFFERED TO ERASMUS STUDENTS | English<br>Yes |
| COURSE WEBSITE (URL) | https://eclass.unipi.gr |

*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*

- *The main purpose of the course is to introduce students to environmental pollution issues in transport and marine facilities. The course analyses the chemical properties that give elements and substances toxic characteristic and specify the prevention and management interventions necessary.*
- *More specifically, upon successful completion of the course, students will be able to:*
- *Understand the properties of toxic substances and their effects on the environment.*
- *Distinguish the differences between key factors of human activities that affect the environment through waste disposal.*
- *Understand the effects on human health, habitats, biodiversity and the balance of Nature.*
- *Understand the Control Mechanisms that operate and are specified by EU directives and national laws.*
- *Evaluate the effects of toxic substances on biota, air, water, soil.*

- *Define what are the factors that influence the release of toxic substances that have an impact on the environment*
- *Know the international bodies responsible for developing the laws as well as enforcing them.*

- *Critically approach the responsibilities of government bodies and NGOs.*
- *Understand the range of environmental issues and their impact on humans.*
- *Discuss up to date issues pertinent to the Port of Piraeus and the licence to operate*
- *Discuss the responsibilities of local government in ensuring the quality of the environment*

## 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…*
*…….*

*Adapting to new situations and Decision-making*
*Working independently as well as in Teams and groups*
*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*

*SYLLABUS*

- Introduction to water, air and soil pollution. Main pollutants and health effects. Sources of pollution.
- The idea of Sustainability. The Club of Rome. Estimations and projections into future trends in resource depletion, population growth, increase in pollution, Industrial Output, Food Production, etc. Limits to Growth and Agenda 21. New issues to be addressed, loss of Biodiversity, Climate Change, Health effects.
- Pollutant categories. Chemical, Biological, Radiation, Heat, Noise (acoustic), Light. Main subcategories in Chemical pollution (Organic & Inorganic). The smog disaster in London 1952. Professional illnesses and their contribution to understanding pollution effects on human health.
- Heavy metal pollution. Toxic effects of Pb, Cr, Cd, Hg, Cu, As, on humans. Main human organs and systems affected. Enzyme systems that depend on trace elements. Tertiary structure of Hemoglobin
- Heavy metal pollution. Enzyme tertiary structure and dependence on metal oxidation state. Zinc fingers, gene transcription and DNA and mRNA regeneration mechanisms.
- Mercury poisoning. The Minamata case. Special reference to the mechanisms of bioaccumulation, biotransformation and trace element substitutions. Cadmium poisoning Itai-Itai illness. Industrial waste, chemicals, toxins, contaminants, in air, water, or land, Industrial fumes, water contaminants and waste accumulated in landfills. Industrial pollution causes an imbalance in the ecosystem, hampers the health of plants, animals & humans and disturbs the ecology of water bodies, etc.
- Nutrient pollution effects of basic nutrients on marine biodiversity. Organic pollution. Oil spills and effects on marine life. Volatile organic compounds (VOCs) effects on atmospheric pollution. Effects of aromatic hydrocarbons on human health and biota.
- Introduction to atmospheric pollution. Classical and novel pollutants. The role of CO2 in climate change. Illnesses from occupational practices. Basic atmospheric pollutants from shipping. Also from CFCs, Halons, Cargo handling, firefighting gases. Recent developments from WHO and E.U. concerning limit levels for basic pollutants. The case of Greece.
- Atmospheric pollution. How Greece and the port of Piraeus are dealing with the new exposure limits to basic pollutants. Serious delays and ineffectiveness in responses and management. Deaths (mortality) and morbidity data from atmospheric pollution in the EEU-27. Serious developments from the European Environmental Agency (EEA).
- Atmospheric pollution. Production of atmospheric pollutants comparison of different transport modes. Emissions per transport work/effort (Km.ton) vs quantity of emission (ton). Environmental Impact Assessment. Legal requirements, scoping and assessing environmental status , Initial Environmental Report, Background environmental pressures, modelling of future impacts, evaluation of effects, Licensing procedures, Environmental conditions, monitoring and environmental reporting.

## TEACHING and LEARNING METHODS - EVALUATION

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| **DELIVERY**<br>*Face-to-face, Distance learning, etc.* | *Distance learning through the TEAMS platform* |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY**<br>*Use of ICT in teaching, laboratory education, communication with students* | Support learning through the e-class platform |
| **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* | |

| ***Activity*** | ***Semester workload*** |
|---|---|
| Lectures | 30 |
| Case studies analysis | 40 |
| Non-guided study | 112,5 |
| **Total** | 187,5 |

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| **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.* | Written final exam (100%) in English mainly with multiple choice question, including short answer questions based on lectures and outside reading. |

**ATTACHED BIBLIOGRAPHY**

Lecture notes on e-class

Brimblecombe, P., "The Globalization of Local Air Pollution", *Globalizations*, 2 (December 2005), 429-442.
Cain, Louis P., "An Economic History of Urban Location and Sanitation", *Research in Economic History*, 2 (1977), 337-389.
Elkind, Sarah S., *Bay Cities and Water Politics: The Battle for Resources in Boston and Oakland* (Lawrence: University Press of Kansas, 1998).
Goldman, Joanne Abel., *Building New York's Sewers: Developing Mechanisms of Urban Management* (West Lafayette, Ind.: Purdue University Press, 1997).
Hanley, Susan B, "Urban Sanitation in Preindustrial Japan", in: Robert I. Rotberg (ed.), *Health and Disease in Human History: A Journal of Interdisciplinary History Reader*, (Cambridge, Mass.: MIT Press, 2000), pp. 141-166. Kidder, Robert. "Disasters Chronic and Acute: Issues in the Study of Environmental Pollution in Urban Japan", in: Pradyumna P. Karan and Kristin E. Stapleton (eds.), *The Japanese City* (Lexington: University Press of Kentucky, 1997), pp. 156-175
Olsson, Göran. "The Struggle for a Cleaner Urban Environment: Water Pollution in Malmö 1850-1911",*Ambio*, 30 (August, 2001) 287-291