

COURSE OUTLINE

1. GENERAL INFORMATION

SCHOOL	MARITIME AND INDUSTRIAL STUDIES		
DEPARTMENT	INDUSTRIAL MANAGEMENT AND TECHNOLOGY		
LEVEL OF STUDY	UNDERGRADUATE		
COURSE UNIT CODE	TEΠΑΡ05	SEMESTER OF STUDY	7 th
COURSE TITLE	NATURAL RESOURCES MANAGEMENT AND THE ENVIRONMENT (ELECTIVE COURSE)		
INDEPENDENT TEACHING ACTIVITIES <i>in case in which credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures, Laboratory, Project			5.5
<i>Add rows if necessary. The organization of teaching and the teaching methods used are described in detail at section 4.</i>			
COURSE TYPE <i>general background, special background, specialized general knowledge, skills development</i>	Special background		
PREREQUISITE COURSES:	None		
LANGUAGE OF INSTRUCTION and EXAMINATION/ASSESSMENT:	Greek / English (in ERASMUS class)		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.unipi.gr/courses/BDT218/		

2. LEARNING OUTCOMES

<p>LEARNING OUTCOMES</p> <p><i>The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail. It is necessary to consult:</i></p> <p>APPENDIX A</p> <ul style="list-style-type: none"> • <i>Description of the level of learning outcomes for each qualifications' cycle, according to the European Higher Education Area's Qualification Framework.</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and APPENDIX B</i> • <i>Guidelines for writing Learning Outcomes</i> <p>The course presents topics related to: natural resources categorization, renewable and non renewable energy resources, reserves, depletion time, conventional energy sources and environmental impact (coal, lignite, oil, natural gas), energy consumption and environmental impact, increasing energy consumption scenarios, necessity for developing alternative energy sources, types of renewable resources, economy and the environment, the material balance model, resources flow, the recovery of raw materials, subsidy, multicriteria analysis, break-even point, presentation of the methods for life cycle analysis and life cost cycle, biomass exploitation and biomass energy, presentation and analysis of the carbon footprint and water footprint concepts in Greek enterprises. Many case studies from Greek enterprises are presented.</p> <p>Upon successful completion of the course, the students will be able to:</p> <ul style="list-style-type: none"> • Effectively manage natural resources • Provide definitions, distinguish and analyze the categories of natural resources • Examine the technical and economic dimension of natural resource management

- Provide various ways for exploiting natural resources and present their correlation with environmental parameters
- Use inventory depletion models, dead-end analysis and multicriteria analysis
- Demonstrate knowledge on methodologies for the recycling and recovery of waste biomass
- Demonstrate knowledge on industrial / energy / environmental use of natural resources

General Competences

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aims

Search for, analysis and synthesis of data and information, by the use of technologies that are necessary according the case

Adapting to new situations

Decision-making

Independent work

Team work

Working in an international environment

Working in an interdisciplinary environment

Introduction of innovative research

Project planning and management

Respect for difference and multiculturalism

Environmental awareness

Social, professional and ethical responsibility and sensitivity to gender issues

Critical consciousness, criticism and self-criticism

Development of free, creative and inductive thinking

- Search for, analysis and synthesis of data and information, by the use of technologies that are necessary according the case
- Adapting to new situations
- Decision-making
- Independent work
- Working in an international environment (ERASMUS)
- Working in an interdisciplinary environment (ERASMUS)
- Introduction of innovative research
- Project planning and management
- Respect for difference and multiculturalism
- Environmental awareness
- Social, professional and ethical responsibility and sensitivity to gender issues
- Critical consciousness, criticism and self-criticism
- Development of free, creative and inductive thinking

2. COURSE CONTENT

The course covers the following topics:

Week	Topic
1	Categorization of natural resources – renewable and non renewable resources
2	Reserves – natural resources depletion time
3	Conventional energy sources and environmental impact
4	Renewable Energy Sources (RES)
5	Economy and the Environment – recovery of raw materials
6	Economy and the Environment – subsidy
7	Biomass exploitation
8	Biomass energy
9	Multicriteria analysis – break-even analysis
10	Life cycle analysis (LCA) and Life cost cycle (LCC)
11	Carbon footprint – Water footprint
12	Case studies from Greek enterprises
13	Review exercises

Students also attend a laboratory training program in the Laboratory of Simulation of Industrial Processes in order to develop an intuitive and hands-on understanding of the concepts presented in

the lectures, such as modeling of industrial processes, data analysis and decision making based on techno-economic criteria. The software used is MS EXCEL or equivalent (Open Office, etc.) as well as in-house software. The workshop program is presented below:

Week			Laboratory Syllabus
1 st	5 th	9 th	Biomass thermal treatment (furnaces)
2 nd	6 th	10 th	Biomass hydrothermal treatment (autoclave)
3 rd	7 th	11 th	Utilization of aluminum - anodizing
4 th	8 th	12 th	Electrochemical recovery of copper from scrap
13 th			Rescheduled lab practice

In addition, articles, audiovisual lecture material, web addresses, useful information, exercises and case studies are posted at eclass.

3. TEACHING METHODS - ASSESSMENT

<p>TEACHING MODE <i>Face-to-face, in-class lecturing, on distance teaching and distance learning etc.</i></p>	In-class lecturing / Laboratory teaching																			
<p>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY <i>Use of ICT in Teaching, Laboratory Education, Communication with students</i></p>	<p>Teaching: Lectures with audiovisual media, support of the learning process through the eclass platform Laboratory Education: Use of open access and in-house software for laboratory exercises Communication with students: face-to-face at office hours, email, eclass</p>																			
<p>COURSE DESIGN <i>Description of teaching techniques, practices and methods: Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, clinical practice, Art Workshop, Interactive teaching, Educational visits, project, Essay writing, Artistic creativity, etc.</i></p> <p><i>The study hours for each learning activity as well as the hours of non- directed study are given according to the principles of the ECTS</i></p>	<table border="1"> <thead> <tr> <th><i>Activity / Method</i></th> <th><i>Semester Workload</i></th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td>26</td> </tr> <tr> <td>Laboratory</td> <td>26</td> </tr> <tr> <td>Project</td> <td>25</td> </tr> <tr> <td>Case studies</td> <td>20</td> </tr> <tr> <td>Self-study of lecture material and exercises</td> <td>38</td> </tr> <tr> <td>Counselling</td> <td>0.5</td> </tr> <tr> <td>Exams (written)</td> <td>2</td> </tr> <tr> <td>Course Total</td> <td>137.5</td> </tr> </tbody> </table>		<i>Activity / Method</i>	<i>Semester Workload</i>	Lectures	26	Laboratory	26	Project	25	Case studies	20	Self-study of lecture material and exercises	38	Counselling	0.5	Exams (written)	2	Course Total	137.5
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<p>STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS <i>Detailed description of the evaluation procedures: Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice questionnaires, short- answer questions, open-ended questions, problem solving, written work, Essay/report, oral exam, public presentation, laboratory work, art interpretation, other.....etc</i></p> <p><i>Evaluation criteria are specifically defined and given as well as if and where they are reported and accessible to students.</i></p>	<p>Language of exams: Greek / English (in ERASMUS class)</p> <p>Assessment Methods: After the last lecture, the exam material is posted at eclass. The final course grade is formed as follows:</p> <ul style="list-style-type: none"> • By the participation of students in class activities (10%) • By the laboratory (30%) • by the written exams (60%) taken in the examination period of the winter semester and, in case of failure, in the September resits <p>The written examination includes problem solving/exercises. It is conducted with open books.</p>																			

	<p>The evaluation of students with special learning difficulties in writing and reading (as certified and qualified by a competent institution) is performed according to the relevant procedure decided by the Department Assembly.</p> <p>Notification of the Assessment Criteria: The evaluation criteria are made known during the first lecture and are clearly stated on the course website and e-class. The answers to the exam questions are posted at eclass after the exam date. Students have the opportunity to discuss their exam paper with the course instructor (at the posted office hours) after the announcement of the course grades.</p>
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4. SUGGESTED BIBLIOGRAPHY

-Suggested Bibliography :

- Book [50662617]: Economics of Natural Resources and the Environment [in Greek], Chalkos E.G.
- Book [11739]: Environment and Natural Resources, Vol. A' [in Greek], Vlachou A.

-Scientific Journals:

- Bioresource Technology
- Renewable Energy
- Chemical Engineering Journal

-Lecture Notes

-Laboratory Workbook