ETY606 - Materials and Environment

COURSE OUTLINE

(1) GENERAL

SCHOOL				
ACADEMIC UNIT				
LEVEL OF STUDIES				
COURSE CODE	ETY606	**SEMESTER**	5	
COURSE TITLE	Materials and Environment			
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**
			3	3
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*	Special background, specialised general knowledge, skills development			
PREREQUISITE COURSES:				
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek (English optional)			
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes			
COURSE WEBSITE (URL)				

(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*

This course covers all commonly used materials (nanomaterials, polymers, structural materials, adsorbents) into two-directions: [α] their use is environmental technologies. [β] their impact in the environment during their use-cycle as after their and-of-life disposal. The engineering aspects are focusing on [i] the interfacial properties of materials, which determine their interaction with environmental factors and pollutants [ii] their physicochemical properties related to their stability, dispersion and dynamics under environmental conditions. Each group of materials is covered in a discrete chapter, where their key properties-applications and environmental behavior are analyzed. A detailed encoding is discussed related to their recycling technologies. The principles of Life Cycle Analysis (LCA) and Environmental Impact Assessment (EIA) are introduced to the students.

Learning Outcomes

- Understanding the key techno-economical parameters of environmental pollution.
- Understanding the structure-function relationship of materials related to their interfacial, chemical stability properties.
- Deeper understanding of the fundamental physicochemical properties of materials related to their environmental impact and dynamics.
- Familiarization with Life Cycle Analysis (LCA) and Environmental Impact Assessment (EIA) of novel technological materials with emphasis on nanomaterials and polymers.

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

Search, analysis and synthesis of data using the appropriate technologies .
Production of novel research ideas.
Work in a interdisciplinary environment.
Autonomous work.
Adapting to new situations

(3) SYLLABUS

Introduction to engineering aspects of chemistry and pollution of waters, soils and atmosphere. Interfacial processes in materials under environmental conditions. Modern-life pollutants nano-pollutants in the environments. Environmental impact of polymers. Recycling of polymers. Amiant, cement and their environmental impact. Use of materials in remediation of pollutants. Adsorption vs. Absorption. Advanced catalytic technologies using materials, in industrial gas emissions. Advanced catalytic technologies using materials, in car exhaust emissions. Homogeneous, heterogeneous photocatalysis. Principles of Life Cycle Analysis of Materials. Principles of Environmental Impact Assessment (EIA) of Materials.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face or Distance learning
USE OF INFORMATION AND	Dropbox & MS-TEAMS is used to communicate

COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	courses' notes, practicum works to the students.

TEACHING METHODS

The manner and methods of teaching are described in detail.
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.

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,	39
Essay writing	10
study and analysis of bibliography	11
Non supervised study	12
Exams	3
Course total	75

STUDENT PERFORMANCE EVALUATION

Description of the evaluation procedure

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

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.

Written exams at the end of semester, on problem solving and context understanding.
Volunteer homework on LCA

(5) ATTACHED BIBLIOGRAPHY

- -Suggested bibliography:

- Υλικά και Περιβάλλον, Ι. Δεληγιαννάκης, 2012, Εκδόσεις Τζιόλα.
- Environmental Nanotechnology: Applications and Impacts of Nanomaterials (1st Ed)M.Wiesner,J.-Y.Bottero, McGraw-Hill Education, 2007.
- Degradable Polymers, Recycling, and Plastics Waste Management A-C. Albertson, S.J, Huang, 1995 Marcel-Dekker
- Materials Characterization Techniques, Sam Zhang, Lin Li, Ashok Kumar (2008) CRC Press.
- Physical Methods for Materials Characterisation, Peter E.J. Flewitt, R.K. Wild (2003) CRC Press.