COURSE OUTLINE

1. COURSE INFORMATION

SCHOOL	Chemical & Environmental Engineering		
DEPARTMENT			
COURSE LEVEL	Postgraduate		
COURSE ID		**SEMESTER**	Winter
COURSE TITLE	Design of Sustainable Energy & Mobility Systems		

COURSE MODULES *in the case of credits being awarded in distinct parts of the course eg. Lectures, Laboratory Exercises, etc. If credit units are awarded uniformly for the whole course, indicate the weekly hours of teaching and the total number of credits.*	**INSTRUCTION HOURS PER WEEK**	**CREDITS**
Lectures	3	9
Laboratories		
Tutorial Exercises		
Total	3	
Add rows if needed. The teaching organization and teaching methods used are described in detail in (4).		

COURSE TYPE *Background, General Knowledge, Scientific Area, Skills Development*	Scientific Area
PREREQUISITES:	
INSTRUCTION/EXAM LANGUAGE:	English
THE COURSE IS OFFERED TO ERASMUS STUDENTS:	Yes
COURSE URL:	EURECA PRO LMS Moodle URL: https://moodle.eurecapro.tuc.gr/course/view.php?id=83

2. LEARNING OUTCOMES

Learning Outcomes

The learning outcomes of the course describe the specific knowledge, skills and competences of an appropriate level that students will acquire after successfully completing the course.

Refer to Appendix A.

- *Description of the Level of Learning Outcomes for each course of study in line with the European Higher Education Area Qualifications Framework*
- *Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B*
- *Learning Outcomes Writing Guide*

After completing this course the student will be able to:

- Implement an environmental impact analysis
- use of alternative fuels in transport (biofuels, electricity, etc.)
- manage Renewable Energy Sources and Energy Saving systems (regional-local energy planning, sustainable management of natural resources, Life Cycle Analysis),
- design of green energy applications for buildings, cities and ports

General Competencies/Skills

Considering the general competencies that the graduate must have acquired (as listed in the Diploma Supplement and below), which one(s) the course enhances?

Search, analysis and synthesis of data and information, using the necessary technologies

Project design and management

Respect for diversity and multiculturalism

Adaptation to new situations *Decision making* *Autonomous work* *Teamwork* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Respect for the natural environment* *Demonstration of social, professional and moral responsibility and sensitivity to gender issues* *Exercise criticism and self-criticism* *Promoting free, creative and inductive thinking*

Search, analysis and synthesis of data and information, using the necessary technologies
Decision making
Adaptation to new situations
Autonomous work
Teamwork
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Demonstration of social, professional and moral responsibility and sensitivity to gender issues
Exercise criticism and self-criticism
Promoting free, creative and inductive thinking

3. COURSE SYLLABUS

0. Introduction

1. Basic design principles.

2. Demonstration of using the ReSEL-PLAN toolbox.

3. Use of Life Cycle Analysis to study environmental impacts.

4. zero Energy Systems

5. (two weeks). Special applications of renewable energy sources. Electrical systems. Wind -

photovoltaic - hybrid. Desalination, autonomous energy systems. Solar air conditioning. Integration

into the built environment.

6. Biofuels. Energy, environmental and economic assessment.

7. Multi-criteria analysis for the optimal choice of sustainable energy and transport systems.

8 (two weeks).Sustainable large-scale zero emission system design (islands, cities, ports).

9. Economics, system dimensioning and examples. Discussion.

10. Final presentation of all students' projects

4. TEACHING and LEARNING METHODS – ASSESSMENT

LECTURE METHOD *Face to face, distance learning, etc.*	Hybrid (both physical and virtual)
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY	• **Zoom** • Powerpoint presentations, videos and e-class support

Use of ICT in Teaching, in Laboratory Exercises, in Communication with students	

TEACHING ORGANISATION *Describe in detail the way and methods of teaching.* *Lectures, Seminars, Laboratory Exercise, Field Exercise, Literature review & analysis, Tutoring, Practice (Placement), Clinical Exercise, Artistic Lab, Interactive teaching, Educational visits, Project work, project, etc.* *The student's study hours for each learning activity and the hours of non-guided study according to the ECTS principles are mentioned.*	***ACTIVITY***	***Workload per semester (in Hours)***
	Lectures	39
	Tutorials	
	Lab assignments	
	Projects	100
	Autonomous study	120
	Course Total (25 hours' workload/ECTS credit)	***259***

ASSESSMENT METHODS *Description of the evaluation process* *Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Public Presentation, Laboratory Assignment, Clinical Examination of Patients, Artistic Interpretation, Other* *Well defined student assessment criteria are mentioned. Mention whether and how the students can access them.*	Project development of a sustainable energy & transport system **Criteria:** Scientific & technical readiness, quality of the deliverable, initiative, quality of presentation

5. DIGITIZATION (use of tools & software)

- ReSEL Virtual library containing 10+ engineering tools
- ReSEL-Plan Tool to develop and implement sustainable energy communities

6. RECOMMENDED INTERNATIONAL LITERATURE

Publications using the ReSEL library:
http://www.resel.tuc.gr/index.php?option=com_content&view=article&id=8&Itemid=26&lang=en

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