COURSE OUTLINE

1. GENERAL

SCHOOL	ENGINEERING		
DEPARTMENT	PRODUCT AND SYSTEMS DESIGN ENGINEERING		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**4202**	**SEMESTER**	**7**
COURSE TITLE	**Design for Sustainability and Cyclic Economy**		

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	**3**	**6**
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, skills development
PREREQUISITE COURSES:	NONE
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK/ENGLISH
COURSE DELIVERED TO ERASMUS STUDENTS	YES
MODULE WEB PAGE (URL)	https://eclass.uowm.gr/

2. LEARNING OUTCOMES

Learning outcomes

Product design is the vehicle by which designers choose the way which manufacturers can develop the product. Therefore, Sustainable planning is the key to achieving sustainable goals. The concept of sustainable development has many implications and completely different dimensions related to social, environmental and economic elements, so a long-term view and the overall impact of the life cycle must be taken into account.

Upon completion of this course, students must be able to have knowledge about:

1. The description and understanding of the term sustainable design and the analysis of the right ways for an appropriate approach by designers.
2. Critical evaluation of the definitions and the purpose of sustainable design related with various technical, environmental and social aspects.
3. Development of design methods for problem definition, analysis and evaluation, the right guidelines, all with the aim of achieving a sustainable result.
4. Analysis of the four levels, the environment, the planet, society, business, which can quickly identify which levels of the environment are associated with certain aspects of the sustainable design.
5. Application of methods and tools for all product design steps.
6. Demonstration of methods for acquiring sustainable design skills.
7. Integration of design into environmental issues during the product life cycle

General Skills

The course deals with design for sustainability. We live in a period of time where environmental pressures reinforce the need to transcend the social and economic models that are the basic reason for the current situation. Design plays a key role in creating these phenomena, but at the same time it has the potential to be the beginning of the transition to a more sustainable society. During the course students will face different approaches to design for sustainability and should find the golden mean between these methodologies and other emerging design aspects such as service design and open design. This course provides an overview of the success of sustainable design. This can be done by optimizing the viability of products and services using evaluation tools.

3. COURSE CONTENTS

1. Exploring and defining sustainability.

Sustainability and Business, Definition of Brundtland Report, Industrial Ecology, Triple P (People, Planet, Profit)

2. Overview of creating sustainable design.

General product design steps, design steps for sustainable design.

3. Define a project task.

Challenges for sustainable design, the design process with team spirit, goal setting and scope, sustainability constraints.

4. Structure of the sustainability framework.

In terms of environment, society, economy and business.

5. Creating design solutions

Design Composition, Evaluation of Preliminary Solutions, Product Life Cycle Assessment (LCA), Design Evaluation.

6. Integration of environmental methodologies in the product life cycle during design process.

Environmental aspects in the product life cycle, product LCA development, environmentally friendly design, integration of LCA technique and environmental design methodology.

7. LCA process in the eco-design.

Life Cycle Assessment, Goal and Purpose Definition, Life Cycle Inventory, Life Cycle Impact Assessment, Life Cycle Interpretation.

8. Sustainable design evaluation tools.

Matrix Assessment Tools, Checklists, Spider Charts, Parametric Assessment.

9. Environmental aspects in strategic decisions.

Sustainable product logistics, Supplier Management and Selection, Environmental Materials Management, Inventory Management Model Improvement, Closed Loop Supply Chains and Reverse Logistics

10. Optimizing sustainability in products and services.

Sustainable Development of Products and Services,

11. Green marketing and development of new products.

Introduction, green marketing, comparison between traditional and green marketing, environmental marketing requirements

4. TEACHING METHODS - ASSESSMENT

MODE OFDELIVERY	In class, face to face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	• Video and slide presentations via projector • Support of teaching process via the electronic platform e-class • Communication with students.	
TEACHING METHODS	***Activity***	***Semester workload***

	Lectures	90
	Non-directed study	60
	Course total	**150**
ASSESSMENT METHODS	Final written exam which includes: i. Short-answer questions ii. Multiple choice questions iii. Problem solving Assignments	

5. ATTACHED

- Suggested bibliography:

Proposed Bibliography:

- Maurizio Bevilacqua, Filippo Emanuele Ciarapica, Giancarlo Giacchetta. "Design for Environment as a Tool for the Development of a Sustainable Supply Chain". Springer-Verlag London Limited 2012.
- Gerald Jonker and Jan Harmsen. "Engineering for Sustainability, A Practical Guide for Sustainability. Elsevier B.V. 2012.
- Walker, S. (2017). Design for Life. Abingdon, Oxon: Earthscan.

Related scientific journals

- The Journal of Cleaner Production
- Sustainability — Open Access Journal