

## COURSE OUTLINE

### 1. GENERAL

<b>SCHOOL</b>	ENGINEERING		
<b>DEPARTMENT</b>	PRODUCT AND SYSTEMS DESIGN ENGINEERING		
<b>LEVEL OF STUDIES</b>	UNDERGRADUATE		
<b>COURSE CODE</b>	<b>4204</b>	<b>SEMESTER</b>	<b>8<sup>o</sup></b>
<b>COURSE TITLE</b>	ENGINEERING AND MATERIALS DESIGN (EMD)		
<b>INDEPENDENT TEACHING ACTIVITIES</b> <i>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</i>		<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>
Lectures		3	6
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
<b>COURSE TYPE</b> <i>general background, special background, specialised general knowledge, skills development</i>	GENERAL BACKGROUND Compulsory Specialization « <i>Product Design and Constructions</i> » (YEK2)		
<b>PREREQUISITE COURSES:</b>	MATERIALS TECHNOLOGY		
<b>LANGUAGE OF TEACHING AND EXAMINATIONS:</b>	GREEK		
<b>COURSE DELIVERED TO ERASMUS STUDENTS</b>	YES		
<b>MODULE WEB PAGE(URL)</b>	<a href="https://eclass.uowm.gr/">https://eclass.uowm.gr/</a>		

### 2. LEARNING OUTCOMES

<b>Learning Outcomes</b>
<p>The course of «Engineering and Materials Design» is an alternative approach to the teaching of materials by selecting appropriate materials to solve problems and design studies. It seeks to achieve students understanding of basic concepts in terms of the property's behaviors and requirements. The students understand the principles and context of the processing by the structure, the peculiarities for the performance of the final product and materials, the matching of materials to the design and the options of access data, their processing, and their final evaluation.</p> <p><b>On successful completion of this module the learner will be able to:</b></p> <ol style="list-style-type: none"> <li>1. Understand the properties of materials.</li> <li>2. Acquire the fundamental data processing skills for the selection of Materials.</li> <li>3. Understand the relationship between the properties and the structure of materials.</li> <li>4. Apply the knowledge of engineering to solving problems for the selection of materials.</li> <li>5. Select the most suitable materials for specific applications.</li> <li>6. Analyze the data and propose solutions to product design studies.</li> <li>7. Acquire the necessary skills and techniques for the selection of composite and advanced materials.</li> </ol>

## General Skills

### Upon successful completion of the program students will:

- have the theoretical background concerning the Selection of Materials for Product Design.
- the ability to apply a wide range of scientific and technical knowledge concerning the structure and properties of materials, their processing and selection for the design and development of new products.

## 3. COURSE CONTENTS

The course includes the familiarization of students with the selection of appropriate materials for solving problems in product design studies. It seeks to achieve students understanding of basic concepts of the chemical properties of materials and how they are related to their processing and selection in Design. The purpose of the course is to understand the principles and methodology of material selection in the context of Product Design.

The content of the course is as follows:

- Materials-History and character
- Family trees: Organization of materials and processes
- Matching materials and design
- Physical Properties
  - Stiffness and Weight
  - Flexibility, bending and shock
  - Elasticity, plasticity, leakage, and ductility
  - Bending and crushing
  - Fracture and Fracture toughness
  - Vibrations, reciprocating movements, rotations
- Engineering Characteristics
- Thermal Behavior
- Electrical, magnetic, and optical response
- Durability
  - Oxidation
  - Corrosion
  - Degradation
- Processes and how they affect properties
- Environmental issues
  - Material processes and environment

## 4. TEACHING METHODS - ASSESSMENT

<b>MODE OF DELIVERY</b> <i>Face to face, Distance learning, etc.</i>	THEORY In class, face to face	
<b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b>	<ul style="list-style-type: none"><li>• Use of appropriate software</li><li>• Use of projection system</li><li>• Support of teaching process via the electronic platform e-class.</li></ul>	
<b>TEACHING METHODS</b>	<b>Activity</b>	<b>Semester workload</b>
	Lectures (teaching hours)	45
	Independent student's own-time course,	55

	preparation of the final exam	
	<b>Total Course</b>	<b>100</b>
<b>ASSESSMENT METHODS</b>	<p>Written exam at the end of the semester based on theory and exercises developed during the courses.</p> <p>The final written exam include:</p> <ol style="list-style-type: none"> <li>i. Short-answer questions</li> <li>ii. Problem solving and</li> <li>iii. Multiple choice questions</li> </ol>	

## 5. ATTACHED

### *-Suggested Bibliography:*

- Materials - Engineering, Science, Processing and Design, Michael Ashby, Hugh Shercliff, David Cebon, KLIDARITHMOS EDITIONS LTD, 2nd Edition, 2011.
- Materials and Design, Mike Ashby, Kara Johnson, KLEDARETHMOS EDITIONS LTD, 3rd Edition, 2019.
- Chemical Technology, Vatalis Argyris, ZITI PUBLICATIONS, 1<sup>st</sup> Edition, 2003.

*- Related academic journals.*