COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Business		
ACADEMIC UNIT	Department of Financial and Management Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**MH0114**	SEMESTER	4th
COURSE TITLE	Engineering Materials		

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	4.5
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*	Engineering background, specialised knowledge, skills development
PREREQUISITE COURSES:	-
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	http://www.fme.aegean.gr/el/c/tekhnika-ulika

(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*

The course is addressed to undergraduate students and aims to allow students to:

- **Recognize how the internal structure of a material (both at the micro and macro levels) controls the mechanical properties.**
- **Be able to explain how dislocation motion is responsible for permanent deformation in metals and how the ability to undergo slip influences the mechanical properties of the material.**
- **Realize their ability to control the mechanical properties of materials through a variety of processes and the implications on materials selection and design.**
- **Demonstrate an integrated understanding of engineering materials principles through applications involving problem solving and through creation of design solutions to engineering scenarios.**
- **Work cooperatively with others to facilitate a collegial atmosphere**

conducive to learning for all students in the class.

- **Prepare for and attend each class by reading the assigned sections before class, completing homework before class, and actively participating in class.**

Upon successful completion of this course, the students should be able to do the following:

- **understand how materials are being made (basic material science),**
- **use the principles from chemistry, physics, statistics, and mathematics in engineering applications,**
- **emphasize on properties and how they are influenced by thermal and mechanical treatments,**
- **relate the microstructure of a material to its properties,**
- **identify, formulate, and solve engineering problems,**
- **understand the effects of the environment on materials and the possible failure modes of structures,**
- **characterize engineering materials and design for possible applications, and**
- **understand and contribute to the challenges of a rapidly changing society**

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

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Respect for the natural environment
- Adapting to new situations
- Decision-making
- Working independently
- Team work
- Production of free, creative and inductive thinking
- Criticism and self-criticism

(3) SYLLABUS

1. Atomic and molecular structure of materials
2. Imperfections in materials
3. Diffusion
4. Mechanical properties of materials

5. Dislocations and strengthening mechanisms
6. Failure of engineering materials
7. Phase diagram
8. Phase transformation
9. Applications and processing of metals
10. Introduction to ceramics
11. Introduction to polymers
12. Introduction to composites
13. Other properties

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face teaching
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	**Use of eClass in delivering notes and presentations**
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*	
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.*	Grading will be determined on three exams: two mid-term exams covering the first 60 % of the topics of the course (30 % each) while the final exam covers the rest 40 % of the topics. The students that fail the course will be re-examined in September at the whole topic of the course (100 %). The course grade will be calculated as follows: (1st Mid-term exam x 30 %) + (2nd Mid-term exam x 30 %) + (Final exam 40 %) = (Total 100 %) Exam in September covers the whole topic of the course 100 %

Activity	*Semester workload*
Lectures	39
Bibliography study	90
Essay writing	46
Tests	25
Course total	***200***

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography: William D. Callister, Jr., Materials Science and Engineering, John Wiley & Sons, Inc.

- Related literature:

- *D.R. Askeland and P.P. Phulé: The Science and Engineering of Materials, 4th Edition, Brooks/Cole.*
- *J.M. Shackelford, Introduction to Materials Science for Engineers, 5th Edition, Prentice-Hall, Inc*