

COURSE OUTLINE

(1) GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	Department of Mechanical Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	MY1300	SEMESTER	6 th
COURSE TITLE	Mechanical Behaviour of Materials		
INDEPENDENT TEACHING ACTIVITIES <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>	WEEKLY TEACHING HOURS	CREDITS	
	5	6	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialized general knowledge, skills development</i>	Special background		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (tutoring)		
COURSE WEBSITE (URL)	https://www.mie.uth.gr/?page_id=18347&lang=en		

(2) LEARNING OUTCOMES

<p>Learning outcomes</p> <p><i>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.</i></p> <p><i>Consult Appendix A</i></p> <ul style="list-style-type: none"> • <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> • <i>Guidelines for writing Learning Outcomes</i>
<p>The course delivers to the student combined knowledge from different scientific areas in the fields of Materials Technology, Physical Metallurgy and Mechanics of Materials . Emphasis is given on</p> <ul style="list-style-type: none"> • The understanding of the behavior of metallic materials under the influence of the environment and simultaneous effect of mechanical loads. • Prediction of material behavior when subjected to various types of mechanical loading • Gaining knowledge regarding the careful implementation of design procedures in the use of materials for avoiding failure

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...

In the frame of the Course “Mechanical Behavior of Metallic Materials” the student becomes competent in analyzing and synthesizing knowledge regarding the behavior of materials under different loading and environmental conditions. He/she develops his/her skills and decision making ability towards the use of structural materials for specific engineering design applications/environments and failure analysis.

(3) SYLLABUS

- Review of fundamental concepts: internal forces, stresses and strains
- Stress transformations, principal stresses and planes, maximum shear stress
- Elements of elasticity theory: Linear and non linear elasticity, anelasticity, generalized Hooke’s law
- Elements of plasticity theory: flow curve, equivalent stress – strain, yielding criteria (Von Mises, Tresca)
- Crystal microplasticity : dislocations, slip of crystallographic planes, Schmid Law
- Strengthening mechanisms: strain hardening, solid solution strengthening, precipitation hardening, grain boundary strengthening
- Principles of fracture mechanics
- Mechanical behavior under alternating stress (Fatigue)
- Mechanical behavior und high temperatures (Creep)

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face to Face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	Use of personal computer and projection media for teaching assistance	
TEACHING METHODS	<i>Activity</i>	<i>Semester workload</i>

<p><i>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.</i></p> <p><i>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</i></p>	Lectures	52
	Assignments	20
	Laboratory Assignments	6
	Literature Study	42
	Interactive Teaching	15
	Tutoring	15
	Course total	150
<p>STUDENT PERFORMANCE EVALUATION</p> <p>Description of the evaluation procedure</p> <p><i>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</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>		
<p>The evaluation language is the greek language. The method of evaluation is summative using short answer questions and examining the problem solving capabilities. The final evaluation is based on the following:</p> <p>I. Final written exam (70%): II. Intermediate exam (20%) III. Assignments (10%)</p> <p>The evaluation criteria are described in the course website.</p>		

(5) ATTACHED BIBLIOGRAPHY

-Suggested bibliography:

1. G.N.Haidemenopoulos and A. Katsamas, "Mechanical Behavior of Materials", Lecture Notes, Thessaly University Press (2004).
2. G.N. Haidemenopoulos, "Physical Metallurgy", Tziolas Publications (2007)
3. Th.B. Kermanidis, "Strength of Materials", Volume I, Singular Publications (1994).
4. Sp. G. Pantelakis, K. I. Tserpes, «Mechanical Behaviour of Materials», Tziolas Publications (2016).
5. N. Aravas, «Mechanics of Materials», Volume I, Tziolas Publications (2014)
6. Dowling, N.E., Mechanical Behavior of Materials: Engineering Methods for
7. Deformation, Fracture, and Fatigue. 2007: Pearson Prentice Hall.
8. 2.F. A. McClintock, A. S. Argon, Mechanical Behavior of Materials, Addison-Wesley
9. Publishing Company Inc. (1996).
10. W. F. Hosford, Mechanical Behavior of Materials, Cambridge University Press, (2005)

- Related academic journals:

11. Materials Science and Engineering A
12. Fatigue and Fracture of Engineering Materials and Structures
13. International Journal of Fatigue
14. Engineering fracture Mechanics