COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1213	**SEMESTER**	2^{d}
COURSE TITLE	**NAVAL MATERIALS TECHNOLOGY**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		2	4
Laboratory		2	
Total		4	
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Special background.		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek / English		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (English)		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NAFP148/		

(2) COURSE GOALS / LEARNING OUTCOMES

Students who take this course will acquire basic technological knowledge and familiarity concerning the naval materials, and will be able to:

- Understand the structure, properties and main applications of materials, especially the ones used in shipbuilding.
- Understand the basic processing procedures concerning the naval materials and obtain the necessary skills to apply them.
- Use the obtained knowledge in order to address specific technological issues met in shipbuilding.

After successfully completing the course, students will be able to:

- Apply and research efficiently, naval materials, based on scientific and technological principles.
- Combine and use information and data concerning the properties and applications of metals, alloys and non-metallic naval materials.
- Work cooperatively within a team and make decisions concerning the properties, mechanical behavior and technological applications of naval materials.
- Follow the evolution and new developments in the field of naval materials.
- Produce innovative ideas and participate in research projects.
- Experience high standard professionalism and act according to ethical values, showing respect to the human and natural environment, both in national and international level.

(3) COURSE CONTENT / SYLLABUS

The theoretical section of the course, introduces the student to:

- The nature of the chemical bond, and the role it has in determining the properties of the materials.
- The crystal structure of metals and various forms of dislocations (lattice perturbations).
- The process of metal solidification as well as the microstructures of metallic materials, their mechanical properties and standard methods used for testing them.
- Binary equilibrium phase diagrams, including analysis of the iron-carbon binary system.
- Various methods of mechanical, thermal and surface treatment of metallic materials.
- Classification and applications of various types of steel, cast-iron, copper and aluminum alloys.
- The problem of corrosion and several methods of protecting metallic materials exposed to corrosion conditions.
- Non-metallic materials, such as polymers and wood, in relation to their classification, structure, physical and mechanical properties, processing and applications.

In the experimental section of the course, laboratory experiments are performed including:

- Metallographic examination of metals and alloys.
- Determination of the hardness of metallic materials.
- Tensile strength testing.
- Cold rolling of aluminum.
- Thermal treatment of metals (e.g. tempering, recrystallisation and quenching)
- Corrosion of metallic materials.
- Identification and morphing of polymers.
- Processing glass reinforced polymers (GRP's).
- Application and properties of polyurethanes.

Several methods used for testing the mechanical properties of the materials are presented.

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of ICT in teaching.
• Support learning through the electronic e-class platform.</td></tr>
<tr><td>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</td><td>
<table>
<tr><th>Activity</th><th>Workload (hours)</th></tr>
<tr><td>Lectures</td><td>30</td></tr>
<tr><td>Study of Lectures</td><td>45</td></tr>
<tr><td>Laboratory exercises</td><td>20</td></tr>
<tr><td>Homework assignments</td><td>22</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>117</td></tr>
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<tr><td>STUDENT PERFORMANCE</td><td></td></tr>
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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*	Written examination (50%) Essays and technical reports (50%)

(5) ATTACHED BIBLIOGRAPHY

1. "Materials Science and Engineering. An Introduction", W.D. Callister and D.G. Rethwisch, Wiley, 2014, ISBN: 9781118324578.
2. "The Science and Engineering of Materials", D.R. Askeland and W.J. Wright, Cengage Learning, 2016, ISBN: 9781305077102.