

COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1364	SEMESTER	9 th
COURSE TITLE	APPLICATIONS OF THE FINITE ELEMENT METHOD TO NAVAL ARCHITECTURE AND MARINE TECHNOLOGY		
INDEPENDENT TEACHING ACTIVITIES		WEEKLY TEACHING HOURS	CREDITS (ECTS)
Lectures		3	4
COURSE TYPE <i>general background, specialbackground, specialised general knowledge, skills development</i>	Specialised		
PREREQUISITE COURSES:	NAOME1335- Static Analysis of Marine Structures		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSEWEBSITE(URL)	https://eclass.uniwa.gr/courses/NA194/		

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to introduce the student in the Finite Element Methodology (FEM) with emphasis to the application of the method to the structural analysis of ships and other marine structures. Given that the FEM is extensively used today for the design of marine structures, and in some cases its use is mandatory via compulsory technical standards (e.g. IACS Common Structural Rules for the Construction of Oil Tankers and Bulk Carriers), it is easily understood that the present course will assist the student to become familiar with a modern calculation tool, the use of which is also mandatory.

After the successful completion of the course the student will be in position to:

- Understand the basic principles of the FEM
- Use the basic rules of modelling
- Solve practical problems by using FEM
- Understand and assess the results of FEM Analyses

(3) COURSE CONTENT / SYLLABUS

<p>Theory</p> <ul style="list-style-type: none"> ➤ Introduction to FEM ➤ Energy Theorems in Mechanics and their Variational Formulation ➤ Construction of the stiffness matrix ➤ Types of elements used in Structural Analysis ➤ Basic modelling principles ➤ FEM and Class Rules ➤ Assessment of FEM Results ➤ Non-linear analysis by using FEM <p>Exercises</p> <ul style="list-style-type: none"> ➤ For the better familiarization with the theoretical part, students will be called to solve a series of simple practical problems by using the ANSYS Workbench Code.

(4) TEACHING and LEARNING METHODS - EVALUATION

<p style="text-align: center;">DELIVERY</p> <p style="text-align: center;">Face-to-face, Distance learning, etc.</p>	Face-to-face	
<p style="text-align: center;">USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</p> <p style="text-align: center;">Use of ICT in teaching, laboratory education, communication with students</p>	<ul style="list-style-type: none"> • The training material is distributed in electronic format. • In the context of the course the ANSYS code will be used. 	
<p style="text-align: center;">TEACHING METHODS</p> <p><i>The manner and methods of teaching are described in detail.</i></p> <p><i>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>	<p style="text-align: center;">Activity</p>	<p style="text-align: center;">Workload (hours)</p>
	Lectures	39
	Laboratory exercises	39
	Study	39
	Course total	117
<p style="text-align: center;">STUDENT PERFORMANCE EVALUATION</p> <p><i>Description of the evaluation procedure</i></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>Weight of Final Exams: 60%</p> <p>Weight of Performance in exercises 40%</p>	

(5) ATTACHED BIBLIOGRAPHY

Books

1. Hughes, O. F: "Ship structural design", John Wiley & Sons.
2. IACS, "Harmonized Common Structural Rules for Bulk Carriers & Oil tankers", 2016
3. Hartmann, F., Katz, C., "Structural Analysis with Finite Elements", Springer, 2007

Indicative Journals

1. Marine Structures, ELSEVIER
2. Finite Elements in Analysis and Design, ELSEVIER