UNIVERSITY OF WEST ATTICA
SCHOOL OF ENGINEERING
DEPARTMENT OF NAVAL ARCHITECTURE

COURSES SYLLABUS

FOR ERASMUS+ STUDENTS

Academic Year 2022-2023

JUNE 2022

Courses of 1st Semester

1. MECHANICAL ENGINEERING DRAWING & INTRODUCTION TO MCAD
2. INTRODUCTION TO COMPUTER PROGRAMMING

Courses of 2nd Semester

3. TECHNICAL ENGLISH
4. SHIP LINES DRAWING AND INTRODUCTION TO CASD
5. NAVAL MATERIALS TECHNOLOGY

Courses of 3rd Semester

6. MACHINE ELEMENTS
7. FLUID MECHANICS
8. THERMODYNAMICS

Courses of 4th Semester

9. MANUFACTURING PROCESSES
10. SHIP RESISTANCE – PROPULSION – SHIP HYDRODYNAMICS

Courses of 5th Semester

11. SHIP PROPULSION PLANTS
12. LONGITUDINAL STRENGTH OF SHIPS
13. SHIP WELDING
14. HEAT TRANSFER

Courses of 6th Semester

15. SHIP ENGINE ROOM SYSTEMS AND EQUIPMENT
16. SHIP DESIGN
17. STATIC ANALYSIS OF MARINE STRUCTURES
18. MARITIME TRANSPORT ECONOMICS
19. STEAM BOILERS, STEAM TURBINES, AND APPLICATIONS IN MARINE ENGINEERING

Courses of 7th Semester

20. SHIP CONSTRUCTION DRAWINGS
21. SHIP BUILDING TECHNOLOGY
22. SMALL CRAFT TECHNOLOGY
23. CLASSIFICATION SOCIETIES RULES
24. SPECIAL TOPICS IN SHIPBUILDING MATERIALS

25. CORROSION OF MATERIALS – PROTECTION AND MAINTENANCE OF NAVAL STRUCTURES
26. REFRIGERATION – AIR CONDITIONING
27. BUSINESS ADMINISTRATION AND MANAGEMENT AND ENTREPRENEURSHIP
28. PORT MANAGEMENT AND OPERATIONS

Courses of 8th Semester

29. FLOATING OFFSHORE STRUCTURES
30. DYNAMICS AND VIBRATIONS OF MARINE STRUCTURES
31. FUELS AND LUBRICANTS TECHNOLOGY
32. DECK EQUIPMENT AND STEERING SYSTEMS
33. RISK ASSESSMENT AND RISK MANAGEMENT IN SHIPPING
34. SAFETY, QUALITY AND ENVIRONMENT IN SHIPPING

Courses of 9th Semester

35. DAMAGED STABILITY OF SHIPS
36. DYNAMIC SHIP STABILITY
37. MOORING SYSTEMS OF OFFSHORE STRUCTURES
38. SUPPLY CHAIN IN MARITIME TRANSPORT

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1104	**SEMESTER**	1st
COURSE TITLE	**Mechanical Engineering Drawing & Introduction to MCAD**		

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*	General background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NAFP162/

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to familiarize the students with the basic theory and principles of mechanical design and the production of accurate and detailed 2D mechanical drawings of two-dimensional and three-dimensional objects. Also, main objective of the course is to learn the use of Computer-Aided Design (CAD) software for the design of 3D mechanical parts.

Upon successful completion of the course, the student will be able:

- To have the theoretical and practical background concerning the field of Mechanical Design.
- To correctly identify and describe the mechanical drawings of objects, tools, components, machines, etc.
- To create mechanical drawings of two-dimensional and three-dimensional geometric entities, describing with clarity objects - machine elements - products.
- To have a complete understanding and use of the rules of technical design and standardization of components (DIN, ISO, ANSI, ELOT, etc.).
- To evaluate existing mechanical drawings, to judge their correctness and to make the necessary corrections and modifications.

- To apply the rules of dimensioning in dimensions, tolerances, surface quality, joints, welding symbols, etc.
- 7. To be capable to develop and analyze 3D objects and 2D drawings with the help of Computer (Computer Aided Design).

(3) COURSE CONTENT / SYLLABUS

Lectures:

- Introduction to the Mechanical Drawing. Categories of Mechanical Drawing. International standards and design regulations.
- Paper size. Drawing tools. Scales. Line types and sketching. Title blocks.
- Projection theory. Orthographic projections. Arrangement of drawing views. Auxiliary views. Isometric drawing. Axonometric drawing.
- Sectional views. Types of section. Revolves and removed sections. Partial sections.
- Dimensioning. Rules. Symbols. Construction drawings.
- Threaded fasteners. Threaded holes. Threaded assemblies. Standards. Bolts. Nuts.
- Dimensional tolerances. Geometric tolerances. Feature control frame. Tolerance grades. Limits and fits. Hole and shaft categories. Surface roughness.
- Design of machine elements: wedges, keys, washers, seals, pin fasteners, welds, springs, spur gears, bearings.
- Introduction to assembly drawings. Bill of materials. Disassembly of mechanical products.
- Introduction to Mechanical Computer Aided Design (MCAD). 3D modeling and design. Representation of geometric entities. Edge models. Surface models. Solid models.
- CAD / CAM software. Modeling. Visualization. Simulation. Optimization.

Laboratory: Laboratory exercises on rough drawings of mechanical parts, detailed drawings on sheet (orthographic projections, isometric drawing, sectional drawing, assembly drawing), two-dimensional and three-dimensional computer-aided design using software such as Autodesk AutoCAD & Autodesk Inventor.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Use of ICT in teaching. • Use of specialized CAD software. • Support learning through the electronic e-class platform.
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography,*	

Activity	*Workload (hours)*
Lectures	26

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*	Laboratory drawing exercises	26
	Homework assignments	39
	Study of Lectures	26
	Course total	***117***
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*	Lectures: Written examination (50%) Laboratory (50%) : - Final examination on drawing. - Laboratory drawing exercises.	

(5) ATTACHED BIBLIOGRAPHY

- Interpreting Engineering Drawings, Theodore Branoff, Cengage Learning, 2016, ISBN: 1133693598.
- Beginning AutoCAD 2019 Exercise Workbook Kindle Edition, Cheryl R. Shrock and Steve Heather, 2018, Publisher: Industrial Press, Inc., ASIN: B07CVNZ997.

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1105	**SEMESTER**	1st
COURSE TITLE	**Introduction to Computer Programming**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures	3	4

COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	General background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA188/

(2) COURSE GOALS / LEARNING OUTCOMES

The focus of this course is the introduction to contemporary computer systems and modern programming languages. This course places emphasis on the development of algorithmic techniques to demonstrate the methodological problem solving approach in a variety of fields. A basic goal of the course is to familiarize students with modern integrated programming environments and the development of programs for mathematical computations and visualization of the results. The python programming language and its modules are used throughout the course.

After completing this course the student shall be able to:

- Comprehend and describe the basic functionality of the architectural components of a computer system.
- Understand how data and information is organized and represented within a computer system
- Use the basic data and algorithmic structures available in modern computer languages
- Analyze a problem in it's primary components and develop an algorithmic solution for such problems
- Understand basic algorithm representation and encoding techniques

- Analyze a problem and structure an algorithmic solution
- Utilize modern integrated programming environments for Python with emphasis on Jupyter Notebooks and Jupyter Lab
- Develop programs in the Python programming language with the use of good programming practices and programming techniques
- Utilize tools and methodologies for program debugging
- Understand and deploy the basic principles of procedural and vector programming
- Use current data types like tuples, sets, sequences, dictionaries and lists to develop programs
- Develop programs that perform scientific computations that include scalars, vectors and matrices
- Provide visualizations through two-dimensional and three-dimensional graphs
- Develop and modify Python programs and functions

(3) COURSE CONTENT / SYLLABUS

- Computer architecture and components
- Hardware – Software
- Principles of Computer Programs. Introduction to computer languages
- Problem solving methodologies, Design principles of computer programs, Introduction to algorithms, Flow diagrams, Pseudocode
- Integrated development environments
- Introduction to Python. Online development environments like Jupyter Labs and the use of Notebooks
- Variables and expression. Logical expressions, Input and output functions
- Basic data types (arithmetic, logical, strings, records) and computations between different data types
- Flow control structures, Loops and Functions
- Contemporary data types (lists, tuples, sets, sequences and dictionaries)
- Matrices and use of Python modules (NumPy, SciPy). Matrix computations and addressing
- Mathematical functions and numerical applications
- File input and output
- Program debugging
- Graphs through the use of Matplotlib

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Use of ICT methodologies in teaching. • Learners support through email, and the asynchronous electronic platform (e-class)

<table>
<tr><td></td><td>

- Lectures available on the course webpage (e-class)

</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>26</td></tr>
<tr><td>Exercises</td><td>13</td></tr>
<tr><td>Homework assignments (problem solving with code development in Python programming language)</td><td>26</td></tr>
<tr><td>Study of Lectures</td><td>52</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>117</td></tr>
</table>

</td></tr>
<tr><td>

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

</td><td>

- Written final examination (60%).
- Problem solving / code development in Python (40%).

</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

- Καρολίδης Δ.Α., 2016, Μαθαίνετε εύκολα Python, Εκδόσεις Άβακας.
- Gaddis, T., 2014, Ξεκινώντας με την Python, Εκδόσεις DaVinci.
- Αβούρης Ν. κ.α., 2018, Python - Εισαγωγή στους υπολογιστές
- Schneider D., 2016, Εισαγωγή στον Προγραμματισμό με την Python, Εκδόσεις Γκιούρδας
- Μανής, Γ., 2015. Εισαγωγή στον Προγραμματισμό με αρωγό τη γλώσσα Python. [ηλεκτρ. βιβλ.] Αθήνα:Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. Διαθέσιμο στο: http://hdl.handle.net/11419/2745

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME 1209	**SEMESTER**	2nd
COURSE TITLE	TECHNICAL ENGLISH		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures	3	3

COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Special background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA246/

(2) COURSE GOALS / LEARNING OUTCOMES

The objective of the course is the effective use of the foreign language structure and the development of language skills by the students, to enhance their interest in further learning through authentic passages of their specialty. The course aims at familiarizing students with the terminology of Marine Engineering & Naval Architecture with the use of foreign bibliography, for correct and fluent communication (oral and written), within the framework of Marine Engineering issues and for their participation in European programs, seminars, conferences, interviews, etc.

(3) COURSE CONTENT / SYLLABUS

Acquisition and effective use of the English Language and Terminology through the study of authentic texts (ESP) from books, technical magazines, internet, etc. based on various subjects of Naval Architecture and practice on their context by composing technical specifications and reports. The linguistic processing is supplemented with a list of readings:

- Introduction to Shipbuilding (Basic Design of the Ship, Ship Dimensions)
- Classification Societies (Passenger, Cargo Vessels, Special Duty Ships, Tankers)
- Development of Ship Types
- Shipbuilding Material - Strength of Ships
- Welding
- Marine Engines
- Shipyard Layout
- Prefabrication
- Launching
- Manoeuvrability
- Propulsive System Characteristics - Propellers
- Ballasting
- Ship Structure (Shell Plating, Framing, Bulkheads, Decks; Hatches, Superstructures, Bottom Structure)
- Sea Waves

(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>Homework practice</td><td>9</td></tr>
<tr><td>Edit Authentic English Texts. Study and Analysis of Bibliography.</td><td>16</td></tr>
<tr><td>Small individual and group practice works</td><td>15</td></tr>
</table>
</td></tr>
</table>

	Study and preparation for exam	13
	Course Total	83
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*	Written examination (80%) Presentation of practice works (20%)	

(5) ATTACHED BIBLIOGRAPHY

1. Manuals prepared by the Lecturer
2. International Bibliography

Indicatively:

- Tupper E.C. (2013). Introduction to Naval Architecture. 5th Ed. Butterworth – Heinemann.
- Tupper E.C. (1996). Introduction to Naval Architecture. 3rd Ed. Butterworth – Heinemann.
- Biran. A.B. (2000). Ship Hydrostatic and Stability. Butterworth – Heinemann.
- Stokoe E.A. (2009). Naval Architecture for Marine Engineers. 4th ed. A & C Black Publishers Ltd.
- Rawson K.J and Tupper E.C. (2001). Basic Ship Theory. 5th Ed. Butterworth – Heinemann.
- Molland A.F. (2008). The Maritime Engineering Reference Book: A Guide to Ship Design, Construction and Operation. 1st Ed. Butterworth – Heinemann.
- Okumoto Y., Takeda Y., Mano M., Okada T. (2009). Design of Ship Hull Structures: A Practical Guide for Engineers. Springer – Verlag Berlin Heidelberg.
- Eyres D.J. (2007). Ship Construction. 6th Ed. Butterworth – Heinemann.
- Stokoe E.A. (2005) Reeds Vol 5: Ship Construction (Reeds Marine Engineering and Technology Series). New Ed. Adlard Coles Nautical.
- Zubaly R.B. (2009). Applied Naval Architecture. Schiffer Publishing.

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1212	**SEMESTER**	2nd
COURSE TITLE	**Ship Lines Drawing and Introduction to CASD**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures	2	5
Laboratory	2	
Total	4	

COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Special background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (Italian)
COURSE WEBSITE (URL)	https://eclass.teiath.gr/courses/NAFP109/ https://eclass.teiath.gr/courses/NAFP112/ https://eclass.teiath.gr/modules/video/?course=NAFP112 https://ocp.teiath.gr/courses/NAFP_UNDER118/ (VIDEO lectures) https://ocp.teiath.gr/modules/video/?course=NAFP_UNDER118 (VIDEO lectures)

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to familiarize students with the basic principles and fundamentals of the lines plan design of the ship. In the course the geometric form of the ship will be described and students will understand how to use the lines plan of the ship in order to solve design and geometric resolution problems. Finally the application of CASD to the design of lines plan will be provided.

(3) COURSE CONTENT / SYLLABUS

1. LECTURES
   Fundamental Concepts and Definitions: Terminology of ship parts, general dimensions, hull coefficients. Hull geometric form, forward section forms, stern forms. Lines plan drawing, design methods. Main dimensions and hull coefficients optimum selection, main dimensions ratio. Calculations using lines plan drawing. Systematic series, introduction and lines plan design using systematic series. Introduction to CASD.

2. LABORATORY
   Conventional method lines plan design. Introduction and Analytical presentation of CASD. Lines plan design using CASD.

(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>• 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>26</td></tr>
<tr><td>Laboratory exercises</td><td>26</td></tr>
<tr><td>Homework assignments</td><td>52</td></tr>
<tr><td>Individual study</td><td>39</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>143</td></tr>
</table>
</td></tr>
<tr><td>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,</td><td>1. Lectures (50 %)
1A. theoretical questions

2A. problems calculation

2. Laboratory (50 %)
- lines plan drawing examination
- CASD drawing examination</td></tr>
</table>

problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other	

(5) ATTACHED BIBLIOGRAPHY

1. SHIP DESIGN DRAWING AND INTRODUCTION TO CASD, G. Hatzikonstandis, UNIWA, 2019
2. Letcher, J., 2009, The Principles of Naval Architecture Series: The Geometry of Ships, The Society of Naval Architects and Marine Engineers, ISBN: 978-0-939773-67-1.
3. Journal of Ship Research, ISSN# 0022-4502
4. Journal of Ship Production and Design, ISSN#2158-2866

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1213	**SEMESTER**	2d
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</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>
</table>
</td></tr>
</table>

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*	Laboratory exercises	20
	Homework assignments	22
	Course total	**117**
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*	Written examination (50%) Essays and technical reports (50%)	

(5) ATTACHED BIBLIOGRAPHY

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

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAMOE1215	**SEMESTER**	3rd
COURSE TITLE	**Machine Elements**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures and case studies		4	5
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Special background		
PREREQUISITE COURSES:	MECHANICS II		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NAFP118/		

(2) COURSE GOALS / LEARNING OUTCOMES

This course aims at introducing the students to the general topology and the main characteristics of typical Machine Elements as used in naval installations. The purpose of the course is to analyze the main machine elements in order to calculate and correctly select the type of element needed for each naval application. The analysis includes the analysis of its geometry, construction materials, usual stresses, calculation and design methods, methods of construction and methods of operation in a ship's mechanical system or generally in a floating construction.

(3) COURSE CONTENT / SYLLABUS

1. Connectors (screws, bolts). Calculations, bolt pre-tensioning. Tightening torque of bolts.
2. Power transfer elements. Spindles, (strength, spindle deformation, critical speed). Spines,

belts, pulleys, chains.
3. Components for load lifting (flexible and steel cables, properties, calculation, Pulleys and drums of steel cables).
4. Power connectors (couplings, mechanical and hydraulic clutches).
5. Gears (tooth modeling, basic tooth law, tooth shape, involute curve construction, and strength and tooth calculation).
6. Rolling and sliding bearings (description, types, lubrication, and selection).
7. Springs (description, types, calculations)
8. Pressure tanks (design calculations)
9. Basic principles of vibrations and dynamic position of axial ship system.
10. Axial ship system alignment. (Calculation of reactions in bearings, preparation of alignment plan)
11. Design of the ship speed reduction propulsion unit.

(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>52</td></tr>
<tr><td>Project</td><td>26</td></tr>
<tr><td>Technical essay assignments</td><td>26</td></tr>
<tr><td>Study of Lectures</td><td>39</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>143</td></tr>
</table>
</td></tr>
<tr><td>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</td><td>• Written final examination (80%) that includes solving problems related to the theory.
• Evaluation of technical group work reports (20%).

The grade corresponding to each technical report will be available to the student on the e-class platform.</td></tr>
</table>

presentation, laboratory work, clinical examination of patient, art interpretation, other	

(5) ATTACHED BIBLIOGRAPHY

- Στεργίου Ι, Στεργίου Κ.: Στοιχεία Μηχανών Ι Σύγχρονη Εκδοτική. Αθήνα 2004
- Παπαδόπουλος Α. Χρήστος, Στοιχεία Μηχανών, Εκδόσεις Τζιόλα, 2013
- Robert L. Norton, Design of Machinery: An Introduction To The Synthesis and Analysis of Mechanisms and Machines, Fifth Edition, McGraw Hill, 2011
- Steven R. Schmid, Bernard J. Hamrock, Bo. O. Jacobson, Fundamentals of Machine Elements, Third Edition, CRC Press, 2013
- Robert L. Norton, Machine Design: An Integrated Approach, 5th Edition

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOE1216	**SEMESTER**	3rd
COURSE TITLE	**Fluid Mechanics**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		4	5
Laboratory			
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Special background		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA192/		

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the present course is to understand the basic principles and laws of hydrostatics, fluid kinematics and fluid dynamics, as well as the solution methodologies of relative technical problems with an emphasis on non-viscous flows. Also, main objective of the course is to understand the underlying physics of representative fluid flows, their mathematical modeling and finally solving the corresponding equations by use of proper simulation software.

(3) COURSE CONTENT / SYLLABUS

Fluid properties

Basic principles of hydrostatics – pressure measurement, hydrostatic forces on surfaces, buoyancy, flotation and stability of floating bodies

Fluid kinematics and dynamics – Eulerian and Langrangian flow, material derivatives, flow field description, mass and volume flow rate, streamlines, streaklines, and pathlines, one-, two- and three- dimensional flows, uniform and non-uniform flows, steady and unsteady flows. Equations of continuity, momentum and energy for macroscopic and differential control volumes, Euler equations, Bernoulli equation.

Potential flow – streamline equations, vorticity, irrotational flow, velocity potential.

Complex potential, Blasius and Kutta-Joukowski theorems, conformal map.

Basic two dimensional potential flows – uniform flow, sources and sinks, circulation – free vortices.

Superposition of basic two dimensional potential flows - source in a uniform stream—half-body, doublet of source and sink, flow past a circular cylinder, μέθοδος της εικονικής ροής.

Joukowski and airfoil transformation.

Φέρουσες επιφάνειες, drag and lift forces.

Software use for solution of fluid mechanics problems.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	Use of programming languages for scientific calculations (Matlab, python, Julia) The learning process is supported by use of e-class platform

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

Activity	*Workload (hours)*
Lectures	39
Laboratory exercises	13
Homework assignments	39
Study and preparation for exam	52
Course total	**143**

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*	Finally written examination (70%) including: 1. theory questions 2. problem solution Evaluation of personal assignments (30%); the latter include solution of groups of exercises.

ATTACHED BIBLIOGRAPHY

- Elger D., Williams B., Crowe C., Roberson J., Engineering Fluid Mechanics, 10th Edition, ISBN-13: 978-1118372203, 2012.
- Munson - Okooshi - Huensch – Rothmayer, Fundamentals of Fluid Mechanics, 7th Edition, ISBN-13: 978-1118116135, 2012.
- Hughes W.F., Brighton J.A., Schaum's Ouline of Theory and Problems of Fluid Dynamics.
- Pritchard P.J., Fox and McDonald's Introduction to Fluid Mechanics, 8th edition, Wiley, 2011.
- White, F.M., "Fluid Mechanics", 5th edition, McGraw – Hill, 2003.

- *Relative scientific journals:*

Journal of Fluid Mechanics, ISSN: 0022-1120

European Journal of Mechanics - B/Fluids, ISSN: 0997-7546

Journal of Computational Physics, ISSN: 0021-9991

Journal of Fluids and Structures, ISSN: 0889-9746

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1217	**SEMESTER**	3rd
COURSE TITLE	**Thermodynamics**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		4	4
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	General background		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (Italian)		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NAFP111/ http://ocp.teiath.gr/courses/NAFP_UNDER110		

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to understand the basic principles and fundamentals of thermodynamics. During the course the students will be familiarized with the description and application of the physical concepts of work, heat, inner energy, temperature, entropy, the laws of thermodynamics and the use of tables and diagrams.

(3) COURSE CONTENT / SYLLABUS

1. Fundamental Concepts and Definitions : Terminology, definition and scope, microscopic and macroscopic approaches. Engineering Thermodynamics: Definition, some practical applications of engineering thermodynamics. System (closed system) and Control Volume (open system).

2. Ideal and real gases. Differences between ideal and real gases, equation of state for ideal gases, real gases. Van der Waal's equation of state, other equations of state.

3.The First Law of Thermodynamics. Basic concepts : system, state, equilibrium, process. Quasi –equilibrium processes. Equation of state.

4. Heat and Work: changing the state of a system. Zeroth law of thermodynamics. Work. The first law of thermodynamics and its corollaries: adiabatic, steady, throttling of a gas, quasi-static expansion of gas, transient filling of a tank. Enthalpy. Specific heats. Conservation of mass and energy in control volume form. Engineering cycles: properties of cycles, work and efficiency, general presentation of cycles, Carnot cycle, refrigerator and heat pump, Otto cycle, Diesel cycle, Joule cycle, Sabathe cycle.

5. The Second Law of Thermodynamics, Reversible processes, The second law of thermodynamics: statements and related concepts. Entropy changes in an ideal gas. Calculation of entropy change in basic processes.

6. Power cycles : Introduction, Practical Rankine Cycle, Reheat Cycle (continuation of Rankine cycle), Regenerative Cycle. Mollier and Ts-diagrams.

(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>• 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>39</td></tr>
<tr><td>Exercises to understand problems resolution</td><td>13</td></tr>
<tr><td>Personal study</td><td>65</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>117</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure</td><td>Final written examination : 80%</td></tr>
</table>

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	Evaluation of individual work : 20%

(5) ATTACHED BIBLIOGRAPHY

1. Thermodynamic (theory and exercises) , G Hatzikonstandis, UNIWA 2019
2. TERMODINAMICA E TRASMISSIONE DI CALORE, Y. Cangel & M. Boles, McGraw-Hill Education
3. Thermodynamics, ZEMANSKY, HOEPLI 2002
4. Fundamentals of Engineering Thermodynamics, MORAN & SHARPIRO, J. Wiley & Sons 2006

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1224	**SEMESTER**	4th
COURSE TITLE	**Manufacturing Processes**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		2	5
Laboratory		2	
Total		4	
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Special background		
PREREQUISITE COURSES:	NAOME1104		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NAFP123/		

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of this course is to familiarize the students with the basic manufacturing processes and the principles of cutting and forming materials. Emphasis is given both on theoretical and practical issues, such as performing measurements, calculations of material removal conditions and programming of CNC machines. Also, main objective of the course is to practice students to the use of conventional machines (lathe, drill, mill) for the construction of mechanical objects.

Upon successful completion of the course, the student will be able :

- To have the theoretical and practical background concerning the field of manufacturing technology.
- To select the required machines, tools, and materials for the production of a metal component.
- To understand and create the phases to produce a given object performing the necessary calculations for the required manufacturing conditions.
- To operate the lathe machine and other conventional machines (drilling, sawing, milling) to make an object according to a given mechanical drawing.
- To perform measurements of mechanical quantities using measuring instruments.
- To program CNC machines and develop the appropriate G-code for cutting a given object.

- To compare and evaluate modern product production technologies.
- To apply the principles and special regulations of health and safety at work, as required to be applied in mechanical work areas.

(3) COURSE CONTENT / SYLLABUS

Theory lectures:

- Introduction to Integrated Mechanical Product Design (Development - Design - Production - Quality Control).
- The machine shop (structure, operations, facilities, equipment, safety means and hygiene rules).
- Metrology. Statistical Process Control. Measuring instruments. Control and analysis of measuring systems. Errors and uncertainties. Gauges.
- Machining materials. Metalworking.
- Material formation processes (cutting, bending, deep-drawing, forging, drawing, wire-drawing, extrusion, rolling).
- Material removal processes (turning, milling, drilling, reaming, grinding, planning).
- Machine tool operation, cutting conditions and correlation with cutting tools. Cutting forces and power of machine tools. Processing times.
- Characteristics and basic principles of metal cutting (cutting mechanism, chip formation, heat contagion, cutting tools, tool wear, cutting fluids).
- New technologies for cutting materials (Electrical discharge machining, water cutting, plasma cutting, laser cutting).
- Rapid prototyping techniques (Stereolithography, Fused Deposition Modeling, Selective Laser Sintering, Laminated Object Manufacturing, 3D Printing - Binder Jetting).
- Programming of CNC machine tools. Structure and operation of numerical control NC - CNC machine tools.

Laboratory:

- Use of laboratory measuring instruments to determine the geometry of given objects.
- Laboratory exercise on sand casting.
- Laboratory exercise on cold rolling of metal plate.
- Construction of machining process sheets for cutting a shaft with gradations (cutting conditions calculation).
- Laboratory training on shaft cutting on a Maximat V13 lathe.
- Familiarize with cutting tools such as grinder, cutting saw, drills, Bridgeport CNC milling machine.
- Creation of G-code programs for cutting of a cylindrical object on a CNC lathe and cutting of a prismatic object on a CNC milling machine.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS	• Use of ICT in teaching.

<table>
<tr><td>TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Laboratory familiarization with measuring instruments, tools and machines.
• 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>26</td></tr>
<tr><td>Laboratory practice on machines, tools</td><td>26</td></tr>
<tr><td>Homework exercises</td><td>26</td></tr>
<tr><td>Visit to machine shop</td><td>5</td></tr>
<tr><td>Group project</td><td>13</td></tr>
<tr><td>Study of Lectures</td><td>47</td></tr>
<tr><td>Course total</td><td>143</td></tr>
</table>
</td></tr>
<tr><td>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</td><td>Theory:
Written examination (80%)
Midterm examination (20%)
Laboratory:
- Final written examination (50%).
- Laboratory examination on the use of cutting machines (50%).

The overall grade occurs from the grade of theory (50%) and the grade of laboratory (50%).</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

1. Manufacturing Technology: Materials, Processes, and Equipment, Helmi A. Youssef, Hassan A. El-Hofy, Mahmoud H. Ahmed, 2017, Publisher: CRC Press, ISBN 9781138072138.
2. Manufacturing Engineering Handbook, Second Edition, Hwaiyu Geng, 2015, Publisher: McGraw-Hill Education, ISBN: 9780071839778.
3. Principles of Modern Manufacturing SI Version, Global Edition, Mikell P. Groover, 2016, Publisher: John Wiley & Sons, ISBN: 9781119249122.
4. Handbook of Manufacturing Engineering and Technology [electronic resource], Andrew Y. C. Nee, 2015, ISBN: 9781447146704, HEAL-Link Springer ebooks. Κωδικός Βιβλίου στον Εύδοξο: 73263938.
5. Modern Manufacturing Engineering [electronic resource], J. Paulo Davim, 2015, ISBN: 9783319201528, HEAL-Link Springer ebooks. Κωδικός Βιβλίου στον Εύδοξο: 73265161.

COURSE

OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1325	**SEMESTER**	**4°**
COURSE TITLE	**Ship Resistance – Propulsion – Ship hydrodynamics**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures	4	5

COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialised
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (English)
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA200/

(2) COURSE GOALS / LEARNING OUTCOMES

The main goal of the course is to provide students with basic knowledge of ship resistance and propulsion evaluation. In particular the course examines the fluid dynamic mechanisms which control the flow around the hull creating resistance, the experimental techniques for measuring resistance components, the methods for predicting resistance using systematic series, the estimation of ship propulsive power, the powering process and propeller selection.

(3) COURSE CONTENT / SYLLABUS

- Phenomenological methods, Linear wave theory
- Ship resistance, Resistance components, Coherence resistance, Pressure resistance, Friction resistance, Wave resistance and related theories.
- Ship resistance prediction based on systematic series
- Calculation of ship resistance using the FORMDATA method and the Lap-Keller method

- Similarity theory, Dimensional analysis
- Experimental determination of resistance, Froude experimental method
- Ship propulsion, Propeller geometry, Propeller operation, Propeller - hull interaction factors
- Propeller systematic series, Propeller cavitation, Selection of marine propulsion machinery systems, Propeller – Engine matching

(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.
• Communication with students and support of learning procedure 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>52</td></tr>
<tr><td>Exercises / fieldwork</td><td>13</td></tr>
<tr><td>Study and analysis of bibliography</td><td>78</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>143</td></tr>
</table>
</td></tr>
<tr><td>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</td><td>Evaluation:
Written examination (100%) including problem solving, short-answer questions etc</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

- Larsson L. and Raven C. H., 2010, Principles of Naval Architecture Series: Ship Resistance and Flow, Soc. Naval Architects & Marine Eng. (SNAME)
- **Bertram, A:, 2012, Practical Ship Hydrodynamics, 2nd Edition,** Butterworth-Heinemann
- Lothar Birk, 2019, Fundamentals of Ship Hydrodynamics: Fluid Mechanics, Ship Resistance and Propulsion, Willey
- Rawson, K.J. and Tupper, E.C., 2001, Basic Ship Theory, Volume 2, Butterworth-Heinemann
- Harvald, S, 1983, Resistance and propulsion of ships, Wiley
- Lewis, EV (Ed), 1989, Principles of Naval Architecture, vol. 2: Resistance & Propulsion, Vibration, vol. 3: motion in waves, controllability, Soc. Naval Architects & Marine Eng. (SNAME)
- Lewandowski, E.M., 2004, The dynamics of marine craft (maneuvering and seakeeping), World Scientific

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1326	**SEMESTER**	5th
COURSE TITLE	**Ship Propulsion Plants**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures and case studies		2	5
Laboratory exercises		2	
Total		4	
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialised		
PREREQUISITE COURSES:	NAOME1223 - INTERNAL COMBUSTION ENGINES		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NAFP117/		

(2) COURSE GOALS / LEARNING OUTCOMES

This course aims initially to cover the way in which a suitable propulsion engine is selected for each ship, and then to provide with the study of the behavior of the different engines as well as the way in which they are installed and used on board.

Also the characteristics for Diesel and Natural Gas motors of the various types available are presented, as well as the auxiliary machinery necessary for their operation on a ship. The course includes the study of the entire shafting system that moves the propeller in torsional vibrations. Finally, the aim of the course is to educate students on the procedures and protocols of the testing and approval of operation of ships' main and auxiliary engines.

(3) COURSE CONTENT / SYLLABUS

1. Classification and description of ship propulsion installation.
2. Selection of Ship Main Engine
3. Engine / Propeller Cooperation
4. Seating of Ship Main Engine
5. Design and analysis of the shafting system of a ship.
6. Axial Torsional Vibration Analysis.
7. Basic Elements of Dynamic Diesel Engines.
8. Reliability and Maintenance of Propulsion Installations.
9. Financial Performance Analysis of Propulsion Installations.
10. Testing and approval of ship main and auxiliaries engines
11. Pollution-control systems for Ship main and auxiliaries engines
12. Laboratory Exercises (on the four-stroke experimental naval engine of the Department):

A) Basic Principles and Protocols for Testing Naval Engines
B) Exercise on Torque Measurement on the Axis
C) Exercise on Vibration Measurement.
D) Exercise on Noise Measurement
E) Exercise on Gas Exhaust Gas Measurement
F) Exercise on measurement of functional characteristics and drawing of thermal balance.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Use of ICT in teaching. • Support learning through the electronic e-class platform.
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*	

Activity	*Workload (hours)*
Lectures	26
Project case study – design of propulsion installation	26
Laboratory exercises on real Diesel Engine	26
Technical essays	26
Personal study	26
Visits	13

	Course total	**143**
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*	• Written final examination (70%) that includes solving problems related to the theory. • Evaluation of technical group work reports (30%). The grade corresponding to each technical report will be available to the student on the e-class platform.	

(5) ATTACHED BIBLIOGRAPHY

1. A. J. Martyr M A PLINT, Engine Testing , Theory and Practice, 3rd Edition, Butterworth-Heinemann, 2007
2. John Carlton, Marine Propellers and Propulsion, 3rd Edition, Butterworth-Heinemann, 2012
3. D. A. Taylor, Introduction to Marine Engineering, 2nd edition, Elsevier
4. D. Woodyard, Pounder;s Marine Diesel Engines and Gas Turbines, Elsevier
5. Roy L. Harrington, Marine Engineering, SNAME, 1992
6. Indra Nath Bose, Energy Efficiency and Ships, SNAME , 2012

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1328	**SEMESTER**	5th
COURSE TITLE	**LONGITUDINAL STRENGTH OF SHIPS**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		4	5
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialized		
PREREQUISITE COURSES:	NAOME1103 - Mechanics I		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA187/		

(2) COURSE GOALS / LEARNING OUTCOMES

The subject of this course is the longitudinal strength of the ship, when her hull is considered as a girder subjected to several static and dynamic loads. After a description of the several types of loads exerted on the hull girder, extensive reference is made to the calculation of the bending moment and shear force diagrams along the hull girder. Also, the course is focused on the calculation of the normal stresses due to hull bending and the distribution of the shear stresses due to the applied shear forces. As a special loading, the torsion of the hull girder is also considered and the resulted shear stresses due to torsion are calculated. In the context of the course, the calculation of the thermal stresses due to the carriage of heated cargoes is also considered. Finally, the Class requirements for the integrity of the hull girder are analyzed.

The aim of the course is the familiarization of the students with the assessment of the Longitudinal Strength of ships. Upon the successful completion of the course, the students will be in position to:

- Calculate the bending moments and shear forces along the hull girder.

- Calculate normal stresses due to bending.
- Calculate shear stresses due to shear forces and torsional moments.
- Assess the hull girder structural integrity.
- Understand the content of the ship's Loading Manual.
- To design safe loading conditions for ships and to prepare Loading Manuals.

(3) COURSE CONTENT / SYLLABUS

- Description of loads exerted on the hull-structure
- Assessment of weight and buoyancy distributions
- Construction of bending moment and shear force diagrams
- Assessment of normal stresses due to bending
- Assessment of shear stresses due to shear forces
- Assessment of shear stresses due to torsion
- Assessment of Midship Section integrity.
- Calculation of thermal stresses
- Influence of superstructures on the vessel's longitudinal strength.
- Loading Manual

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Development of useful worksheets • Training material is distributed in electronic format.
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*	

Activity	*Workload (hours)*
Lectures	52
Homework assignments	48
Personal Study	43
Course total	**143**

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*	Weight of final exams: 60% Weight of exercises: 40%

(5) ATTACHED BIBLIOGRAPHY

Books

- Alan Mansour, Donald Liu: The Principles of Naval Architecture Series-Strength of Ships and Ocean Structures, 2008
- J. Eyres, “Ship Construction”, Butterworth-Heinemann, 5th Ed., 2001
- Tupper, “Introduction to Naval Architecture”, Butterworth-Heinemann, 3rd Ed., 2002
- Owen Hughes & J.K. Paik, “Ship Structural Analysis and Design”

Indicative Journals

- Marine structures, ELSEVIER
- Journal of Ship Research, SNAME
- Marine Technology, SNAME

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1331	**SEMESTER**	5th
COURSE TITLE	**SHIP WELDING**		
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*	Specialized		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	Theory: https://eclass.uniwa.gr/courses/NAFP157/ Laboratory: https://eclass.uniwa.gr/courses/NAFP140/		

(2) COURSE GOALS / LEARNING OUTCOMES

The course of Welding in Shipbuilding is an important chapter in the education of the Naval Architecture, as it includes all the scientific and technical knowledge of joining plates and reinforcements of (mainly) the hull. The aim of the course is to familiarize students with welding methods in general, and in particular the methods and issues (because of welding) that occur in shipbuilding, during the construction of ships.

Upon successful completion of the course students will be able to:

• Choose the welding method and technique depending on the area of the ship and the parts to be welded.

• Draw welding symbols on construction drawings.

• Calculate the dimensions of the weld, according to the principles of Engineering and the regulations of the classification societies.

• Calculate the cost of welds.

Students will also have acquired knowledge on how to inspect welds, but also the basic principles of non-destructive welding inspection methods.

(3) COURSE CONTENT / SYLLABUS

About Welding in general: Advantages and Disadvantages of Welding, Classification of Welding Methods, General Principles of Fusion Welding, Joint Design, Welding Symbols, Welding Positions.
Modern welding methods: Arc welding and oxygen cutting, Shielded metal arc welding, Tungsten electrode (gas protection) arc welding, Gas metal arc welding, Submerged arc welding, Vertical fusion welding methods. Selection of welding methods. The use of different welding methods in Shipbuilding. Regulations of the Classification Societies.
Residual stresses in welding. Deformations of welded structures. Methods of reducing deformations.
Welding defects. Welding control. Non-destructive methods.
Welding Strength calculations and dimensioning.
Calculation of welding costs.

The course also provides laboratory hours in which students, after practicing, are evaluated in performing welds as follows:
1. Arc ignition and arc maintenance.
2. Bead on plate welds in flat position.
3. Butt joint welds of 5,0 mm thick steel hull plates in flat position.
4. Fillet welds of 5,0 mm thick steel hull plates in horizontal position.
5. Lap joint welds of 5,0 mm thick steel hull plates in flat position.
6. Corner joint welds of 5,0 mm thick steel hull plates in horizontal position.
7. Butt joint welds of 5,0 mm thick steel hull plates in horizontal position.
8. Butt joint welds of 5,0 mm thick steel hull plates in vertical-up position.
9. Oxy-fuel cutting.
10. MIG
11. TIG
12. Butt Welding of pipes.
13. Branch connection welds.

Students are aware of what exactly they will be asked to perform/execute days before the Lab.
Students also familiarized with the visual welding inspection equipment and the liquid penetrant / magnetic particle inspection methods. The welding inspection methods of eddy currents, ultrasonic and x-ray are also presented.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face Laboratory exercises
USE OF INFORMATION AND COMMUNICATIONS	Training material is distributed in electronic format through the e-class platform.

<table>
<tr><td>TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td></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>26</td></tr>
<tr><td>Laboratory exercises</td><td>26</td></tr>
<tr><td>Laboratory essay writing</td><td>26</td></tr>
<tr><td>Personal study</td><td>26</td></tr>
<tr><td>Course total</td><td>104</td></tr>
</table>
</td></tr>
<tr><td>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</td><td>Weight of final exams (theory and problems solving): 50%
Weight of laboratory exercises and oral examination: 50%</td></tr>
</table>

ATTACHED BIBLIOGRAPHY

Books

1. A.W.S., Welding Handbook (5 volumes), 7th edition, American Welding Society, 1976-1984.
2. Metals Handbook, vol. 6, Welding, Brazing and Soldering, 9th edition, American Society for Metals, Materials Park, Ohio, 1983.
3. Davies, A.C., The science and practice of welding (2 volumes),8th edition, Cambridge University Press, 1984.
4. Phillip, L.D., Shipyard welding processes for hull construction, Maritime Technology Monograph, No. 7, RINA, London 1980.
5. Tera, K., Recent progress of welding in shipbuilding, Australian welding journal, 1974.

Indicative Journals

1. Welding Journal
2. British Welding Journal
3. Journal of the Japan Welding Society
4. International Shipbuilding Progress
5. Journal of Ship Production and Design
6. SNAME Transactions
7. ASME Transactions
8. Technical Bulletins of Shipyards

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1232	**SEMESTER**	5th
COURSE TITLE	**Heat Transfer**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		4	4
COURSE TYPE *general background, specialbackground, specialized general knowledge, skills development*	Special background		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA213/		

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to educate the student in order to be able to understand and solve Heat Transfer problems. After the completion of the course, the student will be able to:

- Know the three heat transfer modes (conduction, convection, diffusion) and understand their basic principles and governing laws.
- Apply the appropriate governing equations in the analysis of basic heat transfer problems.
- Perform steady-state heat transfer calculations in simple and complex geometries, involving combination of heat transfer modes.
- Perform basic calculations for the sizing and rating problems of heat exchangers.

(3) COURSE CONTENT / SYLLABUS

Lectures:

- Introduction to heat transfer, thermophysical properties of materials, heat conductivity, heat transfer modes.
- Conduction, Fourier's law, thermal resistance, one-dimensional conduction in simple and composite-layer plane, cylindrical and spherical geometries, critical and optimum insulation thicknesses. Extended heat transfer surfaces, fins and their efficiency. Introduction to transient heat conduction.
- Convection, forced and natural. Hydraulically and thermally fully developed flow. Velocity and temperature boundary layer, laminar and turbulent flow, Reynolds, Prandtl and Nusselt numbers. Forced convection over plane, cylindrical and spherical geometries, in transverse flow around bundle of tubes, internal flow convection in ducts. Natural convection around bodies, Grashof number. Combined forced and natural convection.
- Radiation, black body, laws of Planck, Stefan-Boltzmann, Wien, Kirchoff, radiation properties of surfaces, coefficients of emission, absorption, reflection and permeability, grey body, radiation heat transfer, surface view coefficient.
- Conjugate heat transfer problems. Heat exchangers, classification. Calculation of geometry for given performance (sizing). Calculation of performance for given geometry (rating). Logarithmic Mean Temperature Difference (LMTD), NTU method.

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td colspan="2">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 colspan="2">• 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 colspan="2"><table>
<tr><th>Activity</th><th>Workload (hours)</th></tr>
<tr><td>Lectures</td><td>52</td></tr>
<tr><td>Homework assignments</td><td>26</td></tr>
<tr><td>Individual study</td><td>39</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>117</td></tr>
</table></td></tr>
</table>

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*	Evaluation: Written examination (100%). Alternatively, percentage of the final mark could be obtained by means of an assignment or a project presentation.

(5) ATTACHED BIBLIOGRAPHY

1. Holman J. P., 2009, Heat Transfer, McGraw – Hill (10th edition).
2. Incropera F. P., Dewitt D. P., Bergman T. L., Lavine A. S., 2006, Introduction to Heat Transfer, John Wiley & sons, Inc. (5th edition).
3. Kakaç Σ., Liu H., Pramuanjaroenkij A., Heat Exchangers: Selection, Rating, and Thermal Design, Third Edition, CRC Press, 2012.

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1333	**SEMESTER**	6th
COURSE TITLE	**Ship Engine Room Systems and Equipment**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		4	5
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialised		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NAFP108/		

(2) COURSE GOALS / LEARNING OUTCOMES

This course covers the key aspects of systems and equipment used in the engine room of ships and floating structures. The course aims at introducing the students to the main structural and functional characteristics of auxiliary machinery and systems of the ship's engine room. The course also familiarizes students with the supporting networks of the ship and their design. The course complements the course of MARINE ENERGY SYSTEMS AND SHIP PROPULSION PLANTS, by describing in detail all the systems supporting the operation of the ship's main and auxiliary (power generator) engines.

(3) COURSE CONTENT / SYLLABUS

1. Basic principles of design of hydraulic networks (piping dimensioning, pump selection, simulation of functional characteristics).
2. Main Engine Networks: Fuel (fuel oil, natural gas), coolant, lubricant, compressed air, steam, exhaust and combustion air.
3. Marine Networks: Ballast, Bilge, Central Cooling.

4. Ship cargo networks.
5. Mechanical ventilation networks.
6. Steam networks for the heating of tanks and pipelines: steam pipe networks, calculations of pressure drop, heat, steam traps, manufacturing of networks.
7. Fuel Tanks (Liquid and Gaseous) and Lubricants.
8. Fire-fighting networks and systems.
9. Processing systems (centrifugal separation, filtration, etc.) of ship fuels and lubricants.
10. Treatment, recirculation and preheating of water for use in steam boilers, safety regulations for steam generators, determination of deionization water characteristics at the various stages of Heat exchangers operation.
11. Compressed air production and storage systems.
12. Liquid natural gas storage and management systems.
13. Systems for desulphurization and denitrification of exhaust gases (SCR, Scrubbers).
14. Water Ballast Management Systems
13. Case studies and design of engine room networks.

(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>26</td></tr>
<tr><td>Exercises on theory</td><td>26</td></tr>
<tr><td>Case study essay</td><td>39</td></tr>
<tr><td>Personal study</td><td>52</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>143</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure
Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-</td><td>• Written final examination (70%) that includes solving problems related to the theory.</td></tr>
</table>

ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other	• Evaluation of technical group work reports (30%). The grade corresponding to each technical report will be available to the student on the e-class platform.

(5) ATTACHED BIBLIOGRAPHY

1. Taylor D.A., Introduction to Marine Engineering, Elsevier
2. McGeorge, H.G., Marine Auxiliary Machinery, BH
3. Harrington R.L., Marine Engineering, εκδόσεις SNAME

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1334	**SEMESTER**	6th
COURSE TITLE	**Ship Design**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		5	6
COURSE TYPE *general background, specialbackground, specialized general knowledge, skills development*	Specialized		
PREREQUISITE COURSES:	NAOME1318 - Ship Hydrostatics and Stability		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA243/		

(2) COURSE GOALS / LEARNING OUTCOMES

Ship Design I is a compositional course in the sense that it combines and uses knowledge of other specialized courses in order to conduct the preliminary design of a specific ship. Starting from ship-owner requirements students come to estimate the basic design parameters of a ship which satisfies, in an optimum manner, both ship-owner and Rules requirements. Aim of the course is students' familiarization with the basic methodologies and stages in Ship Design and especially:

- The estimation of main dimensions and hull-form coefficients of a ship
- The estimation of the various weight groups, the lightship and the weight margin of the ship
- The design of ship lines and the general arrangement
- The preliminary estimation of ship's trim and stability
- The calculation of the required freeboard according to Loadline Rules
- The preliminary estimation of the cost of ship

(3) COURSE CONTENT / SYLLABUS

Ship Design: Aims, owner's requirements, design specifications, stages in ship design.

Preliminary Design: Preliminary estimation of main dimensions and hull-form coefficients. Powering requirements. Weight groups and displacement equation. Displacement control, hold capacity control. Preliminary control of trim and stability, basic stability regulations of IMO. Loadline regulations and freeboard calculation. Preliminary estimation of construction cost.

In the context of the course, the students, divided in small groups of two persons, have to compile a study with subject "Preliminary selection of main dimensions and hull form coefficients. Displacement control". Each group is dealing with a different type and size of ship.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Support learning through the electronic e-class platform.
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*	Written examination (70%) Evaluation and oral examination on the work (30%)

Activity	*Workload (hours)*
Lectures	65
Homework assignments	39
Study of Lectures	65
Course total	**169**

presentation, laboratory work, clinical examination of patient, art interpretation, other	

(5) ATTACHED BIBLIOGRAPHY

Text books:

- Lewis, E.V., (ed), Principles of Naval Architecture, vol. I-III, SNAME Publ., New York, 1988.
- Lamb, T., (ed), Ship Design and Construction, SNAME Publ., New York, 2003.
- Rawson, K.J., Tupper, E.C., Basic Ship Theory, vol. I,II, Longman Scientific and Technical, 4th edition, 1994.
- Schneekluth, H., Bertram, V., Ship Design for Efficiency and Economy, Butterworth-Heinemann, 2nd edition, 1998.
- Taggart, R., (ed), Ship Design and Construction, SNAME Publ., New York, 1980.
- Αντωνίου, Α., Μελέτη Πλοίου, 2η Έκδοση, Εκδόσεις Σελλούντος, Αθήνα, 1984.
- Παπανικολάου, Α., Μελέτη Πλοίου-Μεθοδολογίες Προμελέτης, Τεύχη 1 και 2, Εκδόσεις Συμεών, Αθήνα, 2009.

Relevant Journals:

- Journal of Marine Science and Technology (Springer)
- Computer-Aided Design (Elsevier)
- Journal of Ship Research (SNAME)
- Ocean Engineering (Elsevier)
- Applied Ocean Research (Elsevier)

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1335	**SEMESTER**	6TH
COURSE TITLE	**STATIC ANALYSIS OF MARINE STRUCTURES**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		4	5
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialized		
PREREQUISITE COURSES:	NAOME1103 - Mechanics I and NAOME1211 - Mechanics II		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA205/		

(2) COURSE GOALS / LEARNING OUTCOMES

The course objective is the familiarization of the attendee with the solution of several static structural problems encountered during the design of the hull.

In the context of this course several topics from the field of Structural analysis of hull structures are examined, including the following:

- Buckling of columns and beams
- Bending of unreinforced and reinforced plates
- Buckling of plates
- Bending of composite beams
- Plastic analysis of beams

(3) COURSE CONTENT / SYLLABUS

1. Basic principles of Mechanics – Structural failure criteria
2. Structural design of ship structures
3. Elastic buckling of beams and columns
4. Bending of unreinforced plates
5. Bending of rectangular reinforced plates
6. Buckling of plates
7. Implementation of buckling requirements of IACS standard S11
8. Bending of composite beams
9. Plastic analysis of beams
10. Introduction to Finite Elements

(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>• Training material is distributed in electronic format
• Use of the code ANSYS Workbench</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>52</td></tr><tr><td>Homework assignments</td><td>39</td></tr><tr><td>Personal study</td><td>52</td></tr><tr><td>Course total</td><td>143</td></tr></table></td></tr>
<tr><td>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</td><td>Weight of final exams: 60%
Weight of exercises: 40%</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

Books

- J. Eyres, “Ship Construction”, Butterworth-Heinemann, 5th Ed., 2001
- Tupper, “Introduction to Naval Architecture”, Butterworth-Heinemann, 3rd Ed., 2002
- Owen Hughes & J.K. Paik, “Ship Structural Analysis and Design”

Indicative Journals

- Marine structures, ELSEVIER
- Journal of Ship Research, SNAME
- Marine Technology, SNAME

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOE1342	**SEMESTER**	6st
COURSE TITLE	**Maritime Transport Economics**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures	4	4

COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialised
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NAFP167/

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to understand the basic principles of international maritime trade and the shipping industry. Emphasis is placed on the understanding of demand - supply of modern maritime transportation system, the operation of shipping companies and the role of ports in the transportation system. Particular emphasis is given to the study of charters and freight calculations.

(3) COURSE CONTENT / SYLLABUS

Lectures:

- Financial organization of shipping market. The financial role of shipment.
- The international sea transportation system. The demand for sea transportation.
- World trade via mare. Geo allocation of sea trade. The global merchant fleet.

- Progress in shipbuilding technology, scale economies and ship size, cargo specialization, progress on cargo handling.
- Contribution of sea transportation. Bulk cargo (tramp) shipping. Liner shipping.
- Ferry transport. The European Commission Regulation on maritime cabotage. Short sea shipping.
- Port contribution in the transportation system. Port types. Congestion in ports. The largest ports in the world. Productivity of terminal stations. Port funding and investment.
- Structure and organization of a shipping company. Organization chart of the shipping company. Ship organization. Headquarters choice.
- Charters. Types of charters: single voyage charter, consecutive voyages charter, time charter, bare boat charter, contract of affreightment. Contract types. Management agreements. Freight scales. Freight calculation. Laytime calculation. Time charter calculation.
- Oil distribution network. Connection of fares and oil prices.
- Second hand shipment. Ship demolition. New ship order and scrap market.
- The private cost of providing maritime transport services.
- The social cost of providing maritime transport services. Maritime insurance.

(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>Case study analysis</td><td>25</td></tr>
<tr><td>Essay writing</td><td>30</td></tr>
<tr><td>Study of Lectures</td><td>32</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>117</td></tr>
</table>
</td></tr>
<tr><td>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</td><td>Lectures:
Written examination (80%)
Presentation of essay (20%)</td></tr>
</table>

presentation, laboratory work, clinical examination of patient, art interpretation, other	

(5) ATTACHED BIBLIOGRAPHY

1. Elements of Shipping, 8th Edition, Alan Edward Branch, 2007, Publisher: Routledge, ISBN: 9780415362863.
2. UNCTAD Review of Maritime Transport, United Nations Conference on Trade and Development.
3. The International Handbook of Shipping Finance [electronic resource], Manolis G. Kavussanos, Ilias D. Visvikis, ISBN: 9781137465467, HEAL-Link Springer ebooks, Κωδικός Βιβλίου στον Εύδοξο: 75493855.

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1338	**SEMESTER**	6th
COURSE TITLE	**Steam Boilers, Steam Turbines, and Applications in Marine Engineering**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		4	4
COURSE TYPE *general background, specialbackground, specialized general knowledge, skills development*	Specialized		
PREREQUISITE COURSES:	Thermodynamics		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/ET153/		

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to educate the student in order to obtain the theoretical and practical knowledge concerning steam production technology, as well as its use for power production through steam turbines. After the completion of the course, the student should:

- Be aware of basic elements of steam production technology, corresponding boiler configurations, basic subsystems and related measurement devices.
- Have the knowledge of power production by means of steam turbines and required auxiliary devices.
- Know heat losses and be able to calculate efficiency of a steam boiler, as well as of a steam boiler-steam turbine plant.

(3) COURSE CONTENT / SYLLABUS

Lectures:

- Water vaporization, steam boilers (classification, description, operational characteristics).
- Combustion and related calculations in steam boilers, dew point of flue gases, fuels, burners and combustion systems (for compatible solid, liquid or gas fuels).
- Energy calculations of a steam boiler, efficiency, heat losses.
- Main systems (vaporizator, superheater, reheaters, preheaters) and auxiliary systems (pumps, fans, elements of steam network, instruments for monitoring, safety, control, measurement) of steam boilers. Boiler maintenance and water processing issues.
- Energy production by means of steam turbines, ideal and real Rankine cycles, modifications of Rankine cycle for efficiency enhancement, reference to alternative cycles (e.g. Binary and Organic Rankine Cycles).
- Classification and characteristics of steam turbines, condensers, cooling towers, energy calculations. Thermal efficiency of a steam boiler-turbine plant. Matching and cooperation of steam boiler and steam turbine. Load control, operation in partial loads.
- Applications of steam boilers and steam turbines in Marine Engineering (Marine boilers, energy systems in ships, cogeneration, combined cycle).

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Support learning through the electronic e-class platform.
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*	

Activity	***Workload (hours)***
Lectures	44
Laboratory demonstration	8
Homework assignments	39
Individual study	52
Course total	***143***

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*	Lectures: Written examination (100%). Alternatively, percentage of the final mark could be obtained by means of an assignment or project presentation.

(5) ATTACHED BIBLIOGRAPHY

- E.B. Woodruff, H.B. Lammers, T.F. Lammers, "Steam Plant Operation", 7th Edition, Mc Graw Hill, 1998.
- D. Anarratone, "Steam Generators: description and design", Springer Verlag, 2008.
- V. Ganapathy, "Industrial Boilers and Heat Recovery Steam Generators: design, application and calculations", Marcel Dekker, 2003.
- Flanagan G.T.H., Marine boilers, Oxford : Newnes, 1990.

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1339	**SEMESTER**	7th
COURSE TITLE	**Ship Construction Drawings**		

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*	Specialized
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (Italian)
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA180/

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to familiarize students with the basic principles and fundamentals of the ship construction drawings. The course includes the description of the ship structure, methods and systems structure, stiffener forms used to the ship construction, construction planning, ship structure design and calculations.

(3) COURSE CONTENT / SYLLABUS

3. LECTURES
   Fundamental concepts and definitions: ships terminology, symbols and construction design basic principles, longitudinal and transverse construction systems, stiffeners design, bottom and deck forms. General arrangement plans, construction plans, rudder construction, engine setting design.

4. LABORATORY
Construction drawings, calculations.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Support learning through the electronic e-class platform. • https://eclass.teiath.gr/courses/NAFP113/ • https://eclass.teiath.gr/courses/NAFP114/ • https://ocp.teiath.gr/courses/NAFP_UNDER114/ (VIDEO lectures)
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*	3. Lectures (50 %) 1A. theoretical questions 2A. calculation problems 4. Laboratory (50 %) - Construction plan drawing examination

Activity	*Workload (hours)*
Lectures	26
Laboratory exercises	26
Homework assignments	26
Study of Lectures	39
Course total	**117**

(5) ATTACHED BIBLIOGRAPHY

- Tecnologia della nave, Lomeo, Genova, 1980
- Costruzioni Navali, Rizzo / Tedeschi, Genova 2007
- Ship Design and Construction, SNAME
- Structural design of sea – going ships , N. Barabanov
- Ship Construction , D.J. EYRES , Redwood Books , 1994
- SHIP CONSTRUCTION DRAWING, G. Hatzikonstandis, UNIWA,2019
- R.I.N.A. (Registro Italiano Navale), Rules and Regulations

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOE1340	**SEMESTER**	7th
COURSE TITLE	**SHIP BUILDING TECHNOLOGY**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		4	5
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialized		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA233/		

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is the familiarization of the students with the basic stages of shipbuilding, starting from the production of the Technical Specifications that must be followed during the construction until the successful completion of the acceptance tests of the ship.

The ultimate goal of the course is to provide the students with all the necessary knowledge to supervise the shipbuilding and to help them to perform the activity of the supervising inspector (site surveyor), either on behalf of the shipowner or on behalf of the Classification Society.

(3) COURSE CONTENT / SYLLABUS

Theory:

- Production of shipbuilding technical specifications
- Construction materials
- Fatigue of constructions
- Preparation of plates
- Preparation of pieces for the construction of frames
- Methods of connecting frames and blocks in slip-ways and dry dock
- Alignment of ship construction
- General issues of quality control of ship production
- Ship equipment
- Ship launching preparation and phases
- Ship acceptance tests.

Exercises are prepared on ship data (construction drawings-test results) that include:

- Checking compliance with agreed technical specifications.
- Calculation of weight of metal construction of frames.
- Calculation of low - high frequency fatigue
- Evaluation of acceptance test results (speed - consumption-vibrations)

(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>• Training material is distributed in electronic format.</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>52</td></tr>
<tr><td>Team projects</td><td>39</td></tr>
<tr><td>Personal Study</td><td>52</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>143</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION</td><td>Weight of final exams: 60%</td></tr>
</table>

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	Weight of exercises: 40%

(5) ATTACHED BIBLIOGRAPHY

Books

- Lee Storch, Hammon, Bunch & Moore, "Ship production", Cornell Maritime Press, 1995.
- Eyres D.G., Bruce G.J, "Ship Construction", Butterworth-Heinemann, 2012.
- Yamaguchi, Y., "Fatigue Failures in Ship Structures", Journal of the Japan Welding Society, Vol. 37, No. 10, 1965

Indicative Journals

- Journal of Ship Production and Design, SNAME
- Marine Technology, SNAME

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1341	**SEMESTER**	**7°**
COURSE TITLE	**Small Craft Technology**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		4	5
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialized		
PREREQUISITE COURSES:	NAOME 1325 - Ship Resistance – Propulsion – Ship hydrodynamic)		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (English)		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NAFP115/		

(2) COURSE GOALS / LEARNING OUTCOMES

The main goal of the course is to provide students with fundamental knowledge of the performance and design of small craft. Particular emphasis is given on the understating of the basic mechanics and design principles of high speed crafts and sailing yachts.

(3) COURSE CONTENT / SYLLABUS

- General Description - Types of small crafts
- Design of small crafts
- Materials and construction of small crafts
- Types of high speed crafts
- Planning hulls - Resistance calculation of planning hulls
- Systematic series of semi-displacement and planing hull forms
- Propulsion of high speed crafts
- Sailing yachts
- Geometry of sailing - Analysis of forces acting on the hull of sailing yachts
- Systematic series of sailing yachts

(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.
• Communication with students and support of learning procedure 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>26</td></tr>
<tr><td>Exercises / fieldwork</td><td>26</td></tr>
<tr><td>Project and essay writing (Evaluation of Resistance – Propulsion)</td><td>43</td></tr>
<tr><td>Study and analysis of bibliography</td><td>45</td></tr>
<tr><td>Visits</td><td>3</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>143</td></tr>
</table>
</td></tr>
<tr><td>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</td><td>Evaluation:
- Written examination including problem solving, short-answer questions etc</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

- Larsson L. & Raven C. H, Principles of Naval Architecture Series: Ship Resistance & Flow, Soc. Naval Architects & Marine Eng. (SNAME), 2010
- Robert J. Scott, Fiberglass Boat Design & Construction, 2nd Edition SNAME, 1996
- Odd M. Faltinsen, Hydrodynamics of High-Speed Marine Vehicles, Cambridge University Press, 2006
- Roger Marshall, All About Powerboats: Understanding Design and Performance, International Marine/Ragged Mountain Press, 2002
- P.R.Payne, Design of High Speed Boats: Planing, Fishergate Pub Co, 1988
- C.A. Marchaj, Sail Performance, Adlard Coles Nautical, 2003
- Yun, Liang, Bliault, Alan, High Performance Marine Vessels, Springer, 2012
- Lawrence J. Doctors: Hydrodynamics of high-performance marine vessels, Springer, 2016
- C.A. Marchaj, Aero-Hydrodynamics of Sailing, Adlard Coles Nautical, 1988
- Lars Larsson – Rolf Eliasson, Principles of Yacht Design, Adlard Coles Nautical, 1994

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1336	**SEMESTER**	7th
COURSE TITLE	**CLASSIFICATION SOCIETIES RULES**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		3	4
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialized		
PREREQUISITE COURSES:	NAOME1328 - Longitudinal Strength of Ships		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA204/		

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is the familiarization of the attendee with the structure, the content and the implementation of the Rules of the Classification Societies.

Precisely, the students will learn:

1. The content of the Class rules in contradiction to the statutory requirements.
2. The Class Survey requirements depending on the ship's type and age.
3. The Class requirements for the ship construction materials.
4. To apply the Class rules for the assessment of ship scantlings.
5. The class requirements for the design of the machinery and electrical installations.
6. To examine compliance of fire protection systems with the Rule requirements.
7. About the novelties introduced with the IACS Common Structural Rules.

(3) COURSE CONTENT / SYLLABUS

- Lecture 1: Class and Statutory Requirements
- Lecture 2: Class Certificates and Statutory certificates
- Lecture 3: IACS and Legislative Requirements
- Lecture 4: Class Survey requirements – Thickness measurements
- Lecture 5: Steel grades and other alloys used in ship building
- Lecture 6: Weldings
- Lecture 7: Longitudinal Strength
- Lecture 8: Calculation of hull scantlings – Corrosion allowances
- Lecture 9: Propulsion Installations and auxiliary machinery
- Lecture 10: Main piping systems and their design
- Lecture 11: Electrical Installations
- Lecture 12: Automation Systems
- Lecture 13: Fire protection
- Lecture 14: Common Structural Rules for Oil Tankers and Bulk Carriers

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Training material is offered in electronic format
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*	Weight of Final Exams: 60% Weight of Exercises: 40%

Activity	*Workload (hours)*
Lectures	39
Homework assignments	39
Personal study	39
Course total	**117**

presentation, laboratory work, clinical examination of patient, art interpretation, other	

ATTACHED BIBLIOGRAPHY

- IACS Harmonized Common Structural Rules
- IACS Blue Book
- Rules of several Classification Societies
- Lagoni, N, “The Liability of the Classification Societies”, Springer, 2007.

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1344	**SEMESTER**	7th
COURSE TITLE	**Special Topics In Shipbuilding Materials**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		3	4
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialized		
PREREQUISITE COURSES:	NAOME1213 - NAVAL MATERIALS TECHNOLOGY		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (English)		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA225/		

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to familiarize the students with:

- The factors that determine the properties and the mechanical behavior of metallic and non-metallic materials.
- The various processes of producing and manufacturing materials with specific properties, as well as the methods that improve the properties of these materials.
- The metals and alloys of interest in marine and shipbuilding technology, as well as their specifications.
- The methods of production, the manufacturing processes, the chemical composition and properties of materials used in shipbuilding.
- The evaluation and selection of materials for ship and off-shore structures.
- The use of technical information and data for the selection and application of the appropriate materials in ship and off-shore structures.
- The current trends and developments in the area of the materials used in shipbuilding and marine technology.

(3) COURSE CONTENT / SYLLABUS

Lectures:

- Dislocations and other defects in the structure of materials.
- Phase diagrams and phase transformations.
- Strengthening mechanisms.
- Thermal processing of metal alloys.
- Surface treatment of metals and alloys.
- Fracture and failure of materials.
- Steel and cast iron in shipbuilding.
- Marine and naval copper alloys.
- Marine and naval aluminum alloys.
- Structure and properties of polymers.
- Processing of polymers.
- Composite materials.
- Wood in shipbuilding.

(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>• Communication with students and support of learning procedure 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>39</td></tr>
<tr><td>Study of Lectures and Homework assignments</td><td>78</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>117</td></tr>
</table>
</td></tr>
<tr><td>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</td><td>Written examination (100%).</td></tr>
</table>

presentation, laboratory work, clinical examination of patient, art interpretation, other	

(5) ATTACHED BIBLIOGRAPHY

Suggested readings:

- W.D. Callister and D.G. Rethwisch, "Materials Science and Engineering", 9th ed. Wiley Interscience, 2014.
- B.S. Mitchell, "An Introduction to Materials Engineering and Science", Wiley Interscience, New Jersey, 2004.
- J.F. Shackelford, Y. Han, S. Kim, S. Kwon, "CRC Materials Science and Engineering Handbook", CRC Press, New York, 2016.

Journals and other material:

1. Materials. *www.mdpi.com/journal/materials*
2. Journal of Materials Science. *https://link.springer.com/journal/10853*
3. TJPRC: Journal of Naval Architecture and Marine Engineering. *http://www.tjprc.org/journals/tjprc-journal-of-naval-architecture-and-marine-engineering1112*

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1345	**SEMESTER**	7th
COURSE TITLE	**Corrosion of materials – Protection and maintenance of naval structures**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		3	4
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialized		
PREREQUISITE COURSES:	NAOME1213 - NAVAL MATERIALS TECHNOLOGY		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (English)		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA226/		

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to familiarize the students with :

- The principles of electrochemistry.
- The mechanisms of corrosion in metals.
- The thermodynamic aspects of corrosion.
- The kinetics of corrosion.
- The various forms of corrosion.
- The various methods of protection against corrosion.
- The use of anti-corrosive technology.
- The protection of naval and marine structures against corrosion.
- The survey and maintenance of naval and marine structures.
- The current trends and developments in the area of corrosion science and engineering.

(3) COURSE CONTENT / SYLLABUS

Lectures:

- An overview of the corrosion process.
- Electrochemistry (oxidation and reduction half reactions, electrochemical potential, galvanic cells, Faraday's law).
- Thermodynamics of corrosion (equilibrium electrochemistry, Nernst equation, Reference electrodes, Pourbaix diagrams).
- Kinetics of corrosion (corrosion rate, polarization, overpotential).
- Forms of corrosion.
- Corrosion of shipbuilding materials.
- Corrosion in ship and marine structures.
- Anti-corrosive protection (design, cathodic protection, SACP, ICCP, passivity, protecting coatings, inhibitors and passivators).
- Marine coatings and paints.
- Survey and maintenance of naval structures.

(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>• Communication with students and support of learning procedure 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>39</td></tr>
<tr><td>Study of Lectures and Homework assignments</td><td>78</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>117</td></tr>
</table>
</td></tr>
<tr><td>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</td><td>Written examination (100%)</td></tr>
</table>

ATTACHED BIBLIOGRAPHY

Suggested readings:

- E. McCafferty, "Introduction to Corrosion Science", Springer edition, London, 2009.
- R. Revie, H. Uhlig, "Corrosion and Corrosion Control. An Introduction to Corrosion Science and Engineering, 4th edition, Wiley Interscience, New York, 2008.
- R. Singh, "Corrosion control for offshore structures", Elsevier, 2014.
- D.A. Bayliss and D.H. Deacon, "Steelwork corrosion control", Spon Press, 2002.
- P.R. Roberge, "Corrosion Engineering. Principles and Practice", McGraw-Hill, New York, 2008.

Journals and other material:

- *Corrosion Science*, Elsevier. *www.journals.elsevier.com/corrosion-science*
- *Materials and Corrosion*, Wiley. *https://onlinelibrary.wiley.com/journal/15214176*
- *Journal of Corrosion Science and Engineering.* *www.jcse.org*
- *Corrosion Engineering, Science and Technology,* *www.tandfonline.com/toc/ycst20/current*

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1247	**SEMESTER**	7th
COURSE TITLE	**Refrigeration – Air Conditioning**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures	4	4

COURSE TYPE *general background, specialbackground, specialized general knowledge, skills development*	Special background
PREREQUISITE COURSES:	NAOME1217 - Thermodynamics
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA208/

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to understand the principles of thermal comfort air conditioning, as well as the need for industrial refrigeration and to be able to design the required relevant systems. After the completion of the course, the student should:

- Know the basic characteristics of the refrigeration and air conditioning systems in small scale applications and industrial plants.
- Perform calculations of heat losses and cooling loads in a closed space.
- Demonstrate in simple case studies the calculation and design of a ventilation and air conditioning system, as well as the related refrigeration plant.
- Be aware of energy conservation technologies and environmental laws concerning CO2 reduction, in order to design mechanical engineering plants with ecological conscience.

(3) COURSE CONTENT / SYLLABUS

Lectures:

- Introduction, definition, thermal comfort air conditioning, industrial refrigeration, applications in Marine Engineering, kinds of cooling machines, thermodynamics of cooling cycles, inverse Rankine and Brayton cycles. Trigeneration plants.
- Theoretical and real cooling vapor compression cycles, compressor isentropic efficiency, superheating of refrigerant vapor, subcooling of refrigerant condensate. Calculation and improvement of coefficient of performance (COP). Two-stage and multi-stage refrigeration systems. Heat pump and its operation in heating and cooling modes. Elements of refrigeration plants: compressors (various types), condensers (air-cooled, water-cooled) evaporators, expansion valves, control and safety systems. Performance calculations in refrigeration plants. Vapor absorption refrigeration plants (H2O/LiBr and NH3/H2O). Environmental impact of refrigerants, Ozone Depletion Potential (ODP), Global Warming Potential (GWP). Reference to liquefaction cycles (high-low pressure), cryogenic gases.
- Psychrometry, psychrometric chart, psychrometric processes, sensible and latentloads, the air conditioning problem. Thermal comfort, required ventilation, selection of indoor and outdoor design conditions, kinds of cooling loads, thermal inertia, time lag phenomena. Calculation of heating and cooling loads.
- Overview of an air conditioning system. Mechanical installations. Classification of air conditioning systems. Calculation of air conditioning systems on the psychrometric chart. Design of air conditioning system in case studies. Calculation of cooling coil, hydraulic network, duct sizing and pump selection. Mechanical ventilation, calculation of air ducts, fans and air diffusers. Air-to-air heat exchangers. Part-load operation, energy consumption estimation. Reference to control and energy conservation systems in air conditioning plants.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Support learning through the electronic e-class platform.
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-*	

Activity	*Workload (hours)*
Lectures	44
Laboratory demonstration	8
Homework assignments	30
Individual study	35

directed study according to the principles of the ECTS	Course total	***117***
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*	Evaluation: Alternatively, percentage of the final mark could be obtained by means of an assignment or project presentation.	

(5) ATTACHED BIBLIOGRAPHY

- McQuiston C. F, Parker D. J., Heating, Ventilating and Air Conditioning. Design and Analysis, 1994.
- Whitman W.C., Johnson W.M., Tomczyk, J.A. Refrigeration and Air Conditioning Technology, Concepts, Procedures, and Troubleshooting Techniques, Delmar Publishing, 7th edition, 2013.

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1248	**SEMESTER**	7th
COURSE TITLE	**Business Administration and Management and Entrepreneurship**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures and case study projects	3	4

COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Special background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NAFP128/

(2) COURSE GOALS / LEARNING OUTCOMES

This course covers the basic aspects of Organization and Business Administration Science. The course goal is to introduce students to the processes of organizing medium and large enterprises and to present their basic principles of management.
The aim of the course is to present in detail the general characteristics of Greek enterprises and the influence of management on their activation and also to familiarize students with the use of management and decision making methods.
The course also covers introductory concepts of Organization and Staffing, Human Resource Management, Business control, so that the student has a comprehensive understanding of procedures and methodologies in organizing and managing business in the wider maritime area and shipping companies. Finally, the aim of the course is to understand the importance of entrepreneurship in the modern economy.

(3) COURSE CONTENT / SYLLABUS

1. Forms of Economic Activity - Economic Organizations.
2. Management as an incentive-activating mechanism for businesses and organizations.
3. Decision Making Analysis (Methods and Tools).
4. Forms of Organizational Function.
5. Project Management.
6. Supply Chain Management (Logistics)
7. Human Resources Management - Staffing.
8. Business control and feedback.
9. Basic Principles of a Business Plan.
10. Technical & Economic evaluation of Investments - Business Decisions. The temporal change in the value of money. Cash Flow. The main evaluation criteria, IRR, NPV, PBP. Applications and examples in the concepts of NPV, IRR, PBP. Applications in Investment Evaluation. Practical examples of investment evaluation in the field of engineering. Exercises and cash flow estimation and evaluation of business plans. Case studies on energy and construction work.
11. Reading and interpreting balance sheets. Financial analysis of enterprises. Financial Indicators. Applications in index calculation and financial analysis. Applications in the Financial Statement Analysis of Financial statements.

(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>• Support learning through the electronic e-class platform.
• Lectures through software for presentations available on the course website.</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>26</td></tr>
<tr><td>Practice exercises focusing on the application of methodologies and analysis of case studies</td><td>26</td></tr>
<tr><td>Group project in a case study. Drawing up business plans.</td><td>26</td></tr>
</table>
</td></tr>
</table>

	Study of Lectures	39
	Course total	***117***
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*	• Written final examination (80%) that includes solving problems related to the theory. • Evaluation of technical group work reports (20%).	

(5) ATTACHED BIBLIOGRAPHY

1. Heinz Weihrich, Harold Koontz, Management: A Global Perspective, McGraw Hill
2. Joan Magretta, What Management Is, Free Press, 2002
3. Peter Drucker, Management: Tasks, Responsibilities, Practices, Harper Business, 1993
4. Edmund R. Gray, Larry R. Smeltzer, Management: The competitive edge, Kendall Hunt Pub Co, 2nd Revised edition (June 1996)
5. Stephen Robbins, Mary Coulter, Management, 13th edition, Pearson, 2015

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1349	**SEMESTER**	7th
COURSE TITLE	**Port Management and Operations**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		3	4

COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialised
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA260/

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to familiarize the students with port operations and their role in the maritime transport chain. The course material also aims to introduce students to issues related to port design and development, port competitiveness, the port services and facilities and the application of optimization methods. Finally, students will gain knowledge of the authorities and regulations governing port facilities.

(3) COURSE CONTENT / SYLLABUS

- The role of ports in the maritime transport chain. Port services and facilities.
- Port design and development. Loading, unloading, storage and management of cargo. Types of terminals.
- Maritime traffic management issues, ship-port interconnection.
- Organization and management of ports.
- Port authorities and responsibilities.

- International Ship and Port Facility Security Code (ISPS).
- Port competitiveness.
- Investments (expansion, improvement and maintenance of port infrastructure and shipbuilding zone).
- Intermodal transport projects with private investment.
- Automation of port operations. New generation port security systems (smart systems). Integrated information systems.
- Green ports, Sustainable development, Environmental management practices.
- The cost of quality in ports.

(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>39</td></tr>
<tr><td>Case study project</td><td>26</td></tr>
<tr><td>Homework assignments</td><td>13</td></tr>
<tr><td>Study of Lectures</td><td>39</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>117</td></tr>
</table>
</td></tr>
<tr><td>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</td><td>• Written final examination (80%).
• Evaluation of technical work reports (20%).</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

- Dynamic Shipping and Port Development in the Globalized Economy [electronic resource], Paul Yae-Woo Lee, Kevin Cullinane, 2016, ISBN: 9781137514233, HEAL-Link Springer ebooks. Κωδικός Βιβλίου στον Εύδοξο: 75484656.

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1351	**SEMESTER**	8th
COURSE TITLE	**Floating Offshore Structures**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		5	6
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialized		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA191/		

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to familiarize the students with :

- The description of the wave environment
- The evaluation of wave loading in real fluids

with particular emphasis to special geometric configurations used in offshore applications.

(3) COURSE CONTENT / SYLLABUS

Lectures:

- Types of offshore structures (jackup, semisubmersible, Tension Leg Platforms, ect)
- Description of the wave environment (wave, wind, current)
- Wave theories

- Evaluation of wave loading on slender marine structures in real fluids (Morison Type Loading)
- Evaluation of the wave loading and motions of large-volume structures
- Evaluation of wave loading and motions
- Hydrodynamic mass
- Results for typical offshore structures
- Applications

Laboratory:

Free - fixed floating offshore structures experiments (wave run up, motions, etc.).

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Support learning through the electronic e-class platform.
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*	

Activity	*Workload (hours)*
Lectures	52
Laboratory exercises	13
Homework assignments	39
Study of Lectures	52
Course total	**156**

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*	Lectures: Written examination (80%) Laboratory: Laboratory exercises (20%).

presentation, laboratory work, clinical examination of patient, art interpretation, other	

(5) ATTACHED BIBLIOGRAPHY

- O.M. Faltinsen, "Sea Loads on Ships and Offshore Structures", Cambridge University Press, Cambridge Ocean Technology Series, Cambridge, New York, 1990
- J.N. Newman, "Marine Hydrodynamics", MIT Press, Cambridge, Mass., 1977
- T. Sarpkaya, "Wave Forces on Offshore Structures", Cambridge University Press, New York, 2010
- Journee and Massie, "Offshore Hydromechanics", Delft University of Technology, 2001.
- Elements of Ocean Engineering, Robert Randall, 2010, ISBN: 978-0-939773-77-0 Greek Section of the Society of Naval Architects & Marine Engineers.
- Mazarakos T. P. 2014. "Special Marine Constructions & Sailing Vessels", offshore structure experiments, Athens, 2014.

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1362	**SEMESTER**	8th
COURSE TITLE	**DYNAMICS AND VIBRATIONS OF MARINE STRUCTURES**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures	5	6

COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialized
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (English)
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA202

(2) COURSE GOALS / LEARNING OUTCOMES

Subject module teaches aspects in dynamics and vibrations ship structures as shown below:

- Free and forced vibrations in one degree of freedom.
- Response of linear dynamical systems under harmonic excitation.
- The effect of damping in ship vibrations
- Ship Hull-girder, shaft, propeller and engine vibrations is ships.

The methodology of using FEA methods for assessing the ship vibrations is also explained.

By successful completion of the module, students will be able to:

- Calculate typical vibration problems and have a deep insight in the vibrations experienced by the ship structures.

Students will learn how to search and analyse data in order to compose solutions required for decision making and develop their critical thinking. Such will be also

accomplished by course assignment.

(3) COURSE CONTENT / SYLLABUS

Subject module discusses the following aspects:

1) Introduction of Dynamical Systems
2) Types of Dynamical Systems and types of External Excitations
3) Second Order Linear Differential Equations for Ship Vibrating Problems and Equations of Motion
4) Discretization Means of Vibrating Structures
5) Vibrations of Dynamical Systems in One Degree of Freedom
6) Vibrations of Dynamical Systems in Multi-Degrees of Freedom
7) Free Vibrations with and without Damping
8) Forced Vibrating Dynamical Systems under Harmonic Excitation
9) Forced Vibrating Dynamical Systems under Periodic Excitation
10) Vibrations under Impact Loads
11) Fourier & Laplace Transformations
12) Continuous Vibrating Systems
13) Harmonic Vibration Analysis
14) Vibration Measurements and Required Vibration Limits of Structures
15) Axial, Torsional and Whirling Shaft Vibrations. Shaft Alignment Procedure
16) FEA assessment techniques for Ship Vibration
17) Hull-Girder Ship Vibrations
18) Main Engine, Propeller and Wheelhouse Vibrations

(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>• Support learning through the electronic e-class platform.
• Specialized Software Ansys</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</td><td>
<table>
<tr><th>Activity</th><th>Workload (hours)</th></tr>
<tr><td>Lecturing</td><td>65</td></tr>
<tr><td>Assignments</td><td>39</td></tr>
<tr><td>Self-Study</td><td>52</td></tr>
</table>
</td></tr>
</table>

activity are given as well as the hours of non-directed study according to the principles of the ECTS	Course total	***156***
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*	Semester exams including problem solving (70%). Course assignment(s) (30%).	

(5) ATTACHED BIBLIOGRAPHY

Bibliography:

1. Thomson, W.T., (1988), Theory of Vibration with Applications, Unwin Hyman LTD.
2. Meirovitch, L., (1975), Elements of Vibration Analysis, McGraw-Hill,
3. Lin, Tian Ran (2009) Vibration of ship structures and its control. VDM Publishing House, Germany
4. Anil K. Chopra, (2017), Dynamics of Structures, 5th Edition, University of California at Berkeley, Prentice Hall
5. Beards C.F. (1996): Structural Vibration: Analysis and Damping, Arnold.
6. Dietmar Gross, Werner Hauger, Jörg Schröder, Wolfgang A. Wall & Sanjay Govindjee (2011): Engineering Mechanics 3: Dynamics, Springer
7. ABS (2018): Guidance on Ship Vibration.
8. ABS (2019): Guidance Notes on Shafting Alignment.
9. ABS (2017): Guidance Notes on Noise and Vibration Control for Inhabited Spaces.
10. Lloyds Register (2006): Guidance Notes on Ship Vibration and Noise.
11. Lloyd's Register of Shipping (2015): General Overview of Ship Structural Vibration Problems, Guidance Notes.
12. Asmussen I., Menzel W. & Mumm H. (2001): Ship Vibration, GL – Technology.
13. IMO Resolution A.468(XII): Code on Noise Levels on Board Ships.
14. IMO Resolution MSC.337(91): Adoption of the Code on Noise Levels on Board Ships.
15. Masaki M., Tatsuhiro O., Yasuhisa O. and Yu Takeda (2009): Practical Design of Hull Structures, Springer Publishers
16. Vorus W.S. (1988): Vibration, Principles of Naval Architecture Vol.II (Lewis E. Editor), SNAME.
17. Anil V. Rao (2009): Mechanical Vibrations, University of Florida.

Journals:

1. Marine structures, ELSEVIER
2. Journal of Ship Research, SNAME
3. Marine Technology, SNAME

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1266	**SEMESTER**	8th
COURSE TITLE	**Fuels and Lubricants Technology**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures	3	4

COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Special background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to educate the students on basic technological knowledge regarding fuels and lubricants, focusing on the ones used in marine technology. After the completion of the course, the student will be able to:

- know the origin, composition, structure, properties of fuels and lubricants
- know about the technology and applications of marine fuels and lubricants.
- be able to apply the knowledge they have acquired and solve problems related to the characteristics and quality control of marine fuels and lubricants.
- meet the broader scientific and technological requirements of shipbuilding regarding the fluid and lubricants sector.

(3) COURSE CONTENT / SYLLABUS

The course starts with an introduction to energy, conventional energy sources and conventional fuels, solids, liquids and gases. Reference is made to crude oil, key refinery processes and its major derivatives. Oil products and specifications of all transport fuels are studied: gasoline and its specifications, octane number and correlation with the operation of gasoline engines, kerosene and aviation fuels, gasoline and its specifications, cetane number and correlation with the operation of diesel engines. Subsequently, marine fuels, distillation fractions and residuals, their properties and basic qualitative characteristics, kinematic viscosity, density, ignition point, cetane index, water content, sulfur content, etc. are analyzed. A brief historical evolution of the specifications of marine fuels to the most recent ones is described. Reference is made to the phenomenon of combustion, and its harmful emissions are correlated with the above characteristics of marine fuels. Reference is also made to key issues of transport, storage and management of marine fuels. Renewable substitutes for liquid fuels, bioethanol and biodiesel are then analyzed. Reference is made to natural gas, in compressed and liquefied form (i.e. CNG, LNG) with particular emphasis on LNG, as an important marine fuel and the Wobbe index. The uses of LPG and methanol are also studied as marine fuels. There is also a brief reference to solid fuels and their applications. With regard to lubricants, the production, properties and types of lubricants (mineral oils, synthetic lubricants) are analyzed, with emphasis on their specifications. Their relations to the lubrication mechanisms are mentioned, as well as issues related to their selection, maintenance and storage. References are made to the interaction of fuels and lubricants in marine engines and to the diagnostic significance of used lubricants in the assessment of failures. Finally, reference is made to the regeneration of used lubricants, as well as to lubricating greases.

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face lectures & homework assignments</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• 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</td><td>
<table>
<tr><th>Activity</th><th>Workload (hours)</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Study of Lectures</td><td>39</td></tr>
</table>
</td></tr>
</table>

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*	Homework assignments	39
	Course total	117
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*	Written examination (60%) + homework assignment based on bibliographic study (40%).	

(5) ATTACHED BIBLIOGRAPHY

- Fuels and Lubricants Handbook: Properties, Performance and Testing, G.E. Totten Ed., ASTM Manual Series, June 2003
- Chemistry of Petrochemical Processes, S. Mattar & L.F.Hatch, 2nd ed. Gulf Professional Publishing, June 2001.
- Chemistry and Technology of Lubricants, Mortier, Roy M., Fox, Malcolm F., Orszulik, Stefan (Eds.), Springer Science+Business Media B.V., 2010.

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1346	**SEMESTER**	8th
COURSE TITLE	**Deck Equipment and Steering Systems**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures and case studies		3	4
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialised		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NAFP122/ https://ocp.teiath.gr/courses/NAFP_UNDER115/		

(2) COURSE GOALS / LEARNING OUTCOMES

The course refers to the mechanical installations of the deck of ships and floating structures with emphasis on the hydraulic high pressure systems. The aim of the course is to introduce students to the basic concepts of deck equipment requirements, ship's steering equipment as well as the installation / operation / equipment / calculation of the hydraulic networks of deck and superstructure. Also the course familiarizes students with the importance of deck machinery and the analysis, study and design of these systems. Besides students will be familiarized with the operation of ship loading / unloading systems, steering systems and the design / construction of the rudder and its hydraulic control mechanism.

(3) COURSE CONTENT / SYLLABUS

1. Introduction to high-pressure hydraulic systems of ships.
2. Advantages and Disadvantages of Hydraulic Systems.
3. Classification of Hydraulic Systems according to operating pressure.
4. Symbols of Hydraulic Systems.
5. Types of Hydraulic Systems (Open-Closed Circuit).
6. High-pressure pumps and positive displacement motors: torque, non-dimensional coefficients, dimensional calculation of drive mechanism.
7. High Pressure Hydraulic Valve Characteristics: Loads, Losses, Moving Mechanism Selection.
8. Design and analysis of high pressure hydraulic circuits: Standard circuit with constant load and speed, standard circuit with load varies with speed.
9. Deck Auxiliary Machinery: Steam engines, Electric motors, Hydraulic Motors, anchors and fastening systems, anchor brake calculation, anchor engine power calculation, loading and unloading systems.
10. Maneuvering and heel control Equipment: Rudder mechanism, rudder design, regulations for the construction and operation of steering gears, stability devices (active fins - stability tanks).

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Use of ICT in teaching. • Support learning through the electronic e-class platform.
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*	

Activity	*Workload (hours)*
Lectures	26
Exercises on theory	13
Technical essays	26
Personal study	52
Course total	**117**

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*	• Written final examination (80%) that includes solving problems related to the theory. • Evaluation of technical work reports -exercises (20%).

(5) ATTACHED BIBLIOGRAPHY

1. Smith D.W., Marine Auxiliary Machinery, 6th edition, Butterworth-Heinemann
2. H D MCGEORGE, Marine Auxiliary Machinery, Seventh Edition, Butterworth-Heinemann, 1999

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NA0ME1358	**SEMESTER**	8nd
COURSE TITLE	**RISK ASSESSMENT AND RISK MANAGEMENT IN SHIPPING**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures	3	4

COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialised
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA237/

(2) COURSE GOALS / LEARNING OUTCOMES

The need for implying risk assessment and management methodologies in the Shipping Sector stems from the International Safety Code (ISM Code) established by the International Maritime Organization and widely applied worldwide. Also in recent years, the major oil companies in order to charter ships demand from the Shipping Companies all their activities / operations to be affirmed by corresponding risk analyses.

Based on the above, the need to familiarize the modern shipbuilding engineer with the methodologies of risk assessment and management becomes imperative today, and this familiarization is primarily aimed at this course.

Upon successful completion of the course the student will be able to:

- Identify and assess the basic risks related to shipping and shipbuilding.
- Understand the process and basic risk assessment techniques such as Failure Mode Effect and Critical Analysis and Fault Tree Analysis.

- Know the legislation on occupational safety at ship and shipyard (ISM, ISPS, ISGOTT, STCW) as well as modern risk assessment procedures (FSA, TMSA).
- Use the tools and techniques of risk management and be able to analyze the risks, consequences, actions to ensure the safe operation of the ship and shipyard.
- Manage real cases of danger on deck, in the engine room and in the yard.

Also, after successfully completing the course the student will become familiar with the various techniques of incident investigation, which is widely used by shipping companies to investigate maritime accidents and draw useful conclusions for avoiding their recurrence.

(3) COURSE CONTENT / SYLLABUS

- Risk definition.
- Identification of hazards in Shipping (external factors, equipment errors, port operations, endogenous ship factors, cargo hazards, cabin hazards).
- The risk assessment process. Risk assessment techniques (Failure Mode Effect and Critical Analysis, Fault Tree Analysis, etc)
- Root Cause Analysis
- Consequence Analysis
- Risk categories - Risk treatment - Risk monitoring.
- Risk control measures
- Monitoring the effectiveness of control measures
- Work safety in the ship and the shipyard. Investigation of maritime accidents. Hazardous working conditions, safety of electrical installations, fire safety, safety of transport and storage, hazardous chemicals, special issues of various machines and installations.
- Legislation, codes and organizations related to work safety and accidents (ISM, ISPS, ISGOTT, STCW, etc.)
- Risk Based Technology (Formal Safety Assessment - FSA)
- Risk assessment in the TMSA (Tanker management and self-assessment) program.
- Study of the human factor in maritime accidents. Man as a source of danger. Improving human reliability in maritime transport. Occupational diseases, psychological effects of ship crews.
- Practical examples of cases from deck, engine room and working at ship and shipyard.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education,	Training material is distributed in electronic format through e-class platform.

<table>
<tr><td>communication with students</td><td></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>26</td></tr>
<tr><td>Risk management projects</td><td>26</td></tr>
<tr><td>Team work on case study</td><td>26</td></tr>
<tr><td>Personal study</td><td>39</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>117</td></tr>
</table>
</td></tr>
<tr><td>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</td><td>Final written examination : 80%
Technical essay: 20%</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

- *Books:*

- Lurie, A.I., “Theory of elasticity”, Springer 2005
- Timoshenko, Gere “Theory of elastic stability”, McGraw Hill, 17th Ed., 1985.
- Boresi A.P. et al., , “Elasticity in Engineering Mechanics” John Wiley & Sons, 3rd Ed., 2011
- Γιαντές, Χ.Ι., “Μη-γραμμική συμπεριφορά των κατασκευών”, Εκδόσεις Κάλλιπος, 2015
- Beer, Johnston, Mazurek, Cornwell,Self, “Vector Mechanics for Engineers: Statics and Dynamics”, McGraw Hill, 2019.
- Russell C. Hibbeler, “Engineering Mechanics – Dynamics", Prentice Hall, 2006.
- D. G. Gorman, W. Kennedy, “Applied Solid Dynamics”, Butterworth-Heinemann, 1988

Journals:

- Journal of Mechanics, Cambridge University Press.
- European Journal of Mechanics, Elsevier.
- Journal of Applied Mechanics, ASME.

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1359	**SEMESTER**	**8°**
COURSE TITLE	**Safety, Quality and Environment in Shipping**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		3	4
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialised		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (English)		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NAFP131/		

(2) COURSE GOALS / LEARNING OUTCOMES

The main goal of the course is to provide students with fundamental knowledge of the shipping regulatory framework on issues related to safety, quality and environmental protection and prevention of marine pollution from ships.

The course highlights the roles of various public and private organisations regulating and influencing the maritime industry. Emphasis is given to the description of international conventions, codes, directives, recommendations, and other regulations adopted by the International Maritime Organization (IMO) and European Union and their implementation at national, European and international level. Moreover, during the course students will develop a basic understanding of the role of classification societies, flag and port states and how shipping companies develop strategies to ensure safe navigation and environmental protection in a global shipping industry, which is constantly changing. It also describes the ISO standards for quality and environmental management that are applied to several shipping companies to upgrade the quality of their services.

(3) COURSE CONTENT / SYLLABUS

- Introduction to the international regulatory framework of shipping
- The International Maritime Organization (IMO) and international conventions (SOLAS, MARPOL, STCW, etc.)
- Safety and quality management standards and systems in the maritime industry
- International Safety Management (ISM) Code
- The International Ship and Port Facility Security (ISPS) Code - Crisis Management
- IMO and European regulations for environmental protection
- Shipping company (fleet, structure, departments, operating organization, ship and company communication, monitoring, inspections)
- Verification, Inspection, Classification societies
- Flag and Port States, Port state controls
- The implementation of ISO standards (ISO 9001, ISO 14001) in shipping

(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.
• Communication with students and support of learning procedure 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>26</td></tr>
<tr><td>Seminars</td><td>26</td></tr>
<tr><td>Project and essay writing</td><td>39</td></tr>
<tr><td>Study and analysis of bibliography</td><td>26</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>117</td></tr>
</table>
</td></tr>
<tr><td></td><td></td></tr>
</table>

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*	Evaluation: -Written examination including short-answer questions, multiple choice questionnaires, etc

(5) ATTACHED BIBLIOGRAPHY

- Tan A. K.J, 2006.Vessel Source Marine Pollution. The Law and Politics of International Regulation, Cambridge University Press, Cambridge.
- Sturmey, SG, 1970. A consideration of the ends and means of national shipping policies. In S.G. Sturmey, Shipping Economics Collected Papers. London: The Macmillan Press.
- Karin Andersson, Selma Brynolf, J. Fredrik Lindgren, Magda Wilewska-Bien, 2016, "Improving Environmental Performance in Marine Transportation" https://link.springer.com/book/10.1007/978-3-662-49045-7
- Y.H. Venus Lun, Kee-hung Lai, Christina W.Y. Wong, T. C. E. Cheng, 2016, "Green Shipping Management" https://link.springer.com/book/10.1007/978-3-319-26482-0
- Md Saiful Karim, 2015, "Prevention of Pollution of the Marine Environment from Vessels" https://link.springer.com/book/10.1007/978-3-319-10608-3#about

COURSE

OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1361	**SEMESTER**	9th
COURSE TITLE	**DAMAGED STABILITY OF SHIPS**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		5	6
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialised		
PREREQUISITE COURSES:	NAOME1318 - SHIP HYDROSTATICS AND STABILITY		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (English)		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA255/		

(2) COURSE GOALS / LEARNING OUTCOMES

Flooding of a ship's internal compartments significantly affects her stability. Accordingly, vessels should be properly designed in order to have adequate stability not only in intact condition, but also after damage and flooding of one or more internal compartments in order to avoid sinkage and/or capsize.

By successful completion of the module, students will be able to:

- Calculate the vessel's *equilibrium waterline* after flooding of one or more compartments
- Calculate the *ship's floodable lengths* that are essential especially during ship's preliminary design
- To assess ship's reserved stability after flooding by using both *deterministic* and *probabilistic Damaged Stability Criteria*, as per SOLAS Regulations.

Students will learn how to search and analyse data in order to compose solutions required for decision making. Such will be also accomplished by course assignment.

(3) COURSE CONTENT / SYLLABUS

Subject module discusses the watertight subdivision and stability of ships after damage. The aspects of permeability and subdivision length are also thoroughly explained.
The following aspects are discussed in detail:

- Calculation of *floodable lengths.*
- Stability of ships after damage by using the methods of *lost buoyancy* and *added mass.*
- *Deterministic* and *Probabilistic* methodologies for assessing the damaged stability of ships in accordance with *SOLAS* requirements, including the calculation of the *Attained* and *Required Subdivision Index*.

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td colspan="2">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 colspan="2">• Support learning through the electronic e-class platform.
• Specialized Ship Stability Software</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>Activity</td><td>Workload (hours)</td></tr>
<tr><td></td><td>Lecturing</td><td>65</td></tr>
<tr><td></td><td>Assignments</td><td>39</td></tr>
<tr><td></td><td>Self-Study</td><td>52</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>Course total</td><td>156</td></tr>
<tr><td>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</td><td colspan="2">Final written exam (60%).
Evaluation of assignments and oral exam (40%)</td></tr>
</table>

presentation, laboratory work, clinical examination of patient, art interpretation, other	

(5) ATTACHED BIBLIOGRAPHY

- Baxter, B. (1967), Naval Architecture. Examples and Theory, London: Charles Griffin & Co.
- Biran, A. (2003), Ship Hydrostatics and Stability, Oxford: Butterworth Heinemann
- Comstock, J.P. (Ed.) (1968), Principles of Naval Architecture, New York: The Society of Naval Architects and Marine Engineers (SNAME).
- Rawson, K.J. and Tupper, E.C. (2001), Basic Ship Theory, Vols. 1-2, Oxford: Butterworth Heinemann (original work published 1968).
- Kobylinsky, L. K. and Kastner, S. (2003), Stability and Safety of Ships, (Vols. 1-2), Elsevier Ocean Engineering Book Series.
- Λουκάκης, Θ., Πέρρας, Π. και Τζαμπίρας, Γ. (2000), Υδροστατική και ευστάθεια πλοίου, Σημειώσεις, τόμ. 1-2, Θωμαΐδειο Ίδρυμα ΕΜΠ, Αθήνα.
- Τζαμπίρας, Γ., 2015. *Υδροστατική και ευστάθεια πλοίου*. [ηλεκτρ. βιβλ.] Αθήνα, Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών.
- Σπύρου, Κ. (2015), Δυναμική ευστάθεια πλοίου. [ηλεκτρ. βιβλ.] Αθήνα, Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών.

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1363	**SEMESTER**	9th
COURSE TITLE	**DYNAMIC SHIP STABILITY**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures	4	4

COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialised
PREREQUISITE COURSES:	NAOME1318 - SHIP HYDROSTATICS AND STABILITY
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (English)
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA230/

(2) COURSE GOALS / LEARNING OUTCOMES

In order to fully understand the behaviour of ships under environmental excitations in real seas, it is essential not only to consider the simplified hydrostatics approach, but also to investigate the underlying ship dynamics.

By exploring the dynamic behaviour of ships including wind and wave excitations, we may encounter interesting dynamical phenomena having a dominant non-linear nature that in many cases result in loss of stability, violent responses or even capsize.

By successful completion of the module, students will be able to:

- Understand the differences between ship hydrostatics and ship dynamic stability
- Know the basic non-linear equations during ship rolling
- Understand the significance of Added Mass, Damping and Restoring coefficients in the Pure rolling equation of motions
- Understand the basics of phenomena such as pure rolling seas resonance, pure loss of stability, parametric rolling, surf-riding and broaching-to
- To access the dynamic stability of ships in the early stages of design and means of alleviating the above-mentioned non-linear phenomena.

- Understand the nature of the existing IMO Regulations and the 2nd generation criteria

Students will learn how to search and analyse data in order to compose solutions required for decision making and develop their critical thinking regarding Ship Stability issues.

(3) COURSE CONTENT / SYLLABUS

Subject module discusses the following aspects:

i) Introduction to Dynamic Stability of Ships
ii) Historical Review in Stability of Ships
iii) Revision in Intact Stability & Ship Hydrostatics at Large angles
iv) Modelling of Wind Loads and Ship Responses under Strong Wind Excitations, including the investigation of *IMO Weather Criterion*
v) Dynamic Stability of Ships in Pure Rolling Seas
vi) Parametric Rolling Resonance during Longitudinal Seas and phenomena of Pure Loss of Stability
vii) Dynamic Instabilities in Following Seas including Surf-riding and Broaching-to Applicable *IMO* Regulations and 2nd Generation Criteria

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Support learning through the electronic e-class platform.
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	

Activity	***Workload (hours)***
Lectures	52
Study of Lectures	65
Course total	***117***

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*	Final written exams including theory questions and problem solving.

(5) ATTACHED BIBLIOGRAPHY

- Σπύρου, Κ. (2015) Δυναμική ευστάθεια πλοίου. [ηλεκτρ. βιβλ.], Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών, Αθήνα.
- V.L. Belenky & N.B. Sevastianov, (2007), Stability and Safety of Ships – The risk of capsizing, SNAME.
- Kobylinsky, L. K. and Kastner, S. (2003), Stability and Safety of Ships, (Vols. 1-2), Elsevier Ocean Engineering Book Series

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1365	**SEMESTER**	9th
COURSE TITLE	**Mooring Systems of Offshore Structures**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		4	4
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialized		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA206/		

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to:

- Familiarize the students with the static analysis and design of single and multi-leg mooring systems.
- Identify and evaluate several damping components on the floating structure (i.e. wave drift damping).

(3) COURSE CONTENT / SYLLABUS

Lectures:

- Mooring systems types (spread, multi-leg, taut, semi-taut, etc.)
- Mooring Lines
- Static analysis and design of single mooring systems
- Static analysis and design of multi-leg mooring systems
- TLP systems
- Second order wave drift damping
- Applications

Laboratory: Offshore Structures mooring systems experiments.

(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>• 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>52</td></tr><tr><td>Homework assignment</td><td>26</td></tr><tr><td>Study of Lectures</td><td>39</td></tr><tr><td>Course total</td><td>117</td></tr></table></td></tr>
<tr><td>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</td><td>Lectures:
Written examination (70%)
Laboratory:
Laboratory exercises (30%).</td></tr>
</table>

ATTACHED BIBLIOGRAPHY

- D.T. Brown, G.J. Lyons: “Catenary Moorings design Design Manual”, Bentham Press, Offshore Technology Series, 1994
- Anchoring of Floating Structures, Design Guides for Offshore Structures, coordinated by CLAROM, AREGEMA, Editions Technip, 1990.
- Handbook of Offshore Engineering, Ed. By Subrata K. Chakrabarti, Elsevier, Amsterdam, 2004, Elsevier Ocean Engineering Book Series, ISBN-9780080443812 (set).
- Elements of Ocean Engineering, Robert Randall, 2010, ISBN: 978-0-939773-77-0 Greek Section of the Society of Naval Architects & Marine Engineers.
- Mazarakos T. P. 2014. “Special Marine Constructions & Sailing Vessels”, offshore structure experiments, Athens, 2014.

COURSE
OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1370	**SEMESTER**	9th
COURSE TITLE	**Supply chain in Maritime Transport**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures and case study projects	3	4

COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Specialised
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (English)
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NAFP178/

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to cover the basic principles of the supply chain in maritime transport and the analysis of the crucial parameters. Emphasis is given to the study of the supply chain of liquid and gaseous hydrocarbons by using Floating Storage Regasification Units (FSRU).

(3) COURSE CONTENT / SYLLABUS

Lectures:

1. Introduction to the Supply Chain.
2. International Transport - Trends and Prospects.
3. Modern needs and strategies.
4. Selecting the suitable means of transport. Internodal transport.

5. Terminal stations.
6. Oil and gas shipping.
7. The influence of multiple factors in route selection
8. Decision support analysis in maritime transport
9. Offshore platforms
10. Floating production systems (FPS), Floating Production Storage and Offloading System (FPSO)
11. Floating Storage Regasification Units (FSRU)
12. Specialized case studies on supply chains in maritime transport.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Support learning through the electronic e-class platform. • Lectures through software for presentations available on the course website.
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*	

Activity	*Workload (hours)*
Lectures	39
Case study Project	26
Technical essay writing	13
Study of Lectures	39
Course total	***117***

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*	• Written final examination (70%) that includes solving problems related to the theory. • Evaluation of technical group work reports (30%).

(5) ATTACHED BIBLIOGRAPHY

- Logistics & Supply Chain Management (5th Edition), Martin Christopher, Publishing Financial Times.