Ship Technological Efficiency (ECTS 4)

COURSE OUTLINE

(1) GENERAL

SCHOOL	MARITIME AND INDUSTRIAL STUDIES		
ACADEMIC UNIT	MARITIME STUDIES		
LEVEL OF STUDIES	POSTGRADUATE		
COURSE CODE	**MNATEX01**	**SEMESTER**	A
COURSE TITLE	Ship Technological Efficiency		
INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*		**WEEKLY TEACHING HOURS**	**CREDITS**
	Lectures	**3**	**4**
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE *general background, special background, specialised general knowledge, skills development*	GENERAL BACKGROUND		
PREREQUISITE COURSES:	NO		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO		
COURSE WEBSITE (URL)	https://eclass.unipi.gr/courses/NAS461/		

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of*

the European Higher Education Area

- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The course aims to familiarize students with the basic principles of ship technological performance. It starts with presenting the main characteristics of ships with a focus on the general arrangement of modern ships. The basic principles of Ship Resistance and Propulsion and Internal Combustion Engines (ICE) are presented, and examples are given with conventional and alternative ship propulsion systems. The course also aims to provide basic knowledge about marine fuels and to train students to perform fuel consumption evaluations and ship energy efficiency assessments.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

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

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Respect for the natural environment
- Production of new research ideas
- Decision-making

(3) SYLLABUS

Introduction

- Terminology
- Ship's general arrangement
- General particulars, dimensions
- Ship weight groups, displacement equation
- Basic ship types: design, construction, and operational features
- Analysis of the world merchant fleet

Ship Resistance – Propulsion

- Ship resistance components
- Resistance effect on ship performance
- The ship's power transmission system
- Power definitions, propulsion coefficients
- Basic principles of internal combustion engines (ICE)
- Conventional and alternative propulsion systems

Marine fuels

- Fuels and their properties
- Bunkering/Storage/management on board
- Fuel oil consumption calculations
- Ship air emissions
- Alternative fuels

Ship energy efficiency

- Regulatory framework (IMO, EU)
- Technical and operational measures for energy efficiency

- Energy efficiency indicators (EEDI, EEXI, CII)
- Ship energy performance, Case studies

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face & Distance learning
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	E-class & MS Teams
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	***Semester workload***
Semester teaching/lecture duration (hours)	21 hours
Semester non-directed study & work load (hours)	40 hours
Analysis of Bibliography	20 hours
Study 1: Ship propulsion	10 hours
Study 2: Fuel consumption	10 hours
Study 3: EEXI/CII case studies	15 hours
Workshop	4 hours
Course total	***120***

STUDENT PERFORMANCE EVALUATION

Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.

Language of evaluation

- Greek

Methods of evaluation

- multiple choice questionnaires
- short-answer questions
- open-ended questions
- problem solving,
- written work
- public presentation

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Μελέτη πλοίου - Μεθοδολογίες Προμελέτης Τεύχος 2, Παπανικολάου Απόστολος,ΚΑΛΑΜΑΡΑ ΕΛΛΗ, 2009
- MAN Energy Solutions, Basic Principles of Ship Propulsion, https://www.man-es.com/docs/default-source/document-sync/basic-principles-of-ship-propulsion-eng.pdf
- «Ship design for efficiency and economy», Schneekluth, H., Bertram, V., 1998.
- ABS, PATHWAYS TO SUSTAINABLE SHIPPING, 2022 https://sustainableworldports.org/wp-content/uploads/ABS_2020_Pathways-to-sustainable-shipping-report.pdf
- Center for Zero Carbon Shipping, The role of energy efficiency regulations, 2023 https://cms.zerocarbonshipping.com/media/uploads/documents/Energy_Efficiency_v9.pdf
- UNCTAD Review of Maritime Transport, 2023 https://unctad.org/publication/review-maritime-transport-2023
- DNV, Energy Transition Outlook, Maritime Forecast to 2050, https://www.dnv.com/maritime/publications/maritime-forecast-2023/index.htm