COURSE OUTLINE

(1) OVERVIEW

SCHOOL	MARITIME & INDUSTRY		
DEPARTMENT	MARITIME STUDIES		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ΝΑΑΓ43	SEMESTER	6
COURSE TITLE	SHIPPING POLLUTION		

DISCRETE TEACHING ACTIVITIES *In cases where ECTS credits are awarded to distinct components of the course (e.g., Lectures, Laboratory Exercises, etc.), please indicate them separately. If the credits are awarded as a whole for the entire course, please state the weekly teaching hours and the total number of credits*	WEEKLY TEACHING HOURS	ECTS
Lectures	4	5.5
Please add additional rows if needed. A detailed description of the teaching organization and instructional methods is provided in Section (4).		

COURSE TYPE *core (C), core elective (CE), elective (E) - background, specialization, skill development*	E - Specialization
PREREQUISITE COURSES:	None.
LANGUAGE OF TEACHING AND EXAMINATIONS:	English
THIS COURSE IS AVAILABLE TO ERASMUS STUDENTS	Yes
COURSE WEBPAGE (URL)	

(2) LEARNING OUTCOMES

Learning Outcomes

The learning outcomes of the course are described, specifying the particular knowledge, skills, and competencies at the appropriate level that students will acquire upon successful completion of the course.

Please refer to Appendix A

- *Description of the Level of Learning Outcomes for each study cycle according to the Qualifications Framework of the European Higher Education Area.*
- *Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B.*
- *Concise Guide for Writing Learning Outcomes*

The course focuses on the environmental challenges facing the shipping industry and the marine environment. It explores the sources and types of marine pollutants, the impact of maritime activities on ecosystems, and the regulatory framework governing marine pollution. Emphasis is placed on sustainable practices, smart shipping technologies, and environmental port management, equipping students with the knowledge and skills to contribute to a cleaner, more responsible maritime sector.

Upon successful completion of the course, the students will:

- Be able to identify the types of marine pollutants.
- Understand the need to improve the environmental performance of shipping.
- Have the skills to evaluate the various options for a smart shipping industry.
- Know how to apply an environmental port management scheme.

General Competences

Taking into account the general competences that a graduate should have acquired (as listed in the Diploma Supplement and outlined below), which of these competences does the course aim to develop?

Searching, analyzing, and synthesizing data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Teamwork
Working in an international environment
Working in an interdisciplinary environment
Generation of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Demonstration of social, professional, and ethical responsibility and sensitivity to gender issues
Exercising critical and self-critical thinking
Promotion of free, creative, and inductive thinking
…
Other competences: …

- Adaptation to new situations
- Decision making
- Autonomous work
- Teamwork
- Working in an international environment
- Working in an interdisciplinary environment
- Respect for diversity and multiculturalism
- Respect for the natural environment
- Demonstration of social, professional, and ethical responsibility and sensitivity to gender issues
- Exercising critical and self-critical thinking
- Promotion of free, creative, and inductive thinking

(3) COURSE CONTENT

The course covers the following topics:

- Pollution in general and its sources. Pollution categories. Climate change.
- Atmospheric pollution and its effects. The transport sector and air pollution. Carbon footprint of transport means.
- Shipping and air pollution. Reduction of CO_2 emitted by ships. SEEMP and EEDI. Lower S fuels. Scrubbers. Techniques for preventing the NOx formation during combustion. Alternative fuels. Cold ironing. Alternative energy sources. Polar shipping roads.
- Oil pollution: major causes and impacts. Major marine oil spills. Fate of marine oil spills. Cleaning up oil spills. Bioremediation. Natural recovery.
- Port reception facilities: MARPOL Annex I-VI. The collection of ship wastes. Oily wastes. Sewage. Garbage. Residues of cargo. Hydrocarbons cargo in bulk waste. Chemical cargo in bulk waste. Garbage disposal. Management and treatment of wastes.
- Marine biofouling: Effects on unprotected ships. Anti-fouling technologies. Anti-fouling coatings. Biocidal antifouling paints and Biocide-free foul release coatings. Total biofouling removal. Environmental impacts.
- Marine pollution from ballast water. IMO ballast water convention. Precautionary practices in BWM.
- Hazardous materials within a ship's structure. The Basel Convention. The Hong Kong Convention. EU ship recycling regulation. Green Ship recycling.
- The Green Passport. The Green Award. Clean shipping. The future of shipping. Green coastal shipping program.
- Seaport environmental priorities. The Sustainable-Green port. Case study of a port using biomonitoring for EMS. Smart port. 1st-5th generation port. Smart port-cities.

Also, case studies from international bibliography are presented to the students.. Furthermore, articles, audiovisual lecture material, web links to useful resources, exercises, and software are uploaded in electronic format on the eClass platform..

(4) TEACHING and LEARNING METHODS - ASSESSMENT

TEACHING MODE *Face-to-face, in-class lecturing, distance teaching and distance learning etc.*	• Face-to-face in a classroom • Distance teaching & learning (if required)
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY *Use of ICT in Teaching, Laboratory Education, Communication with students*	**Teaching**: Lectures using modern audiovisual equipment, learning support through the eClass electronic platform, synchronous distance teaching via MS Teams. **Communication with students**: face-to-face during office hours, email, eClass platform, MS Teams tools
Organization of Teaching *A detailed description of the teaching methods and approach is provided.* *Lectures, seminars, laboratory exercises, fieldwork, study and analysis of literature, tutorials, internships (placements), clinical practice, artistic workshops, interactive teaching, educational visits, project work, writing assignments, artistic creation, etc.*	

Activity	Semester Workload
Lectures	52
Project	40
Self-study of lecture material	43
Consultation Support	0.5
Exams (written)	2

The student's study hours for each learning activity, as well as the hours of independent study, are specified in accordance with the principles of ECTS	Course Total: 137.5
STUDENT ASSESSMENT *Description of the assessment process* *Language of assessment, assessment methods, formative or summative evaluation, multiple-choice tests, short-answer questions, essay questions, problem-solving, written assignments, reports, oral examinations, public presentations, laboratory work, clinical patient examination, artistic interpretation, other(s)* *Explicitly state assessment criteria and information on whether and where these criteria are accessible to students are included.*	**Language of Assessment**: English for ERASMUS students **Assessment Mode**: Face-to-face and/or distance learning (if required) **Assessment Methods**: The final grade of the course is determined as follows: • 60% by the written exams during the spring semester examination period and, in case of failure, during the September resits • 40% from the project The written exam includes short-answer and essay questions. It is conducted with closed books. **Students with Learning Difficulties**: Students with certified learning difficulties in reading and writing (as recognized by the competent authority) are assessed according to the procedures established by the Department. **Disclosure of Assessment Criteria**: The assessment criteria are communicated during the first class and are clearly stated on the course website and the eClass platform. The exam syllabus is announced on eClass following the final lecture of the semester. The exam answers are posted on eClass after the examinations take place. Students have the right to review their graded exams and receive explanations regarding their grades. In cases of further requests, the procedures outlined in the current Study Regulations apply.

(5) SUGGESTED BIBLIOGRAPHY

- Books:

- Lindgren, J.F., Brynolf, S., Wilewska-Bien, M., Andersson, K. (2020). Shipping and the Environment - Improving Environmental Performance in Marine Transportation, Da Vinci Publications, ISBN: 9789609732420 [94691832] – in Greek

- Journals:

- Bulletin Marine Policy
- Marine Pollution
- Maritime Journal

- Other educational material:

- Andersson, Karin & Brynolf, Selma & Lindgren, John & Wilewska-Bien, Magda. (2016). Shipping and the Environment - Improving Environmental Performance in Marine Transportation. 10.1007/978-3-66249045-7.
- Europe Economics study "Impact assessment for the review of the 2000/59/EC Directive on port reception facilities for ship-generated waste and cargo residues"
- Reducing CO_2 Emissions to Zero: The 'Paris Agreement for Shipping' Implementing the Initial Strategy on Reduction of GHG Emissions from Ships (adopted by the UN International Maritime Organization), Marisec Publications 2018
- Wang, C., Zhang, D., Yang, X. and Yang, Z. (2018), A novel model for the quantitative evaluation of green port development a case study of major ports in China, Transportation Research Part D. Transport and Environment, Vol. 61, pp. 431-443.
- Lecture Notes and Supporting Material provided by the Instructor