COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1266	**SEMESTER**	9th
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 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</td><td>39</td></tr>
<tr><td>Homework assignments</td><td>39</td></tr>
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<tr><td>Course total</td><td>117</td></tr>
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<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 (60%) + homework assignment based on bibliographic study (40%).</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

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