

## COURSE OUTLINE

### (1) GENERAL

<b>SCHOOL</b>	School of Engineering		
<b>ACADEMIC UNIT</b>	Department of Naval Architecture		
<b>LEVEL OF STUDIES</b>	Undergraduate		
<b>COURSE CODE</b>	NAOME1363	<b>SEMESTER</b>	9 <sup>th</sup>
<b>COURSE TITLE</b>	<b>DYNAMIC SHIP STABILITY</b>		
<b>INDEPENDENT TEACHING ACTIVITIES</b>		<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS (ECTS)</b>
<b>Lectures</b>		4	4
<b>COURSE TYPE</b> <i>general background, specialbackground, specialised general knowledge, skills development</i>	Specialised		
<b>PREREQUISITE COURSES:</b>	NAOME1318 - SHIP HYDROSTATICS AND STABILITY		
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	Greek		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	Yes (in English)		
<b>COURSE WEBSITE (URL)</b>	<a href="https://eclass.uniwa.gr/courses/NA230/">https://eclass.uniwa.gr/courses/NA230/</a>		

### (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 capsizing.

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 2<sup>nd</sup> 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 <i>IMO Weather Criterion</i>
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 <i>IMO</i> Regulations and 2 <sup>nd</sup> Generation Criteria

### (4) TEACHING and LEARNING METHODS - EVALUATION

<b>DELIVERY</b> Face-to-face, Distance learning, etc.	Face-to-face	
<b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b> Use of ICT in teaching, laboratory education, communication with students	<ul style="list-style-type: none"> <li>Support learning through the electronic e-class platform.</li> </ul>	
<b>TEACHING METHODS</b> <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non- directed study according to the principles of the ECTS</i>	<b>Activity</b>	<b>Workload (hours)</b>
	Lectures	52
	Study of Lectures	65
	Course total	<b>117</b>
<b>STUDENT PERFORMANCE EVALUATION</b> <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i>	Final written exams including theory questions and problem solving.	

## (5) ATTACHED BIBLIOGRAPHY

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