GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Seakeeping of Small Crafts, PG_00060610		
Field of study	Design and Construction of Yachts		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	5	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Hydromechanics and Hydroacoustics -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Paweł Dymarski	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	45.0	0.0	15.0	0.0	0.0	60

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	60	6.0	59.0	125

Subject objectives

The aim of the course is to provide students with knowledge of the seakeeping of a yacht. Seakeeping is a branch of the ship theory that describes the behavior of a ship/yacht exposed to waves and wind and the influence of these conditions on the ship's navigability.

As part of the course, the student will learn:

- basic models describing the dynamics of the marine environment

- equations governing the movement of the yacht (or floating object) -

- methods of determining the forces of environmental impact on the yacht

- ways of conducting model research and analyzing the obtained results.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W03] has knowledge of hydromechanics, thermodynamics, machine design, ecology, materials science necessary to understand the principles of construction and operation of ocean engineering facilities and equipment	The student knows the methods of calculating the motion of a yacht at one degree of freedom, understands the effect of coupling between various degrees of freedom, is able to analyze the results of model tests of the motion of a yacht on a wave.	[SW3] Assessment of knowledge contained in written work and projects
[K6_W02] has knowledge in the field of technical mechanics, fluid mechanics, strength of materials, necessary to understand the basic physical phenomena occurring in ocean engineering	The student has knowledge of the dynamics of a yacht on a wave, necessary to understand the process of its design	[SW3] Assessment of knowledge contained in written work and projects
[K6_U06] able to perform basic engineering tasks in the field of yacht design, construction and operation according to the formulated specification, using appropriate methods and tools	The student knows the methods of calculating the motion of a yacht at one degree of freedom, understands the effect of coupling between various degrees of freedom, is able to analyze the results of model tests of the motion of a yacht on a wave.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools

Subject contents

Course content – lecture

1. Omów znane Ci funkcje widma falowania morskiego. Omów parametry niezbędne do określenia funkcji widma

2. Stacjonarny model wiatru

3. Niestacjonarny model wiatru.

4. Omów (nazwij) ruchy jachtu/statku na poszczególnych stopniach swobody.

5. Sformułuj równanie nurzań/kołysań bocznych jacht/statku. Omów poszczególne człony równania

6. Siły działające na jacht/statek/obiekt offshore

7. Badania modelowe: co to jest charakterystyka amplitudowa (RAO)? Omów sposób uzyskiwania charakterystyki amplitudowej w oparciu o badania modelowe an przykładzie nurzań/kołysań wzdłużnych statku.

8. Wyznacz widmo nurzań dla zadanej charakterystyki amplitudowej oraz widma falowania

Prerequisites and co-requisites

Basic knowledge of ship theory and fluid mechanics, in particular

- basic knowledge of flotation (flotation equation - Archimedes' law)

- basic knowledge of stability in terms of the metacentric formula

- flow continuity equation, Bernoulli equation

- basic information about sea waves

- understanding of Newton's second law

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory Ex.	60.0%	33.0%
Lecture (Test)	60.0%	67.0%

Recommended reading

Basic literature	[1] Jan Dudziak Teoria okrętu [2] A.R.J.M Lloyd: Seakeeping ship behaviur in rough weather
Supplementary literature	[3] O.M. Faltinsen Sea Loads on Ships and Offshore Structures [4] J.M.J. Journée, W.W. Massie Offshore Hydromechanics [5] Principles of Naval Architecture vol. 3
eResources addresses	

Example issues/ example questions/ tasks being completed

1. Describe the known functions of the wave spectrum. Discuss the parameters necessary to determine the function of the spectrum
2. Stationary wind model
3. Non-stationary wind model.
4. Discuss (name) the ship's movements on individual degrees of freedom.
5. Formulate the ship's heve / roll equation. Discuss the individual components of the equation
6. Forces acting on the ship / offshore structures
7. Model testing: what is an amplitude response operator (RAO)? Describe the method of obtaining the amplitude characteristics based on model tests on the example of a ship's heave / roll motion.
8. Determine the heave spectrum for the given amplitude characteristics and the given wave spectrum

Practical activites within the subject

Not applicable

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