GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00057298		
Field of study	Ocean Engineering		
Date of commencement of studies	February 2023	Academic year of realisation of subject	2023/2024
Education level	second-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Hydromechanics and Hydroacoustics -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Paweł Dymarski	
	Teachers	mgr inż. Hanna Pruszko dr hab. inż. Paweł Dymarski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	9.0	0.0	9.0	0.0	0.0	18

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	18	5.0	27.0	50

Subject objectives

The aim of the course is to provide students with knowledge of the seakeeping of a ship. Seakeeping is a branch of the ship theory that describes the behavior of a ship 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 ship (or floating object) -

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

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

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W05] has an organized, widened knowledge on design, construction and operation of ocean technology objects and systems	Student has basic knowledge of the seakeeping of a ship and offshore structures	[SW1] Assessment of factual knowledge
[K7_W06] has an organized, widened knowledge on engineering methods and design tools allowing the conducting of advanced projects within the construction and operation of ocean technology objects and systems	The student has knowledge of the methods and design tools for the analysis of seakeeping of ships and offshore structures	[SW1] Assessment of factual knowledge
[K7_U04] can apply mathematical methods and models and computer simulations to analyse, design, and assess the functioning of ocean technology objects and systems and their elements	The student has a basic knowledge of mathematical models, computer programs and research methods in the field of seakeeping	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment

Subject contents	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 statku na poszczególnych stopniach swobody. 5. Sformułuj równanie nurzań/kołysań bocznych statku. Omów poszczególne człony równania 6. Siły działające na 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
Lecture (Test)	60.0%	50.0%
Laboratory Ex.	60.0%	50.0%

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
Work placement	Not applicable