GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Marine Control Systems, PG_00060550		
Field of study	Design and Construction of Yachts, Naval Architecture and Offshore Structures		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
Education level	first-cycle studies	Subject group	Optional subject group 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	6	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Automation and Marine Energy -> Institute of Naval Architecture -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Mohammad Ghaemi	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	0.0	0.0	30

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	30	3.0	17.0	50

Subject objectives

The aim of the course is to develop students' skills and knowledge of basic concepts in the field of ship automation, methods of describing and analyzing the behavior of ship's elements and automatic control systems, as well as understanding the theory of control in the field of course control systems, trajectory and longitudinal linear velocity of the ship and its sideways swings

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W04] has knowledge in the field of computer science, electronics, electrical engineering, automation and control, information technology, computer graphics, useful for understanding the possibilities of their use in ocean engineering	The student has knowledge in the field of technology of automation and control systems of major ship systems, useful for analyzing their application in marine technology.	[SW1] Assessment of factual knowledge
[K6_K03] is aware of the impact of non-technical aspects on the engineer's work and the impact of engineering activities on the natural environment	The student is aware of the impact of engineering activities in the field of ship automation systems on the natural environment, especially the marine environment	[SK5] Assessment of ability to solve problems that arise in practice
[K6_U02] can work individually and in a team, communicate through various techniques in professional environment and also record, analyse, and present the results of work, can estimate the time needed to complete a given task	The student can communicate with professionals using various techniques used in the analysis and synthesis of the structure, elements and modules implemented in the ship automation systems, as well as document, analyze and present the results of his/her work related to the tasks performed in the field of the initial design of the control systems of selected systems ships.	[SU2] Assessment of ability to analyse information

<table>
<tr><td>Subject contents</td><td>Course content – lecture

1. Introduction and basic concepts regarding the fundamentals of automatics

2. Classification of control systems, including course, trajectory and propulsion control systems

3. Modeling of ship's motion, propulsion system and ship rolls

4. Description of mathematical models, including differential equation, transfer function, block diagram, state space model; model transformations - in the context of ship motion and propulsion models

5. Transition function and time characteristics on the example of ship's course, trajectory and linear velocity

6. Analysis of ship control systems in the frequency domain

7. Stability of discussed control systems in previous points

8. Controllers and the principles of their design and selection for the aforementioned control systems

9. Quality indexes of ship control systems</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Mathematics I

Mathematics II</td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>2 tests (50% each)</td><td>56.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>1. Nise N. S., Control System Engineering, 8th Edition, John Whiley & Sons Inc., 2019.

2. Fossen T. I., Handbook of Marine Craft Hydrodynamics and Motion Control, John Wiley & Sons, 2011</td></tr><tr><td>Supplementary literature</td><td>1. Ogata K., Modern Control Engineering, 4th edition, Prentice-Hall, 2009.

2. Fossen T. I., Marine Control Systems, Marine Cybernetics AS, 2002.</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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