



## Subject card

Subject name and code	Theory of Marine Control Systems, PG_00060563						
Field of study	Naval Architecture and Offshore Structures						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2026/2027		
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	5	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Mohammad Ghaemi					
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	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		34.0	100
Subject objectives	The aim of the course is to develop students skills and knowledge of basic concepts in the field of automation, methods of description and analysis of the behaviour of automatic control systems and their elements, as well as understanding the theory of control systems in ship technology.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U03] can use computer-aided design, production and operation tools for ocean technology objects and systems	The student is able to use the basic methods of computer simulation in the field of linear control systems.			[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		
	[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 of the fundamentals of automatics and control systems and understands the possibilities of using control systems in ship systems.			[SW1] Assessment of factual knowledge		

Subject contents	<p>1. Introduction and basic concepts</p> <p>2. Classification of control systems on the example of selected ship control systems</p> <p>3. Modeling of dynamic systems on the example of ship motion and propulsion models</p> <p>4. Types of mathematical models of dynamical systems: differential equation, transfer function, block diagram, state space model; model transformations - in the context of ship motion and propulsion models</p> <p>5. Transition function and time characteristics on the example of ship's course, trajectory and linear velocity</p> <p>6. Application of feedback and feedforward concepts</p> <p>7. Analysis of control systems in the frequency domain</p> <p>8. Stability of control systems</p> <p>9. Controllers and the principles of their design and selection for the chosen ship systems</p> <p>10. Quality indexes of ship control systems</p>														
Prerequisites and co-requisites	<p>Mathematics I</p> <p>Mathematics II</p>														
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="453 1061 794 1093">Subject passing criteria</th> <th data-bbox="799 1061 1141 1093">Passing threshold</th> <th data-bbox="1145 1061 1490 1093">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 1093 794 1124">Lab. reports</td> <td data-bbox="799 1093 1141 1124">51.0%</td> <td data-bbox="1145 1093 1490 1124">25.0%</td> </tr> <tr> <td data-bbox="453 1124 794 1155">Test - tutorials</td> <td data-bbox="799 1124 1141 1155">51.0%</td> <td data-bbox="1145 1124 1490 1155">25.0%</td> </tr> <tr> <td data-bbox="453 1155 794 1187">Exam</td> <td data-bbox="799 1155 1141 1187">56.0%</td> <td data-bbox="1145 1155 1490 1187">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Lab. reports	51.0%	25.0%	Test - tutorials	51.0%	25.0%	Exam	56.0%	50.0%
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Recommended reading	Basic literature	<p>1. Nise N. S., Control System Engineering, 8th Edition, John Wiley &amp; Sons Inc., 2019.</p> <p>2. Kaczorek T., Podstawy teorii sterowania, Wydawnictwo Naukowe PWN, Warszawa, 2020.</p> <p>3. Domachowski Z., Automatyka i robotyka podstawy, Wydawnictwo PG, Gdańsk, 2003.</p> <p>4. Domachowski Z., Ghaemi M. H., Okrętowe układy automatyki, Wydawnictwo Politechniki Gdańskiej, 2019.</p> <p>5. Fossen T. I., Handbook of Marine Craft Hydrodynamics and Motion Control, John Wiley &amp; Sons, 2011.</p>													

	Supplementary literature	<p>1. Bubnicki Z., Teoria i algorytmy sterowania, Wydawnictwo Naukowe PWN, Warszawa, 2019.</p> <p>2. Ogata K., Modern Control Engineering, 4th edition, Prentice-Hall, 2009.</p> <p>3. Fossen T. I., Marine Control Systems, Marine Cybernetics AS, 2002.</p> <p>4. Gucma S., Inżynieria ruchu morskiego, Okrętownictwo i Żegluga Sp.z o.o., Gdańsk, 2001.</p> <p>5. Balicki, J., Małecki, Józef ; Żak, Bogdan, Automatyka okrętowa, Akademia Marynarki Wojennej im. Bohaterów Westerplatte, Gdynia, 1999.</p>
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	