GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Technology of Marine Control Systems, PG_00060570		
Field of study	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	4.0
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	15.0	0.0	15.0	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 familiarize students with the basic and most important technologies applied in the regulation, control and monitoring of ship systems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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 (including simulation) used in the analysis and synthesis of the structure, elements and modules implemented in 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 control systems of selected systems ships.	[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 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 knows the selection criteria and the scope of ship automation, taking into account the technical, economic and ecological aspects of the use of control systems in marine technology.	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents	Course content – lecture 1. Introduction to ship automation - ecological, social, economic and technical aspects 2. Overview of the process of designing the control system by taking into account the technological aspects - example 3. Measuring elements, sensors, transducers and transformers - types and classification, characteristics of measuring elements (including: sensors and transducers/transformers of position, angular velocity, load and force, pressure, temperature, flow, liquid level and sensors used in underwater technology). 4. Servomechanisms and actuators used in control systems - types and characteristics, including: servomechanisms and hydraulic and pneumatic actuators, as well as control valves. 5. Modeling, simulation and control of the ship's propulsion system, including angular speed control, remote control of the propulsion system, control of multi-propeller and/or multi-engine propulsion systems 6. Logic and sequence control, including relays and switching, Boolean algebra, gate logic, ladder diagrams, logic components, programmable logic controllers and their programming. 7. Automatic control of the ship's power plant - principles of operation, elements and characteristics, including: control of marine engine subsystems, e.g. regulation of supercharging parameters, regulation of cooling water temperature, regulation of lubricant parameters, regulation of the fuel system, control of engine start and stop processes, control of reversal, regulation viscosity 8. SCADA, OPC, HMI, IoT, and communication standards and protocols 9. Safety and monitoring systems, alarms and signaling
Prerequisites and co-requisites	Theory of Marine Control Systems
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Tutorials	51.0%	25.0%
Lecture	56.0%	45.0%
Project	51.0%	30.0%

Recommended reading	Basic literature	1. Hugh J., Integration and Automation of Manufacturing Systems (Robots, PLC, CNC), 2001. 2. Shell R. L., Hall E. L., Handbook of Industrial Automation, ed., University of Cincinnati, Ohio, Marcel Dekker Inc., New York, 2000.
	Supplementary literature	1. Kank C., Diesel Motor Ships' Engines and Machinery, Institute of Marine Engineering, London, 1990.
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Practical activites within the subject	Not applicable	

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