GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Principles of hybrid propulsion for waterborne vehicles, PG_00064998		
Field of study	Transport and Logistics		
Date of commencement of studies	February 2027	Academic year of realisation of subject	2027/2028
Education level	second-cycle studies	Subject group	Specialty 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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Division of Marine Auxiliary Machinery -> 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. Magdalena Pospieszyńska	
	Teachers	dr inż. Magdalena Pospieszyńska	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	30.0	0.0	45

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	45	11.0	44.0	100

Subject objectives

To familiarize students with issues related to propulsion systems, especially hybrid and electric ones, currently used for transport in the shipbuilding industry.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U03] identifies and formulates task specifications in the scope of transport systems and processes design, including non-standard problems and taking into consideration their non-technical aspects	Knowledge of the basics of designing and selecting hybrid drive systems.	[SU4] Assessment of ability to use methods and tools
[K7_W12] identifies and interprets the main developmental trends and significant new achievements in the field of engineering and technical sciences and disciplines relevant to the course of study	Knowledge of current trends in watercraft propulsion systems.	[SW3] Assessment of knowledge contained in written work and projects
[K7_U13] evaluates the feasibility and potential for utilizing new technical and technological achievements in accomplishing tasks characteristic for the field of study	Knowledge of the latest electric and hybrid ship propulsion solutions. Ability to pre-select propulsion components.	[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject

Subject contents

Course content – lecture

1.History of hybrid propulsion systems in various industries.2.National and international standards and regulations.3.Basic types of propulsion systems/engines.4.Energy conversion system.5.Hybrid propulsions and their control systems.6.Electric ships. Types of electric power supply for hybrid propulsion.7.Basics of optimizing energy consumption by a unit with a hybrid propulsion.

<table>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of electrical engineering and electronics.

Basic knowledge of hydromechanics and general mechnics.</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>Project</td><td>60.0%</td><td>50.0%</td></tr>
<tr><td>Lecture</td><td>60.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
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<tr><td>Basic literature</td><td>Electric motors and drives: Fundamentals, Types and Applications. Austin Huges, Bill Drury.</td></tr>
<tr><td>Supplementary literature</td><td>Design and control of hybrid power and propulsion systems for smart ships: A review of developments. R.D. GEERTSMA, R.R. NEGENBORN, K. VISSER, J.J. HOPMAN, Applied Energy, 2017.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Calculating the energy requirement for a hybrid propulsion unit.2. Types of hybrid propulsions.3. Types of electric propulsions with a description of the components.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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