



Subject card

Subject name and code	Measurements in marine power systems, PG_00065621						
Field of study	Naval Architecture and Offshore Structures						
Date of commencement of studies	February 2026		Academic year of realisation of subject			2026/2027	
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			3.0	
Learning profile	general academic profile		Assessment form			exam	
Conducting unit	Division of Marine Power Plants -> 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		prof. dr hab. inż. Zbigniew Korczewski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	15.0	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		8.0		22.0	75
Subject objectives	To teach the theoretical foundations of metrology within the selected aspect of offshore wind farms, with particular emphasis on the technology of measuring the control parameters of the offshore wind turbine drive train unit for diagnostic purposes.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K7_W11] interprets social, economic, legal (including industrial and intellectual property laws), and other non-technical aspects of engineering activities, and includes them into engineering practice		Has basic knowledge of legal acts, standards and industry regulations which determine the operation of offshore wind farms, in terms of monitoring their operation.			[SW3] Assessment of knowledge contained in written work and projects	
	[K7_W04] demonstrates knowledge encompassing selected issues in the field of advanced knowledge, particularly in the scope of methods, techniques, tools, and algorithms specific to Naval Architecture and Ocean Engineering		Has basic knowledge of measurement systems used in offshore wind turbine drive systems and their usage for controlling and operational diagnostics.			[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 Naval Architecture and Offshore Structures		Is able to balance energy processes: basic and accompanying, implemented in the main components of the power transmission system of an offshore wind turbine based on the measurement of control parameters.			[SU1] Assessment of task fulfilment	

Subject contents	<p>Course content – lecture Lecture - 15 hours</p> <p>Uncertainties and errors in technological measurements</p> <p>Wind speed measurement technologies.</p> <p>Energy balance of the offshore wind turbine drive train system - basic and accompanying processes</p> <p>Basic and control parameters of an offshore wind turbine</p> <p>Destructive impact of the marine environment on a wind turbine</p> <p>States of operational failure of the main components of an offshore wind turbine</p> <p>Laboratory exercises - 15 hours</p> <p>Measurement of velocity and kinetic energy of the air stream from the wind generator</p> <p>Measurement of torque and rotational speed in a simple mechanical system</p> <p>Measurement of electrical parameters of a wind turbine power systems generator</p> <p>Vibration measurement in a rotating mechanical system</p> <p>Identification of drive shaft fatigue by thermal imaging method</p> <p>Project - 15 hours</p> <p>Work out the energy balance of the offshore wind turbine drive system for the given design form and the range of variability of the kinetic energy of the wind.</p>														
Prerequisites and co-requisites	Knowledge of machine building and electrical engineering														
Assessment methods and criteria	<table border="1" data-bbox="448 1471 1495 1610"> <thead> <tr> <th data-bbox="448 1471 794 1507">Subject passing criteria</th> <th data-bbox="794 1471 1141 1507">Passing threshold</th> <th data-bbox="1141 1471 1495 1507">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 1507 794 1543">Test</td> <td data-bbox="794 1507 1141 1543">51.0%</td> <td data-bbox="1141 1507 1495 1543">50.0%</td> </tr> <tr> <td data-bbox="448 1543 794 1579"></td> <td data-bbox="794 1543 1141 1579">100.0%</td> <td data-bbox="1141 1543 1495 1579">25.0%</td> </tr> <tr> <td data-bbox="448 1579 794 1610"></td> <td data-bbox="794 1579 1141 1610">100.0%</td> <td data-bbox="1141 1579 1495 1610">25.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Test	51.0%	50.0%		100.0%	25.0%		100.0%	25.0%
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Recommended reading	<p>Basic literature</p> <p>Supplementary literature</p>	<ol style="list-style-type: none"> 1. Letcher T. M. Wind Energy Engineering. A Handbook for Onshore and Offshore Wind Turbines. Academic Press. Elsevier Inc. 2017. 2. Passon P., Branner K., Larsen S.E., Hvenekær R.J.: Offshore Wind Turbine Foundation Design. Technical University of Denmark, Department of Wind Energy 2015. 3. Wu B., Youngqiang L., Navid Z., Samir K.: Power Conversion and Control of Wind Energy, John Wiley & Sons, INC., Publication, 2011. <p>Ajid Bastankhah, Fernando Porté-Age: A New Miniature Wind Turbine for Wind Tunnel Experiments. Part I: Design and Performance. Energies 10(7), March 2018.</p> <p>Korczewski, Z., & Rudnicki, J. (2024). Active Diagnostic Experimentation on Wind Turbine Blades with Vibration Measurements and Analysis. <i>Polish Maritime Research</i>, 126-134. https://doi.org/10.2478/pomr-2024-0042</p>													

	eResources addresses	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. <i>Explain the notion of standard uncertainty type A and B.</i> 2. <i>Characterize remote sensing methods of measuring wind speed (SODAR and LIDAR).</i> 3. <i>Betz limit - simplifying assumptions.</i> 4. <i>Determine the energy balance of a wind turbine - Sankey diagram.</i> 5. <i>Perform the external characteristics of a wind turbine.</i> 	
Practical activities within the subject	Not applicable	

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