



Subject card

Subject name and code	Open-air Laboratory, PG_00048378						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2023/2024		
Education level	second-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	1	Language of instruction			Polish		
Semester of study	1	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Marine Electronic Systems -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jacek Marszal					
	Teachers	dr hab. inż. Jacek Marszal mgr inż. Aleksander Schmidt dr inż. Piotr Grall					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	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		4.0		16.0	50
Subject objectives	The aim of the course is to familiarize students with the marine electronics equipment and systems in real operating conditions on vessels.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	<p>[K7_U06] can analyse the operation of components, circuits and systems related to the field of study; measure their parameters; examine technical specifications; interpret obtained results and draw conclusions</p>	<p>The student supports built-in real-time systems in real operating conditions, examines their parameters and functionality and interprets the obtained results. He researches the GPS satellite navigation system and guides the measuring boat with the use of a digital map. Determines the position of moving objects under water using a hydroacoustic local navigation system with a super-short base. It examines the properties and compares the classical and electronic compass indications and measures the velocity with an induction logo. He measures the depth profiles of a basin with a navigational and hydrographic echosounder and examines bottom sediments with a dual-frequency echo sounder. Observes the underwater situation using a pulsed sonar. It guides navigation and observes the coastline using radar. He studies the ultrasonic underwater communication system.</p>	<p>[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject</p>
	<p>K7_K02</p>	<p>The student supports built-in real-time systems in real operating conditions, examines their parameters and functionality and interprets the obtained results. He researches the GPS satellite navigation system and guides the measuring boat with the use of a digital map. Determines the position of moving objects under water using a hydroacoustic local navigation system with a super-short base. It examines the properties and compares the classical and electronic compass indications and measures the velocity with an induction logo. He measures the depth profiles of a basin with a navigational and hydrographic echosounder and examines bottom sediments with a dual-frequency echo sounder. Observes the underwater situation using a pulsed sonar. It guides navigation and observes the coastline using radar. He studies the ultrasonic underwater communication system.</p>	<p>[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills</p>

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Subject contents	<ol style="list-style-type: none"> 1. Performance testing of the GPS satellite navigation system. 2. Practical exercises of navigation systems. Navigation with a digital map and GPS system on motor boat. 3. Hydroacoustic local navigation system with a super short base line - determining the position of moving objects under water. 4. Magnetic Compasses - study and comparison of the properties of the compass classical and electronic. 5. Study the properties of the electromagnetic ship log. 6. Measurement using echo sounder. Echo sounder bottom profiles survey. 7. Dual-frequency echo sounder examination of bottom sediments. 8. Sound speed profiler - examination of influence of sound speed distribution on acoustic waves propagation in the water. 9. Sonar measurements. Miniature pulse sonar with mechanical scanning - observations and searching for underwater objects. 10. Radar - navigation and observation of coast line. 11. Ultrasound underwater communication system - comparison of communications via hydrotelephone and walkie-talkie. 						
Prerequisites and co-requisites							
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Example issues/ example questions/ tasks being completed							
Work placement	Not applicable						