



Subject card

Subject name and code	Modelling and Simulation in Ocean Engineering I, PG_00053281						
Field of study	Ocean Engineering						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2022/2023		
Education level	second-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		English		
Semester of study	1		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Zakład Energetyki i Automatyki Morskiej -> Institute of Ocean Engineering and Ship Technology -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Klaudia Wrzask				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	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		0.0		0.0	60
Subject objectives	Signal modelling, Fourier series, Fourier transformation, Fourier analysis, Laplac'e transform, principal notions and application of state space theory, fuzzy sets theory and its application, fundamentals of, genetic algorithms						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W01] has a deepened and widened knowledge on certain fields of maths, used to formulate, solve and verify complex problems in ocean-technology		The student has extended and deepened knowledge in the field of signal analysis and dynamical systems, used to formulate, solve and verify complex problems in ocean engineering		[SW1] Assessment of factual knowledge		
	[K7_W02] has a widened knowledge in the range of modelling technological processes, including knowledge necessary to describe and assess the functioning of selected elements of ocean technology objects and systems		The student has extensive knowledge in the field of modeling stochastic technological processes, including the knowledge necessary to describe and evaluate the functioning of selected elements of objects and ocean engineering systems.		[SW1] Assessment of factual knowledge		
	[K7_U01] can obtain information from literature, databases and other sources, can verify and organize the obtained information, interpret them and form conclusions and justified opinions		The student is able to obtain information from literature, databases and other sources; verify and systematize the information obtained, interpret it and draw conclusions, formulate and justify opinions on modeling in ocean engineering.		[SU1] Assessment of task fulfilment		
	[K7_U04] can apply mathematical methods and models and computer simulations to analyse, design, and assess the functioning of ocean technology objects and systems and their elements		The student is able to use mathematical methods and models, as well as computer simulations to analyze and evaluate the functioning of ocean engineering systems or their elements.		[SU1] Assessment of task fulfilment		
	K7_W04		The student has knowledge in the field of control using fuzzy logic algorithms in ocean engineering systems.		[SW1] Assessment of factual knowledge		

Subject contents	Signal approximation, Fourier series, Fourier transform, Fourier analysis, Laplace transform, basic concepts and applications of the state space theory, basic concepts and applications of the theory of stochastic processes, fuzzy set theory and its applications, genetic algorithms.		
Prerequisites and co-requisites	knowledge of the basics of differential and integral calculus, mathematical modeling of processes,		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	laboratory	60.0%	50.0%
	lecture	60.0%	50.0%
Recommended reading	Basic literature	Kämpf, J. (2009). <i>Ocean modelling for beginners: using open-source software</i> . Springer Science & Business Media. Naess, A., & Moan, T. (2013). <i>Stochastic dynamics of marine structures</i> . Cambridge University Press.	
	Supplementary literature	1. Fossen T.I. : Guidance and Control of Ocean Vehicles. John Wiley and Sons, Chichester, New York, Brisbane, Toronto, Singapore, 1994,	
	eResources addresses	Adresy na platformie eNauczanie: Modelowanie i Symulacja w Technice, Oceanotechnika, niest, W, sem. 1, lato 22/23, (PG_00057180) - Moodle ID: 30012 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30012	
Example issues/ example questions/ tasks being completed	Purpose of signal approximation with trigonometric and exponential Fourier series, reason for using both types of Fourier seriesThe relationship between multi-valued logic and the concept of a fuzzy set, the role of fuzzy sets in the description and analysis of technical processes,The role of genetic algorithms in optimizing the design and control of devices and technical processes.		
Work placement	Not applicable		