



Subject card

Subject name and code	, PG_00057294						
Field of study	Ocean Engineering						
Date of commencement of studies	February 2023	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	Part-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Institute of Ocean Engineering and Ship Technology -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Paweł Dymarski				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	18.0	0.0	0.0	9.0	0.0	27
	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	27		10.0		63.0	100
Subject objectives	The aim of the course is to familiarize students with the basic mechanics of marine supporting structures, floating and bottom-fixed (multi-degree of freedom structures). Additionally, students become familiar with the mechanics of anchoring systems and basic models of structure-seabed interaction.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_U05] can conduct an initial economic analysis of an investment in the range of ocean technology, indicate detailed rules of law and branch regulations		The student will be able to make an initial estimation of the mass of the supporting structure (including the tower)		[SU4] Assessment of ability to use methods and tools		
	K7_W04		The student will learn the software for modeling the geometry of floating objects and hydrostatic analyses.		[SW1] Assessment of factual knowledge		
	[K7_W07] has knowledge on the development perspectives of ocean technology objects and systems, knows the newest and most relevant achievements in ocean technology		The student will gain knowledge about the currently used supporting structures and will know the development trend of these structures.		[SW1] Assessment of factual knowledge		
	[K7_U07] in compliance with a formulated specification and with the aid of appropriate tools and methods, is able to complete an advanced engineering task within the range of design, construction and operation of ocean technology objects and systems		The student will learn the basic methods used in the process of designing supporting structures		[SU4] Assessment of ability to use methods and tools		

Subject contents	1. Mooring systems 1.1 Types of mooring systems 1.2 Mooring systems modelling 2. Mechanics of motion of a floating wind turbine 2.1 Static solutions for TLP 2.2 Introduction to the dynamics of floating platforms. The equations of motion 3. Seabed impact modelling 3.1 Simplified model for monopile structures 3.2 Simplified model for gravity structures 3.3 Layer model P-y 4. Single-degree of freedom structures 4.1 Equation of motion 4.2 Determining the coefficients of the equation of motion and the force acting on a "concentrated mass" 4.3 Determining the system's natural frequency 5. Multi-degree of freedom structures. Lumped mass model 5.1 (Matrix) equation of motion 5.2 Determination of mass matrix elements, stiffness matrix and damping matrix. 5.3 Determination of forces acting on (lumped) masses. 5.4 Determination of structures eigenfrequencies		
Prerequisites and co-requisites	1. Basic knowledge of surface design software for floating objects, such as: - Freeshipping or - Maxsurf or - NAPA 2. Basic knowledge of hydromechanics of floating objects (stability, dynamic forces) 3. Completion of the course: Offshore Support Structures I		
Assessment methods and criteria			
Recommended reading	Basic literature	1. J.F. Wilson: "Dynamics of Offshore Structures". Willey 2003 2. G. Clauss, E. Lehmann and C. Ostergaard: "Offshore Structures. Volume I Conceptual Design and Hydromechanics". Springer 1992 3. Barry J. Heyer and Lymon C. Reese: "ANALYSIS OF SINGLE PILES UNDER LATERAL LOADING". 1979 4. Junbo Jia: "Soil Dynamics and Foundation Modeling Offshore and Earthquake Engineering". Springer 2018	
	Supplementary literature	1. A.R.J.M. Lloyd: Seakeeping: ship behaviour in rough weather 2. J.M.J. Journée and W.W. Massie, OFFSHORE HYDROMECHANICS 3. S.K. Chakrabarti: Hydrodynamics of Offshore Structures 4. S.K. Chakrabarti: Hand-book of Offshore Engineering 5. T. Sarpkaya: Wave Forces on Offshore Structures 6. DNVGL-ST-0119: Floating wind turbine structures. Edition July 2018 7. DNVGL-ST-0126: Support structures for wind turbines. Edition April 2016 8. Jan Dudziak: Teoria Okrętu	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		