GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00057222		
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	Full-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	dr hab. inż. Paweł Dymarski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	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	10.0	45.0	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_W04	The student will learn the software for modeling the geometry of floating objects and hydrostatic analyses.	[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
[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_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

<table>
<tr><td>Subject contents</td><td>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 stuctures
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 stuctures. 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</td></tr>
<tr><td>Prerequisites
and co-requisites</td><td>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</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>75.0%</td><td>33.0%</td></tr>
<tr><td>Lecture</td><td>60.0%</td><td>67.0%</td></tr>
</table>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>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</td></tr>
<tr><td>Supplementary literature</td><td>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</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
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<tr><td>Example issues/
example questions/
tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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