GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Steel Structures, PG_00048228		
Field of study	Civil Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2023/2024
Education level	second-cycle studies	Subject group	Obligatory subject group in the field of study 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	10.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Metal Structures -> Faculty of Civil and Environmental Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Dariusz Kowalski	
	Teachers	dr inż. Dariusz Kowalski dr inż. Natalia Korcz-Konkol	

Lesson types and methods of instruction							
	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	20.0	0.0	20.0	0.0	70
	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	70	12.0	168.0	250

Subject objectives

The aim of the course is to introduce students to the principles of design, construction and loading conditions of the following types of engineering structures:

- tall objects in the form of: towers, masts, chimneys,
- shell structures: tanks, silos, bunkers, bunkers, pipelines,
- composite structures: ceilings, columns, beams,
- thin-walled structures: purlins, transoms,
- tall and high-rise buildings.

The issues related to:

- designing structures subjected to fatigue loads,
- advanced rules for selecting the steel grade for structures,
- anti-corrosion and fire protection of metal structures,
- NDT

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W04] has knowledge on advanced strength of materials, modeling and optimisation of materials and constructions; has knowledge of fundamentals of Finite Element Method and general nonlinear analysis of engineering constructions and systems	1. The student has in-depth knowledge of various types of steel structures. 2. The student is able to characterize the types of main loads in particular types of engineering structures. 3. The student has knowledge of the extensive issues of steel material strength and its changes over time under the influence of variable loads 4. Has knowledge of structure modeling using programs based on the FEM method	
[K7_U01] can evaluate and list any loads acting on constructions	Can collect loads acting on any type of metal structure objects	
[K7_U02] can design and dimension complex steel, concrete (including reinforced), wood and masonry construtions and its details	1. The student knows how to design complex steel structures according to the rules of code. 2. The student knows how to dimension the elements of complex steel structures according to the rules of code	
[K7_W14] knows and applies building codes and obeys the Construction Law; has knowledge on environmetal impact of investment realisation	1. The student is familiar with the subject standards and knows how to use them when designing various types of steel structures 2. The student knows the rules of selecting steel material for individual types of structures, taking into account the requirements beyond strength	
[K7_W02] knows principles of analysis, design and dimensioning of complex constructions and its elements	He knows the rules of analyzing various metal structures	

Subject contents

Program content in the field of lectures:

- Steel selection for special constructions
- Dimensioning of the structure due to the fatigue phenomenon
- Renovation, modernization and strengthening of steel structures
- Composite structures
- Tower structures - towers, masts, chimneys,
- Tall buildings
- Shell structures - tanks, silos, bunkers, pipelines
- Corrosion protection of metal structures
- NDT testing of structures

Program content of exercises and design:

- Design of the floor and composite beam.
- Design exercise in the field of corrosion protection of structures.
- Design of a thin-walled bi-directional element.
- Design exercise on steel structure strengthening

Prerequisites and co-requisites

The student has knowledge of the entire first-cycle study program in the field of Civil Engineering

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Exam	60.0%	50.0%
Colloquium, Test	60.0%	30.0%
Exercises, Project	60.0%	20.0%

Recommended reading	Basic literature	1. PN-EN 1993 Eurokod 3. Projektowanie konstrukcji stalowych. Części 1-10 (seria norm EC3) 2. Łubiński M., Filipowicz A., Żółtowski W.: Konstrukcje metalowe. Część 1i II. Arkady, Warszawa 2006/07. 3. Giżejowski M., Ziółko J.: Budownictwo ogólne, tom 5. Stalowe konstrukcje budynków projektowanie wg Eurokodów z przykładami obliczeń, Arkady, Warszawa 2010. 4. Ziółko J. Utrzymanie i modernizacja konstrukcji stalowych. Arkady 1991. 5. Ziółko J. i inni: Stalowe konstrukcje specjalne. Arkady, Warszawa 1995. 6. Biegus A.: Stalowe budynki halowe. Arkady, Warszawa 2003. 7. Kozłowski A.: Konstrukcje stalowe. Przykłady obliczeń wg PN-EN 1993-1.Oficyna wydawnicza Politechniki Rzeszowskiej. Rzeszów 2009 8. Bródka J. Przebudowa i utrzymanie konstrukcji stalowych. Politechnika Łódzka 1995. 9. Praca zbiorowa.: Poradnik projektanta konstrukcji metalowych. Arkady, Warszawa 1982 10. Rykaluk K.: Konstrukcje stalowe. Kominy, wieże, maszty.. OWPW, Wrocław 2004 11. Kucharczuk W., Labocha S. Konstrukcje zespolone stalowo-betonowe budynków. Arkady. Warszawa 2007 12. PN-90/B-03200 - Konstrukcje stalowe. Obliczenia statyczne i projektowanie. 13. Goczek J., Supeł Ł., Gajdzicki M.: Przykłady obliczeń konstrukcji stalowych, Wydawnictwo PŁ, Łódź 2010. 14. Bródka J., Broniewicz M.: Projektowanie konstrukcji stalowych według Eurokodów. Materiały szkoleniowe. Polskie Wydawnictwo Techniczne, Rzeszów 2010. 15. Pałkowski Sz.: *Konstrukcje stalowe. Wybrane zagadnienia obliczania i projektowania,* Wydawnictwo Naukowe PWN, Warszawa 2001
	Supplementary literature	1. Bogucki W., Żyburtowicz M.: *Tablice do projektowania konstrukcji metalowych*. Arkady, Warszawa 1996. 2. Bogucki W.: *Budownictwo stalowe*. Arkady, Warszawa 1976. 3. Niewiadomski J., Głąbik J., Kazek M., Zamorowski J.: *Obliczanie konstrukcji stalowych wg. PN-90/B-03200*. PWN. Warszawa 1999. 4. W. Knabe: *Przykłady obliczeń połączeń śrubowych i spawanych*. Wydawnictwo Politechniki Gdańskiej. Gdańsk 2000 5. Praca zbiorowa pod red. A. Kozłowskiego: Konstrukcje stalowe. Przykłady obliczeń według PN-EN 1993-1. Część pierwsza. Wybrane elementy i połączenia. Oficyna Wydawnicza PRz, Rzeszów 2009. Część druga. Stropy i pomosty. Oficyna Wydawnicza PRz, Rzeszów 2011. 6. Rykaluk K.: Konstrukcje stalowe. Podstawy i elementy. DWE, Wrocław 2001.
	eResources addresses	Adresy na platformie eNauczanie: KONSTRUKCJE METALOWE - BO/ITiK - Moodle ID: 34298 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34298
Example issues/ example questions/ tasks being completed	1. Design rules for steel shell structures - tanks, silos, storage tanks, pipelines, bunkers. 2. Design rules for steel structures of high - masts, towers, chimneys, power poles 3. Principles of design of steel structures for buildings tall, multilevel 4. Principles of anti-corrosion and fire protection of steel structures 5. Principles of dimensioning thin-walled structures - purlins, bolts, sheathing sheets, wall cladding 6. Principles of dimensioning of composite structures 7. Principles of dimensioning of structures subjected to fatigue loads 8. Principles of execution control of metal steel structures in the field of NDT tests	
Work placement	Not applicable	