GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Wind and earthquake engineering, PG_00041523		
Field of study	Civil Engineering		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
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	English
Semester of study	2	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Katedra Wytrzymałości Materiałów -> Faculty of Civil and Environmental Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Bartosz Sobczyk	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	15.0	0.0	0.0	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	5.0	25.0	75

Subject objectives

Description of wind and earthquake engineering basics and principles.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W14] knows and applies building codes and obeys the Construction Law; has knowledge on environmetal impact of investment realisation	Student knows what are the seismic and wind loads and knows how to apply them, according to law regulations and standards.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
[K7_U01] can evaluate and list any loads acting on constructions	Student knows what are the seismic and wind loads and knows how to apply them.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
[K7_W13] has knowledge on state of the art methods on knowledge acquisition, filtration, processing and analysis	Student knows what are the seismic and wind loads and knows how to apply them.	[SW2] Assessment of knowledge contained in presentation
[K7_U11] is able to plan and execute laboratory experiments to evaluate quality of construction materials and to determine strength of construction elements	Student knows what are the seismic and wind loads and knows how to apply them.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools

Subject contents	Earthquake Engineering: Lecture: Preliminary information about earthquakes and their reasons. Parameters describing ground vibrations (magnitude, intensity) History of Earthquakes in Poland and in the Worlds. Vibrations of ground caused by mining and other environmental loads. Behaviour and damage of structures caused by earthquakes. Design of structures taking into account seismic loads. Geotechnical aspects of earthquakes. Tutorial: Determination of structural response wit aid of different methods. Response spectrum. Seismic hazard maps. Design of structures, taking into account actions included in Eurocode 8. Wind Engineering: Lecture Atmospheric motion (general circulation, wind velocity profiles, atmospheric turbulence, extreme winds climatology). Navier Stokes Equation. Flow over sharp edge objects. Flow over circular cylinder. Aeroelastic phenomena. Wind tunnel experiments. Tutorial: Calculations of basic wind parameters. Introduction to the Wind Actions Eurocode and basics of the wind load determination. Determination of flow characteristics. Assessment of structure vibration risk due to wind action. Introduction to numerical calculations.

Prerequisites and co-requisites	Structural Mechanics and Dynamics of Structures.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
test (lecture+tutorial) - Wind Engineering	60.0%	25.0%
test (lecture+tutorial)- Earthquake Engineering	60.0%	25.0%
Presentation	60.0%	50.0%

Recommended reading

Basic literature	1. Chopra A. K.: Dynamics of Structures: Theory and Applications to Earthquake Engineering. Englewood Cliffs, USA: Prentice-Hall 1995. 2. Wiegel R. L.: Earthquake Engineering. Englewood Cliffs, USA: Prentice-Hall 1970. 3. Chen W. F., Scawthorn C.: Earthquake Engineering Handbook. Boca Raton, USA: CRC Press 2003. 4. Simiu E., Scanlan R.: Wind Effects on Structures, USA: Wiley-Interscience 1996.
Supplementary literature	1. Chmielewski T., Zembaty Z.: *Podstawy dynamiki budowli*. Warszawa: Arkady 1998.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

Determine seismic response of 3 storey building with dynamic parameters given.

Describe characteristic parameters of an earthquake which affect and influence response of structures.

Calculate maximum seismic loads, according to Eurocode 8, using the spectrum response.

Describe basic wind aeroelastic phenomena,

Calculate Reynolds characterizing flow around an object.

Describe the three cell atmospheric convention model.

Work placement	Not applicable

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