GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Durability of Concrete Structures , PG_00045886		
Field of study	Civil 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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Concrete Structures -> Faculty of Civil and Environmental Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Krystyna Nagrodzka-Godycka	
	Teachers	prof. dr hab. inż. Krystyna Nagrodzka-Godycka dr inż. Marek Wesołowski dr inż. Paweł Piotrkowski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	15.0	0.0	30

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	30	5.0	40.0	75

Subject objectives

Knowledge of basic issues related to the durability of concrete structures. Determining the reliability of structures in terms of European standards, types of loads, combinatorics. Knowledge of the principles of verification of stress states related to durability. The ability to determine the effects of shrinkage and temperature gradient on the structure. Understanding the impact of fire temperatures on structural elements and properties of steel and concrete. Understanding the methods of verifying the load capacity of structural elements under fire load

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W02] knows principles of analysis, design and dimensioning of complex constructions and its elements	Based on lectures and designing, the student is prepared to analyze and dimension complex concrete structures under the influence of thermal interactions in the aspect of durability	[SW2] Assessment of knowledge contained in presentation
[K7_K02] Rocognizes the significance of knowledge in solving cognitive and practical problems; reliably evaluates results of his own and team research	On the basis of lectures and design works, the student is prepared to analyze and dimension complex building structures in the aspect of durability	[SK2] Assessment of progress of work
[K7_U02] can design and dimension complex steel, concrete (including reinforced), wood and masonry construtions and its details	The subject of the project is an object that is subjected to adverse environmental influences.	[SU4] Assessment of ability to use methods and tools
[K7_W15] has deep and adequate knowlege of civil engineering, within offered specialization and profile	The student acquires practical skills of design in the field of concrete structures at an advanced level	[SW1] Assessment of factual knowledge

Subject contents	Basics of making probabilistic reliability of concrete structures in terms of modern standards of structural design, examples of applications in terms of Eurocodes. Checking criteria in terms of building structures to Eurocode 1990, the concept of class structure and consequently the destruction of class reliability, appropriate combinations of interactions. Basic knowledge on the impact of shrinkage and thermal effects arising mainly from the difference in temperature (temperature gradient) on the elements of reinforced concrete structures. Shrinkage of concrete and thermal loads (temperature gradient) in the static and strength analysis. Examples of modeling in computational engineering programs (CAE). The necessary amount reinforcement of shrinkage and thermal loads. Structural fire design – general rules. Fire resistance classifications. Fire curves: the hypothetical fire scenario and estimation of the appropriate design model of fire. Determination of structural fire loads appropriate for the accidental situation of fire, Temperature field calculation. The basic properties of concrete and steel reinforcement to their behavior in fire conditions, Eurocode models. Calculations of reinforced concrete structures fire resistance, Code requirements.
Prerequisites and co-requisites	
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
project	50.0%	50.0%
presentation	50.0%	50.0%

Recommended reading	Basic literature	M. Knauff, Obliczanie konstrukcji żelbetowych według Eurokodu 2, PWN Warszawa 2012, 2014, 2018 R. Kowalski, Konstrukcje żelbetowe w warunkach pożarowych, PWN 2019 K. Chudyba – Weryfikacja odporności pożarowej elementów żelbetowych według Eurokodów, Wydawnictwo Politechniki Krakowskiej, Kraków 2018 A. Halicka, D. Franczak, Projektowanie zbiorników żelbetowych t. 1 i 2 Wydawnictwo Naukowe PWN, Warszawa 2011, 2012 M. Knauff, A. Golubińska, P. Knyziak: Tablice i wzory do projektowania konstrukcji żelbetowych z przykładami obliczeń, PWN 2013 M. Knauff, B. Grzeszczykowski, A. Golubińska, Przykłady obliczania konstrukcji żelbetowych – Zarysowanie, Zeszyt 3, PWN, Warszawa 2018 W. Starosolski, Konstrukcje żelbetowe według Eurokodu 2 i norm związanych, tom 1,2,3, 4 i 5 Wydawnictwo Naukowe PWN, Warszawa 2011-2016 Konstrukcje betonowe, żelbetowe i sprężone, Komentarz naukowy do normy PN-B-03264 t.I i II, ITB Warszawa 2005 Podstawy projektowania konstrukcji żelbetowych i sprężonych wg Eurokodu 2 – praca zbiorowa pod red. M. Knauffa, Dolnośląskie Wydawnictwo Edukacyjne, 2006 K. Flaga, Naprężenia skurczowe i zbrojenie przypowierzchniowe w konstrukcjach betonowych, Seria Inżynieria Lądowa, Monografia nr 391, Wydawnictwo Politechniki Krakowskiej, Kraków 2011 K. Flaga, B. Klemczak: Konstrukcyjne i technologiczne aspekty naprężeń termiczno-skurczowych w masywnych i średniomasywnych konstrukcjach betonowych, Seria Inżynieria Lądowa, Monografia nr 391, Wydawnictwo Politechniki Krakowskiej, Kraków 2016 J. Kobiak W. Stachurski, Konstrukcje betonowe , t. 4, Arkady, Warszawa 1991 A. Halicka, D. Franczak, Projektowanie zbiorników żelbetowych t. 1 i 2 Wydawnictwo Naukowe PWN, Warszawa 2011, 2012 R. Kowalski – Zabezpieczenie pożarowe konstrukcji żelbetowych, Warsztat Pracy Projektanta, 2010.
	Supplementary literature	Zych Mariusz, Zarysowanie ścian zbiorników żelbetowych: Teoria i Projektowanie, Wydawnictwo Politechniki Krakowskiej, Kraków 2017 K. Chudyba – Projektowanie konstrukcji z betonu w warunkach pożarowych według Eurokodów, Wydawnictwo Politechniki Krakowskiej, Kraków 2008 J. Murzewski, Niezawodność konstrukcji inżynierskich, Arkady, Warszawa 1989

	eResources addresses	Adresy na platformie eNauczanie: Trwałość Konstrukcji Betonowych 2023/2024 - Moodle ID: 33741 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=33741
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	