Annex No. 9
to the Rector's Decision No. 35/19
as amended by Decision No. 12/22

COURSE SPECIFICATION

Course code	full-time:	**B1-6-601**
	part-time:	**BN1-6-601**
Course title in Polish	**Konstrukcje betonowe 2**	
Course title in English	**Concrete Structures 2**	
Valid from academic year	**2023/2024**	

CURRICULAR ALIGNMENT

Programme	**CIVIL ENGINEERING**
Level	**first-cycle**
Programme profile	**academic**
Mode of attendance	**full-time; part-time**
Specialism	**all**
Academic unit responsible for the course	**Department of Strength of Materials and Building Structures**
Course coordinator	**dr inż. Wioletta Raczkiewicz**
Approved by	**prof. dr hab. inż. Grzegorz Świt**

COURSE DESCRIPTION

Teaching block		**major**
Course status		**required**
Language of instruction		**Polish**
Semester of delivery	full-time	**semester VI**
	part-time	**semester VI**
Prerequisites		**Actions on Building Structures, Structural Mechanics 1,2, Strength of Materials 1 and 2, Physics of Structures, Foundations, Concrete Structures 1, Computational Methods in Structural Engineering**
Exam (YES/NO)		**YES**
ECTS		**4**

Mode of teaching		**lecture**	**class**	**lab**	**project**	**other**
Number of hours per semester	full-time:	**30**			**30**	
	part-time:	**24**			**24**	

LEARNING OUTCOMES

Category	Code	Learning outcomes	Corresponding programme outcome code
Knowledge	W01	Students know selected issues of construction standards related to the design of concrete structures.	B1_W08
	W02	Students have knowledge of modeling simple reinforced concrete structures using computer programs and knowledge of static analysis of the designed structure.	B1_W06 B1_W07 B1_W17
	W03	Students know the basics of design (reinforcement dimensioning and construction) of elements in simple reinforced concrete structures	B1_W09 B1_W10
Skills	U01	Students can use appropriate standards for the design of concrete structure elements.	B1_U13 B1_U29
	U02	Students are able to model a simple structural system, gather loads acting on the structure and carry out static strength analysis.	B1_U02 B1_U03 B1_U08 B1_U09
	U03	Students can design simple structures (slab-on-grade floors, stairs and ramps) and elements of reinforced concrete structures (beams, columns, slabs, spread footings and continuous footings).	B1_U14 B1_U24
	U04	Students can construct reinforcement in basic reinforced concrete elements based on standards and guidelines; can prepare and interpret construction and structural drawings.	B1_U07 B1_U14
Competence	K01	Students are able to work individually and in a team; independently acquire and expand the necessary knowledge.	B1_K03
	K02	Students understand the importance of responsibility in engineering activities; formulate conclusions from the tasks performed and are responsible for the reliability of the results obtained.	B1_K02 B1_K04
	K03	Students follow the rules of professional ethics.	B1_K07

COURSE CONTENT

Teaching mode	Topics covered
lecture	Fundamentals of structural design: load carrying capacity, serviceability, durability. Actions on structures. Idealization of structures.
	Fire resistance of structures.
	Division of reinforced concrete floor systems.
	Monolithic slab-and-beam floors, defining the shape, load transfer, load distribution. Schematization in the calculation of slab-and-beam floors. Loads, static schemes, static-strength calculations of single-span and continuous slabs. One-way reinforced slabs. Principles of defining the shape and selecting reinforcement: main and distribution reinforcement, spacers.
	Rectangular two-way reinforced slabs: loads, static-strength calculations, one-way and two-way slabs. Principles of reinforcement selection and design.
	Two-way reinforced slabs: round, triangular, trapezoidal plates. Defining the shape of reinforcement. Openings in slabs.
	Frames, structural elements, beam-and-column systems.
	Reinforced concrete stairs and ramps: cantilever, stringer, slab. Principles of loads gathering, static schemes, static-strength calculations, construction of reinforcement.

	Shallow foundations: foundation types and application. Spread and continuous footings: loads, static-strength calculations, reinforcement design.
project	Design of a mixed-structure building: - design assumptions - layout of structural system elements - static-strength calculations - dimensioning of selected reinforced concrete structural elements - preparation of projection and cross-section drawings of the building and working drawings of selected elements.

METHODS OF LEARNING OUTCOMES VERIFICATION

Learning outcome	Learning outcome verification methods					
	Oral exam	Written exam	Test	Project	Report	Other
W01		X		X		
W02		X		X		
W03		X		X		
U01		X		X		
U02		X		X		
U03		X		X		
U04		X		X		
K01		X		X		
K02		X		X		
K03		X		X		

ASSESSMENT

Teaching mode	Assessment type	Criteria
lecture	mark-based	*Scoring at least 50% on the written exam*
project	mark-based	*Attaining at least a passing grade on each project and a 50% score on the oral defence of the project.*

STUDENT WORKLOAD

ECTS weighting												
	Activities	Student workload										
		full-time					part-time					
1.	Scheduled contact hours	W	C	L	P	S	W	C	L	P	S	h
		30			30		24			24		
2.	Other (office hours, exams)	4			2		2			2		h
3.	**Total number of contact hours**	**66**					**54**					h
4.	**Number of ECTS credits for contact hours**	**2,6**					**2,2**					ECTS
5.	**Independent study hours**	**34**					**46**					h
6.	**Number of ECTS credits for independent study**	**1,4**					**1,8**					ECTS
7.	**Practical hours**	**50**					**50**					h
8.	**Number of ECTS credits for practical hours**	**2**					**2**					ECTS
9.	**Total workload**	**100**					**100**					h
10.	**ECTS credits for the course** *1 ECTS credit =25 student learning hours*	**4**										

READING LIST

1. Łapko A.: Projektowanie konstrukcji żelbetowych. Arkady. Warszawa 2001.
2. Knauff M., Golubińska A. Knyziak P.: Przykłady obliczania konstrukcji żelbetowych. Budynek ze stropami płytowo-żebrowymi. Zeszyt 1., Wydawnictwo Naukowe PWN, Warszawa 2015.
3. Knauff M., Golubińska A. Knyziak P.: Tablice i wzory do projektowania konstrukcji żelbetowych z przykładami obliczeń., Wydawnictwo Naukowe PWN, Warszawa 2014.
4. Knauff M., Grzeszykowski B., Golubińska A.: Przykłady obliczania konstrukcji żelbetowych. Elementy ściskane. Zeszyt 2., Wydawnictwo Naukowe PWN, Warszawa 2023.
5. Knauff M., Golubińska A., Grzeszykowski B.: Przykłady obliczania konstrukcji żelbetowych. Zarysowanie. Zeszyt 3., Wydawnictwo Naukowe PWN, Warszawa 2017.
6. Starosolski W.: Konstrukcje żelbetowe według Eurokodu 2 i norm związanych. Tom I-IV PWN, Warszawa 2011.
7. Praca zbiorowa Sekcji Konstrukcji Betonowych KILiW PAN. Podstawy projektowania konstrukcji żelbetowych i sprężonych według Eurokodu 2. Dolnośląskie Wydawnictwo Edukacyjne, Wrocław 2006.