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

COURSE SPECIFICATION

Course code	full-time:	**B1-3-306**
	part-time:	**BN1-3-306**
Course title in Polish	**Technologia betonu**	
Course title in English	**ConcreteTechnology**	
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 Construction Technology and Management**
Course coordinator	**prof. dr hab. inż. Wojciech Piasta**
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 III**
	part-time	**semester III**
Prerequisites		**Building materials**
Exam (YES/NO)		**NO**
ECTS		**3**

Mode of instruction		**lecture**	**class**	**lab**	**project**	**other**
No. of hours per semester	full-time	**15**		**30**		
	part-time	**10**		**20**		

Learning outcomes

Category of outcome	Outcome code	Course learning outcomes	Corresponding programme outcome code
Knowledge	W01	Students know basic standards and guidelines for concrete requirements, Students have acquired knowledge of basic concepts, terms, concrete properties and objectives in concrete technology Students have a general knowledge regarding characteristics of modern and special mixtures and concretes. They are familiar with durability issues.	B1_W08
	W02	Students know the types, purpose and requirements of concrete mix and concrete ingredients, as well as basic test standards .	B1_W18
	W03	Students know design methods of aggregate skeleton and concrete mix composition. They know how to determine concrete requirements appropriately. They know how to assess the requirements and then to select, and design concrete with necessary properties.	B1_W18
Skills	U01	Students are able to use basic standards and guidelines for concrete mix design.	B1_U13
	U02	Students can select adequate methods for testing concrete mix.	B1_U24
	U03	Students can determine basic concrete properties and their dependence on impact factors.	B1_U24
	U04	Students can carry out technical control tests and analyze the results obtained and perform standard concrete verification.	B1_U24
Competence	K01	Students are able to work independently and cooperate in a team on an assigned task.	B1_K01
	K02	Students are responsible for the reliability of the results obtained and their interpretation. They are aware of the responsibility for work safety.	B1_K02
	K03	Students are aware of improving their competences They supplement and expand their knowledge on their own.	B1_K03
	K04	Students describe the results obtained and formulate conclusions.	B1_K04

COURSE CONTENT

Teaching mode*	Topics covered
lecture	Concrete as a composite. Basic concepts, terms and definitions regarding concrete and its technology. Standard classes of concrete mix and concrete.
	Concrete ingredients.
	Design methods for concrete mix composition. Design of optimized aggregate skeleton.

	Concrete mix performance and properties. Concrete mix consistence class. Functions of chemical admixtures in concrete mixes.
	Chemical and physical concrete properties. Compressive and tensile strength of concrete. Concrete compressive strength classes. Concrete microstructure. Strength and deformation properties. Performance properties.
	Elastic modulus of concrete. Temporary deformability of concrete; and concrete contraction and creep under constant compressive loading.
	High-performance and self-compacting concrete. Special concrete. Concrete durability. Concrete exposure classes. Types of chemical and physical aggression.
lab	Occupational health and safety training
	Standard tests necessary for concrete mix design. Laboratory tests of aggregate geometric properties, results analysis. Water demand determination in coarse and fine aggregates.
	Experimental and numerical study of the optimized grain composition for coarse aggregate. Aggregate mix design based on test results. Sand point determination.
	Concrete mix design based on test results. Concrete mix design using mineral additives and chemical admixtures.
	Preparation of a concrete mix sample. Laboratory tests of consistence, density and air content in the mix. Sample preparation for testing concrete properties.
	Testing methods of hardened concrete. Concrete strength tests using sclerometric method and test results analysis. Concrete strength tests using ultrasonic method and test results analysis. Determination of elasticity and lateral deformation coefficients.
	Tests and compressive strength test results analysis and concrete class determination. Concrete mix design revision. Evaluation is made to predict concrete durability and exposure class.

METHODS OF LEARNING OUTCOMES VERIFICATION

Learning outcome	Verification methods					
	Oral examination	Written examination	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		
K02				X		
K03				X		
K04				X		

ASSESSMENT

Teaching mode	Assessment type	Assessment criteria
lecture	mark-based	*Oral tests. Obtaining 60% of the correct responses to the lecture's questions.*

lab	mark-based	*Minimum a passing grade on each in-class test and minimum a passing grade on the project based on lab tests.*

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
		15		30			10		20			
2.	Other (office hours, exams)	2		2			2		2			h
3	**Total number of contact hours**	**49**					**34**					h
4.	**Number of ECTS credits for contact hours**	**2**					**1,4**					ECTS
5.	**Independent study hours**	**26**					**41**					h
6.	**Number of ECTS credits for independent study**	**1**					**1,6**					ECTS
7.	**Practical hours**	**50**					**50**					h
8.	**Number of ECTS credits for practical hours**	**2**					**2**					ECTS
9.	**Total workload**	**75**					**75**					h
10.	**ECTS credits for the course** *1 ECTS credit =25 student learning hours*	**3**										ECTS

READING LIST

1. Neville A. Właściwości betonu, Polski Cement, Kraków 2012.
2. Jamrozy Z. Beton i jego technologie, PWN, Kraków 2003.
3. Śliwiński J. Beton zwykły - projektowanie i podstawowe właściwości, Polski Cement, Kraków 1999.
4. Rusin Z., Technologia betonów mrozoodpornych, Polski Cement, Kraków 2002.
5. Peukert S. Cementy powszechnego użytku i specjalne, Polski Cement, Kraków 2000.
6. Piasta J., Piasta W.G., Beton zwykły, Arkady, Warszawa 1994.
7. Piasta J., Technologia betonów z kruszyw łamanych, Arkady, Warszawa 1974.
8. Piasta J., Piasta W.G., Budownictwo ogólne tom I, rozdz. VI Arkady, Warszawa 2005.
9. Normy związane z tematem zajęć.