COURSE DESCRIPTION CARD

Course name	**Special concretes**				
Course type	**optional**	**Course code**	**SDPB0020**	**ECTS credits**	**1**
Forms and number of hours	**lecture: 10 h**	**Scientificdiscipline**	**civil engineering and transport**		
Course objectives	Consolidation and broadening of knowledge concerning the classification, properties, the specific composition and methods of producing special concretes. Gaining knowledge about technological processes in the production of special concretes. Gaining knowledge about the importance of the future of special concretes in modern construction.				
Course content	1. Special cement concretes: heavy shielding concretes, heat-resistant concretes, self-compacting concretes, underwaterconcretes, sprayed concretes, dispersed reinforced concretes, concretes with nano-dopes and nano-additives, ultra and high-performance concretes, hydrotechnical concretes, architectural concretes. 2. Concretes with a resin binder. 3. Concretes with pozzolanic additives activated with alkali (geopolymer concretes).				
Teaching methods	A problem lecture, enriched with a discussion and short student's presentations. Students' own studies on the basis of available literature sources.				
Assessment method	Final exam, students presentations.				

Symbol of learning outcome	**Learning outcomes**	**Reference to the learning outcomes for the field of study for the 8th level of Polish Qualification Framework (PRK)**	**Methods of assessing the learning outcomes**
LO1	knows and understands the types of special concretes, knows the specificity, classification and their purpose as well as critically evaluates the current global achievements, covers both general, theoretical areas, as well as detailed ones in this scope.	SD_W1	Exam, presentation
LO2	knows and understands the main directions of development of special concretes and identifies the methodology used to conduct scientific research.	SD_W2, SD_W3	Exam, presentation
LO3	knows and understands the need, rules and methods of disseminating research results; is aware of the issues in the context of the development of concrete technology in the world.	SD_W4, SD_W5	Exam, presentation
LO4	knows and understands the economic benefits of using various technologies of special concretes.	SD_W6	Exam, presentation

Student workload (in hours)	
Lecture	10
Consultations	1
The unassisted studentwork	10
Implementation of project tasks and preparation for and participation in exams/tests	5
Total	**26**
ECTS credits	**1**

Basic references	1. Neville A.M.: Properties of concrete, Pearson,2011. 2. Tur V., Kosior-Kazberuk M., Grygo R., Tur A., Krassowska J., Concrete Structures, Publishing House of Bialystok University of Technology, Białystok,2020; 3. Graybeal B. A., Material Property Characterization of Ultra-High Performance Concrete, U.S. Department of Transportation, 2006; 4. Ukesh Praveen P., Srinivasan K., Self-compacting geopolymer concrete-a review, *IOP Conf. Ser.: Mater. Sci. Eng.* 263,2017.
Supplementary references	1. Czarnecki L., International Symposium "Polymers in Concrete", 13-32, University of Minho, Guimaraes, Portugal 2006. 2. Kurdowski W.: Cement and concrete chemistry, Springer, 2014. 3. Ozin G.A., Arsenault A.C., Cademartiri L. eds., Nanochemistry – a chemical approach to nanomaterials,). RSC publishing from Royal Society of Chemistry, 2008
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Date of issuing the programme	22.03.2021