COURSE DESCRIPTION CARD

<table>
<tr><td colspan="10">Bialystok University of Technology</td></tr>
<tr><td>Field of study</td><td colspan="6">Civil Engineering</td><td>Degree level and programme type</td><td>Bachelor’s degree</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6"></td><td>Study profile</td><td>academic profile</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Concrete Structures (E)</td><td>Course code</td><td>19284115H</td></tr>
<tr><td>Course type</td><td>obligatory</td></tr>
<tr><td rowspan="2">Forms and number of hours of tuition</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td>Semester</td><td>6</td></tr>
<tr><td>32</td><td></td><td></td><td>32</td><td></td><td></td><td></td><td>No. of ECTS credits</td><td>5</td></tr>
<tr><td>Entry requirements</td><td colspan="9">Civil Engineering Materials, Concrete Technology, Strength of Materials, Structural (Building) Mechanics, Concrete Structures I</td></tr>
<tr><td>Course objectives</td><td colspan="9">Familiarizing students with the principles of shaping, designing, and constructing selected reinforced concrete structures. Teaching methods of idealization, static calculations, and reinforcement design for the aforementioned structures. Developing the ability to choose appropriate solutions. Presenting and explaining the concept of concrete prestressing.</td></tr>
<tr><td>Course content</td><td colspan="9">Lecture: Slab-column systems. Mushroom slabs. Ribbed slabs. Cross-reinforced slabs. Stairs. Monolithic reinforced concrete frames. Industrial hall structures. Prefabricated column-beam systems. Crane beams, double-branch columns, corbel foundations. Reinforced concrete trusses. Arches. Prestressed concrete – concept, principles of pre-tensioned and post-tensioned concrete. Design exercises: Design of a monolithic reinforced concrete frame. Determination of preliminary cross-sectional dimensions of frame elements. Load summary. Numerical static analysis – determination of internal forces for different loading scenarios (graphical documentation – diagrams), determination of extreme values (tables). Designing bending elements (frame beams) according to EC2: Verification of ULS (bending, shear) and SLS (crack width, deflections). Designing eccentrically compressed elements (frame columns) according to EC2: Considering slenderness effects (second-order effects) using the nominal stiffness or nominal curvature method, determining symmetrical and asymmetrical reinforcement, checking load-bearing capacity. Preparation of structural drawings, node and connection detailing.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">Informative lecture, problem-based lecture, execution of calculation (tabular) examples with student participation, presentation of sample design solutions, individual project assignments carried out by students.</td></tr>
<tr><td>Assessment method</td><td colspan="9">Lecture – written exam, design exercises – assessment quizzes, corrections, presentation, discussion, and project defense.</td></tr>
</table>

Symbol of learning outcome	Learning outcomes	Reference to the learning outcomes for the field of study
EU1	Has knowledge of selected types of concrete structures, can correctly define and characterize them.	K_B1_W05 K_B1_U08
EU2	Has knowledge of building structure loads and their consideration in calculations, correctly compiles them, and accurately performs static calculations (analytical and numerical).	K_B1_W02 K_B1_U06
EU3	Knows the properties of concrete and reinforcing steel; correctly selects materials in the design process, skillfully matching them to the adopted structural solutions.	K_B1_W04 K_B1_U05
EU4	Knows and understands current regulations and standard requirements and correctly applies them in the design process.	K_B1_W06 K_B1_U08
EU5	Knows and understands the principles of reinforcement detailing and sizing for selected types of concrete structures and correctly applies them in the design process.	K_B1_W05 K_B1_U08
EU6	Can prepare graphical documentation (structural drawings) using computer software.	K_B1_U03
EU7	Is ready to critically evaluate their knowledge and the received content in the field of concrete structures.	K_B1_K01

Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed
EU1	Written exam	**L**
EU2	Written exam; corrections, discussion and defense of the project	**L,P**
EU3	Corrections, discussion and defense of the project	**P**
EU4	Colloquiums, corrections, discussion and defense of the project	**P**
EU5	Exam; tests, corrections, discussion and defense of the project	**L,P**
EU6	Corrections, discussion and defense of the project	**P**
EU7	Written exam; discussion and defense of the project	**L,P**

Student workload (in hours)		No. of hours
Calculation	Participation in lectures	**32**
	Participation in design	**32**
	Preparation for project classes and a test, project implementation,	**30**
	working on projects, etc.	20
	Preparation for the exam and attendance at it	22
	Participation in consultations	3
	TOTAL:	139

Quantitative indicators	HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation	**69**	**2,5**
Student workload – practical activities	107	**4**

Basic references	EN 1990 Eurocode 0: Basis of Structural Design EN 1991 Eurocode 1: Actions on structures EN 1992 Eurocode 2: Design of concrete structures V. Tur, M. Kosior-Kazberuk, R. Grygo, A. Tur, J. Krassowska, Concrete Structures, OFICYNA WYDAWNICZA POLITECHNIKI BIAŁOSTOCKIEJ, BIAŁYSTOK 2020	
Supplementary references	A. Lapko. Mechanics and design of reinforced concrete members in the ligth of Eurocode 2. Edited by Universidade da Beira Interior, Covilha, 1996. J. G Mac Gregor „Reinforced Concrete" Mechanics and Design. New Jersey, 1992. Designers guide to EN 1992-1-1and EN 1992-1-2 Eurocode2- ThomasTielford,2009- 242p.	
Organisational unit conducting the course	Department of Building Structures	**Date of issuing the programme**
Author of the programme	Julita Krassowska, PhD, eng.	14.02.2025

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work, S – seminar