COURSE DESCRIPTION CARD

<table>
<tr><td colspan="11">Faculty of Civil Engineering and Environmental Sciences</td></tr>
<tr><td>Field of study</td><td colspan="6"></td><td colspan="2">Degree level and programme type</td><td colspan="2"></td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6"></td><td colspan="2">Study profile</td><td colspan="2">Academic profile</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Concrete structures</td><td colspan="2">Course code</td><td colspan="2">IS-FCEE-00006-1W</td></tr>
<tr><td colspan="2">Course type</td><td colspan="2">Erasmus</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 colspan="2">Semester</td><td colspan="2">winter</td></tr>
<tr><td>30</td><td></td><td></td><td>30</td><td></td><td></td><td></td><td colspan="2">No. of ECTS credits</td><td colspan="2">5</td></tr>
<tr><td>Entry requirements</td><td colspan="10">Civil Engineering Materials, Concrete Technology, Strength of Materials, Structural (Building) Mechanics</td></tr>
<tr><td>Course objectives</td><td colspan="10">Increased knowledge of the design and construction of reinforced concrete structures. The skills necessary to analyze, design and construct of engineering reinforced concrete objects. The skills to identify the issues related to the design (calculation and detailing of reinforcement) and construction of reinforced concrete structures.</td></tr>
<tr><td>Course content</td><td colspan="10">Idea of reinforced structures; behaviour concrete and RC-members under loading. Historical background. Basis of structural design: basic requirements; principles of Limit State Design; verification by partial factor method; actions and environment influence; combinations of actions; partial factors. Materials and products properties. Concrete: strength; elastic deformations; creep and shrinkage; stress-strain relations, durability criteria for concrete. Reinforcing steel properties: strength; ductility characteristics; stress-strain relations, anchorage of reinforcement. Durability and cover to reinforcement. Ultimate Limit State design (ULS). Bending with and without axial force: rectangular sections, flanged sections (single and double reinforced), section of general shape. Shear: members not required or required design shear reinforcement. Punching: punching shear resistance of slabs with or without shear reinforcement. Serviceability Limit States (SLS): Crack control with and without direct calculation of crack widths; Deflection control. Detailing of reinforcement.</td></tr>
<tr><td>Teaching methods</td><td colspan="10">traditional lecture, tasks for self-solution, group discussion of solutions proposed</td></tr>
<tr><td>Assessment method</td><td colspan="10">lecture – written exam; project – project completion, presentation and discussion</td></tr>
<tr><td>Symbol of learning outcome</td><td colspan="8">Learning outcomes</td><td colspan="2">Reference to the learning outcomes for the field of study</td></tr>
<tr><td>LO1</td><td colspan="8">student knows the basic principles of limit states design</td><td colspan="2">KB2_W02, KB2_W11</td></tr>
</table>

LO2	selects the materials and its characteristics for RC -members design	KB2_W05, KB2_U12
LO3	knows how to assess actions and action combinations	KB2_U04
LO4	analyses and designs of the reinforced concrete structures	KB2_W02, KB2_U04
LO5	works out of the project documentation	KB2_U19
Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	written exam, project evaluation, project discussion	L, P
LO2	written exam, project evaluation	L, P
LO3	written exam, evaluation of calculations	L, P
LO4	project evaluation and discussion	P
LO5	evaluation of project documentation	P
Student workload (in hours)		**No. of hours**
Calculation	lecture attendance	30
	participation in classes, project, seminars, etc.	30
	preparation for classes, projects, seminars, etc.	5
	working on projects, reports, etc.	35
	participation in student-teacher sessions related to the classes/seminar/project	10
	implementation of project tasks preparation for and participation in exams/tests	30
	TOTAL:	**135**

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	70	2,5
Student workload – practical activities	65	2,5

Basic references	1.Eurocode 2: Design of concrete structures - Part 1-1: General rules and rules for buildings, 2004 ; 2.Tur V., Kosior-Kazberuk M., etc., Concrete Structures, 2020, Bialystok, Publishing house of Bialystok University of Technology. - 539 pp.
Supplementary references	1. Designers guide to EN 1992-1-1and EN 1992-1-2 Eurocode 2- ThomasTielford, 2009-242p.
Organisational unit conducting the course	**Department of Building Structures** / **Date of issuing the programme**
Author of the programme	**prof. dr hab. inż. Viktar Tur** / **08.03.2021**

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