

## MODULE SPECIFICATION

Module code	
Module title in Polish	<b>Konstrukcje betonowe 2</b>
Module title in English	<b>Concrete Structures 2</b>
Module running from the academic year	<b>2016/2017</b>

### A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

Field of study	<b>Civil Engineering</b>
Level of qualification	<b>First cycle</b> <i>(first cycle, second cycle)</i>
Studies profile	<b>Academic</b> <i>(academic/practical)</i>
Mode of study	<b>Full-time</b> <i>(full-time / part-time)</i>
Specialism	
Organisational unit responsible for module delivery	<b>The Department of Strength of Materials, Concrete Structures and Bridges</b>
Module co-ordinator	<b>Kamil Bacharz, PhD, Eng.</b>
Approved by	<b>Marek Iwański, Professor</b>

### B. MODULE OVERVIEW

Module type	<b>Core module</b> <i>(core/programme-specific/elective HES*)</i>
Module status	<b>Compulsory module</b> <i>(compulsory / non-compulsory)</i>
Language of module delivery	<b>English</b>
Semester in the programme of study in which the module is taught	<b>Semester 6</b>
Semester in the academic year in which the module is taught	<b>Summer semester</b> <i>(winter / summer)</i>
Pre-requisites	<b>None</b> <i>(module code/module title, where appropriate)</i>
Examination required	<b>Yes</b> <i>(yes / no)</i>
ECTS credits	<b>3</b>

Mode of instruction	lectures	classes	laboratories	project	others
<b>Total hours per semester</b>	<b>30</b>			<b>15</b>	

\* elective HES – elective modules in the Humanities and Economic and Social Sciences

### C. LEARNING OUTCOMES AND ASSESSMENT METHODS

<b>Module aims</b>	The aim of the module is to acquire the skills of idealisation, analysis, design the reinforcement of (basic) elements of building structures and to acquire the abilities of preparing working drawings of the designed elements.
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Module outcome code	Module learning outcomes	Mode of instruction (l/c/lab/p/others)	Corresponding programme outcome code	Corresponding discipline-specific outcome code
W_01	A student knows the selected issues of standards connected with the subject, it means the following: Eurocodes: EC0, EC1 part 1-1 and part 1-3, EC2 part 1-1 and part 1-2.	l/p	B_W08	T1A_W07
W_02	A student knows the basics of calculation and design of constructional systems and simple reinforced concrete elements of building structures.	l/p	B_W09	T1A_W07
U_01	A student can determine and compare loads interacting with simple building structures.	l/p	B_U02 B_U03	T1A_U14
U_02	A student is able to prepare and interpret building and constructional drawings.	p	B_U07	T1A_U14
U_03	A student can design simple structures and elements of reinforced structures, i.e. beam-and-slab floors; stairs and ramps; beams, columns, slabs, pad and strip foundations.	l/p	B_U14	T1A_U16
K_01	A student can work individually.	p	B_K01	T1A_K03
K_02	A student is aware of the necessity of raising his/her professional and personal competences.	l/p	B_K03	T1A_K06

#### Module content:

##### 1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1.	The basics of a structure designing: safety, usability, and durability. The impacts on the construction, environmental conditions, the safety coefficients, structure idealisation, the methods of static-strength analysis.	W_01 K_02
2.	Protecting of the concrete structure against a fire: fire bearing capacity, fire tightness, fire insulation. Minimum dimensions, mean distance of rods from the edge. The division of constructional elements.	W_01 K_02
3.	Beam-and-slab floors. Passing of the loads from the slab to the beams (the distribution of loads).	W_02 U_01
4.	Simplifications in the calculations of reinforced concrete slabs – unidirectionally reinforced slabs. Loads, static schemes, static-strength calculations of single-span and continuous slabs.	W_01 W_02
5.	The principles of reinforcements selection, design of reinforcement: main and distribution reinforcement, distance inserts, reinforcement over the substring. The examples of reinforcement design of single-span and continuous slabs.	W_01 W_02
6.	Cross-reinforced rectangular, triangular, trapezium, polygonal, and circular slabs. Loads, static-strength calculations of single-field and continuous slabs.	W_01 W_02
7.	The principle of selecting reinforcement and the design of the reinforcement for discussed types of cross-reinforced slabs. Holes in rectangular slabs.	W_01 W_02

2. Topics to be covered in the classes

No.	Topics	Module outcome code
1.	Assessing the effort of a rod subject to operation of a complex load (a circular and rectangular section).	W_02 U_01 U_03 K_01
2.	Assessing the effort of a rod subject to operation of a complex load (a thin-walled open and closed section).	W_02 U_01 U_03 K_01
3.	Selecting safe force for a slender pole operating in the elastic and elastic-plastic mode.	W_01 W_03 U_02 U_03 K_01
4.	Dimensioning pressed rods (taking buckling into consideration); simple and complex poles.	W_01 W_03 U_02 U_03 K_01
5.	Determining critical force with the energy method for a rod with step variable rigidity.	W_01 W_03 U_02 U_03 K_01
6.	Determining critical force with the energy method for a rod with variable section.	W_01 W_03 U_02 U_03 K_01
7.	Calculating simple cases of beams simultaneously bent and pressed materials.	W_01 W_03 U_02 U_03 K_01
8.	Reinforced concrete stairs and ramps: cantilevered, buccal, and slab. The principles of loads comparing, static shames and the static-strength calculations.	W_02
9.	The principles of rods selecting and the design of cantilevered, buccal, and slab stairs and ramps, The principles of reinforcement design in slabs bands.	W_02
10.	Beam-and-block floors: the applied constructional solutions, shaping, and the principles of constructing. Sample of the beam-and-block floors.	W_02
11.	Skeleton construction, structure elements, beam-column systems. Direct and indirect beam support.	W_01
12.	Direct foundations, foundation types, and the principles of their designing. Pad and strip foundations (loads, static-strength calculations, reinforcement design).	W_01 W_02
13.	Slab loads with the concentrated force. Puncture and pressure in reinforced slabs and pad foundations (calculations and reinforcement construction).	W_01 W_02
14.	The examples of comparing loads; calculation of the reinforcement of single-directionally and cross-reinforced slabs. The selection and construction of the reinforcement.	U_03 K_02
15.	Sample of loads comparison and calculation of the reinforcement of cantilevered and buccal, slab stairs and ramps. The selection and construction of reinforcement.	U_03 K_02

3. Topics to be covered in the laboratories
4. Topics to be covered in the projects

Project number	Topics	Module outcome code
1.	The project of a building with mixed structure: -a layout of a beam-slab floor; -acceptance of the cores section dimensions of basic construction elements; -the working drawings of designed elements	W_01 U_01 U_02
2.	A technical project of the selected structure elements: - static-strength calculations of a single-directionally reinforced slab, beam, column, and pad foundation; - reinforcement design; - working drawings of the calculated structure elements.	W_01 W_02 U_02 U_03 K_01 K_02

### Assessment methods

Module outcome code	Assessment methods <i>(Method of assessment; for module skills – reference to specific project, laboratory and similar tasks)</i>
W_01	An examination and a project
W_02	An examination and a project
U_01	An examination and a project
U_02	An examination and a project
U_03	An examination and a project
K_01	An examination and a project
K_02	An examination and a project

### C. STUDENT LEARNING ACTIVITIES

ECTS summary		
	Type of learning activity	Study time/ credits
1	Contact hours: participation in lectures	<b>30</b>
2	Contact hours: participation in classes	
3	Contact hours: participation in laboratories	
4	Contact hours: attendance at office hours (2-3 appointments per semester)	<b>2</b>
5	Contact hours: participation in project-based classes	<b>15</b>
6	Contact hours: meetings with a project module leader	<b>6</b>
7	Contact hours: attendance at an examination	<b>2</b>
8		
9	<b>Number of contact hours</b>	<b>55</b> <i>(total)</i>
10	<b>Number of ECTS credits for contact hours</b> <i>(1 ECTS credit =25-30 hours of study time)</i>	<b>2.2</b>
11	Private study hours: background reading for lectures	<b>2</b>
12	Private study hours: preparation for classes	
13	Private study hours: preparation for tests	
14	Private study hours: preparation for laboratories	

15	Private study hours: writing reports	
16	Private study hours: preparation for a final test in laboratories	
17	Private study hours: preparation of a project/a design specification	<b>15</b>
18	Private study hours: preparation for an examination	<b>5</b>
19		
20	<b>Number of private study hours</b>	<b>22</b> <i>(total)</i>
21	<b>Number of ECTS credits for private study hours</b> <i>(1 ECTS credit =25-30 hours of study time)</i>	<b>0.8</b>
22	<b>Total study time</b>	<b>77</b>
23	<b>Total ECTS credits for the module</b> <i>(1 ECTS credit =25-30 hours of study time)</i>	<b>3</b>
24	<b>Number of practice-based hours</b> <i>Total practice-based hours</i>	<b>38</b>
25	<b>Number of ECTS credits for practice-based hours</b> <i>(1 ECTS credit =25-30 hours of study time)</i>	<b>1.5</b>