

MODULE SPECIFICATION

Module code	
Module title in Polish	Konstrukcje sprężone
Module title in English	Prestressed Concrete Structures
Module running from the academic year	2016/2017

A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

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

B. MODULE OVERVIEW

Module type	Core module <i>(core/programme-specific/elective HES*)</i>
Module status	Compulsory module <i>(compulsory / non-compulsory)</i>
Language of module delivery	English
Semester in the programme of study in which the module is taught	Semester 6
Semester in the academic year in which the module is taught	Summer semester <i>(winter / summer)</i>
Pre-requisites	None <i>(module code/module title, where appropriate)</i>
Examination required	No <i>(yes / no)</i>
ECTS credits	2

Mode of instruction	lectures	classes	laboratories	project	others
Total hours per semester	15			15	

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

C. LEARNING OUTCOMES AND ASSESSMENT METHODS

Module aims	The aim of the module is to: learn and master basic concepts and principles of operation of a prestressed element; acquire the skills of checking some conditions of a boundary state concerning load bearing capacity and functionality in an initial and durable situation; learn the fundamentals of operation concerning a structure with prestressed supplementary concrete.
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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 principles of compressing and its impact on the distribution of internal forces.	l	B_W09	T1A_W03 T1A_W07
W_02	A student knows the required properties of concrete for a prestressed element. Moreover, a student knows fundamental mechanical properties of prestressing bands.	l/p	B_W09	T1A_W03 T1A_W07
W_03	A student can determine the changes of a compressing force in time.	l/p	B_W09 B_W10	T1A_W03 T1A_W04 T1A_W05 T1A_W07 T1A_W08
U_01	A student can calculate the buckling of the prestressed element in the initial situation.	l/p	B_U13 B_U14	T1A_U03 T1A_U04 T1A_U05 T1A_U07 T1A_U11 T1A_U14 T1A_U15 T1A_U16
U_02	A student is capable of checking bonding conditions.	l/p	B_U13 B_U14	T1A_U03 T1A_U04 T1A_U05 T1A_U07 T1A_U11 T1A_U14 T1A_U15 T1A_U16
U_03	A student can determine computational load bearing capacity of a bent element prestressed with the simplified method in the permanent situation.	l/p	B_U13 B_U14	T1A_U03 T1A_U04 T1A_U05 T1A_U07 T1A_U11 T1A_U14 T1A_U15 T1A_U16
U_04	A student can determine computational load bearing capacity of the bent section prestressed with the simplified method after bonding.	l/p	B_U13 B_U14	T1A_U03 T1A_U04 T1A_U05 T1A_U07 T1A_U11 T1A_U14 T1A_U15 T1A_U16
K_01	A student can determine (for a bent section) a scratching moment of a prefabricated and bonded	l/p	B_K01 B_K05	T1A_K01 T1A_K03

	section.		B_K07	T1A_K04 T1A_K05 T1A_K07
K_02	A student is responsible for the reliability of the obtained results.	p	B_K02 B_K03 B_K07	T1A_K01; T1A_K02; T1A_K03; T1A_K05; T1A_K06 T1A_K07
K_03	A student can formulate conclusions and describe the results of the obtained work.	p	B_K04 B_K07	T1A_K01; T1A_K03; T1A_K07

Module content:

1. Topics to be covered in the lectures

No.	Topics	Module outcome code
1.	Discussing the syllabus of the lectures. Compression (a historical outline). The classification of the prestressed structures. Compression technology concerning pretensioned prestressed concrete. Comparing reinforced concrete and pretensioned prestressed concrete structures. The differences between pretensioned prestressed concrete and posttensioned prestressed concrete.	W_01 U_01
2.	The properties of materials for pretensioned prestressed structures: concrete (strength; stresses in concrete in the initial situation; reological features of concrete); steel (the required features; strength characteristics; reological features; the assortment of prestressing bands).	W_01 W_02 U_01 U_02
3.	Providing safety of the bent elements in the classical formation of permissible stresses. Designing bent elements in the formation of boundary load bearing capacity states: an initial and a permanent situation.	W_01
4.	Functionality boundary state: determining the scratching moment; determining buckling.	W_01 W_02 U_02
5.	The course of losses concerning the prestressed force (temporary and reological). Limiting stresses in prestressing bands.	W_02, W_03 U_02 U_03
6.	A prestressed complex section. Designing binding. Determining M_{Rd} and M_{cr} of the bound section.	W_02 W_03 U_01
7.	Sample applications of prestressing. Errors and hazards.	W_02 W_03 U_01

2. Topics to be covered in the classes

3. Topics to be covered in the laboratories

4. Topics to be covered in the projects

Project number	Topics	Module outcome code
1.	The design of a multi-span bound slab with the Filigran prefabricated unit.	W_02 K_01 K_02 K_03
2.	Determining computational load bearing capacity for bending a prestressed section. Determining a scratching moment of a prestressed section. Determining the buckling of the prestressed element.	W_02 U_01 K_01 K_02 K_03
3.	Determining computational load bearing capacity as well as the scratching moment a prestressed section after bonding. Determining a scratching	W_02 W_03 W_04

	moment of a prestressed section. Determining the buckling of the prestressed element.	U_01 U_02 U_03 U_04 K_01 K_02 K_03
4.	Designing bonding.	W_02 W_03 W_04 U_01 U_02 U_03 U_04 K_01 K_02 K_03

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	A test
W_02	A test and a project
W_03	A test and a project
U_01	A test and a project
U_02	A test and a project
U_03	A test and a project
U_04	A test and a project
K_01	A test and a project
K_02	A project
K_03	A project

C. STUDENT LEARNING ACTIVITIES

ECTS summary		
	Type of learning activity	Study time/ credits
1	Contact hours: participation in lectures	15
2	Contact hours: participation in classes	
3	Contact hours: participation in laboratories	
4	Contact hours: attendance at office hours (2-3 appointments per semester)	1
5	Contact hours: participation in project-based classes	15
6	Contact hours: meetings with a project module leader	2
7	Contact hours: attendance at an examination	2
8		
9	Number of contact hours	35 <i>(total)</i>
10	Number of ECTS credits for contact hours <i>(1 ECTS credit =25-30 hours of study time)</i>	1.2
11	Private study hours: background reading for lectures	4
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	15
18	Private study hours: preparation for an examination	6
19		
20	Number of private study hours	25 <i>(total)</i>
21	Number of ECTS credits for private study hours <i>(1 ECTS credit =25-30 hours of study time)</i>	0.8
22	Total study time	60
23	Total ECTS credits for the module <i>(1 ECTS credit =25-30 hours of study time)</i>	2
24	Number of practice-based hours <i>Total practice-based hours</i>	33
25	Number of ECTS credits for practice-based hours <i>(1 ECTS credit =25-30 hours of study time)</i>	1.1