STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Concrete Structures		**1010102121010113706**
Field of study	Profile of study (general academic, practical)	Year /Semester
Civil Engineering Second-cycle Studies	**(brak)**	**1 / 2**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**
Cycle of study:	Form of study (full-time,part-time)	
Second-cycle studies	**full-time**	
No. of hours		No. of credits
Lecture: **15** Classes: **15** Laboratory: **-** Project/seminars: **15**		**4**
Status of the course in the study program (Basic, major, other)	(university-wide, from another field)	
(brak)	**(brak)**	
Education areas and fields of science and art		ECTS distribution (number and %)

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	-A student has knowledge of: general mechanics and strength of materials, basis of theory of concrete structures, knows analysis principles of simple and complex RC elements design with taken RC two-way reinforced slabs into consideration.
2	**Skills**	-A student can estimate and report loads acting on building structures. Student can classify building structures, design RC structure elements with taken two-way reinforced slabs into consideration and choose analytical or numerical solution of engineering problems.
3	**Social competencies**	-A student understands the need for lifelong learning and knows how to interact in a group.

Assumptions and objectives of the course:

-The gaining of knowledge and skills concerning design of thin- walled structures and prestressed structures. Preparing for numerical modeling of RC structures by the Autodesk Robot Structural Analysis Program.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. A student knows the basic type of loads acting on shell covers, he knows analysis principles rotational shells and spherodial shells whose performance is a complex state of stress. A student knows design and reinforcing principles concerning shell covers. - [K 2 W02, K 2 W14]

2. A student knows different type of loads in design situations concerning prestressed structures. - [K 2 W02, K 2 W14, K 2 W16]

3. A student knows principles of designing, dimensioning and reinforcing sections in prestressed structures. - [K 2 W02, K 2 W14, , K 2 W16]

4. A student knows principles of designing and dimensioning RC structures. He knows basic informations concerning numerical program Autodesk Robot Structural Analysis - [K 2 W01, K 2 W04]

Skills:

1. A student is able to calculate loads acting on ground and underground shell structures. - [K 2 W01, K 2 W02]

2. A student is able to characterize different type of shell covers, liquid tanks, silos and he is able to calculate reinforcement. - [. K 2 W01, K 2 W02, K 2 W03]

3. A student is able to calculate losses of prestress and loads acting on sections in prestressed structures. - [K 2 W01, K 2 W02]

4. 5. A student is able to design RC structures by means the basic knowledge of Autodesk Robot Structural Analysis - [K 2 W01, K 2 W04, K 2 W06, K 2]

Social competencies:

1. A student understands the need of lifelong learning, is able to organize the learning process of others. - [K 2 W02, K 2 W03]
2. A student is able to cooperate and work in a group - [K 2 W01, K 2 W06]
3. He correctly identifies and resolves problems associated with his profession - [K 2 W07]

Assessment methods of study outcomes

-Credit of lectures and exercise classes

Credit in written form (1 per semester) ? 1,5h

Credit of projects

Estimation of individual projects on the basis of calculation and structural drawings with a defence of submitted work

Number of evaluation

[%]	(grade)
100- 91	A excellent
90- 75	B very good
74- 65	C good
64- 51	D sufficient
< 50	E failed

Course description

-Form of teaching: lectures

Selected issues of thin- walled structures: shall covers, liquid tanks, silos. Design issues of prestressed structures (pre-tensioned and post-tensioned structures)

Form of teaching: exercise classes

Principles of design selected thin- walled structures. Main principles of calculation losses of prestress and loads acting on sections in prestressed structures.

Form of teaching: projects

Calculation of two-way reinforced slabs supported on spatial frames by means the finite element method. Reinforced concrete structure numerical modeling in Autodesk Robot Structural Analysis.

Basic bibliography:

1. 1.Nilson H.A., Darwin D., Dolan w. Ch. Design Concrete Structures, Mc Graw Hill Higher Education 2004
2. 2.Mosley B., Bungey J., Hulse R. Reinforced Concrete Design, Palgrave macmillan 2007
3. 3.Bhatt P. Prestressed concrete design to Eurocodes, Spon Press 2011

Additional bibliography:

1. 1.Halicka A., Frantczak D.: Projektowanie zbiorników żelbetowych, Wydawnictwo Naukowe PWN 2011,2013 t. 1,2.
2. 2.Ajdukiewicz A., Mames J.: Konstrukcje z betonu sprężonego, Polski Cement Kraków 2004

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	15
2. Participation in exercise classes	15
3. Participation in design classes	15
4. Complete (at home) works involved in project	20
5. Participation in the consultations associated with the exercises and design classes	10
6. Preparing to the final test of lectures	20
7. Preparing to the final test of exercise classes	15

Student's workload

Source of workload	hours	ECTS
Total workload	110	4
Contact hours	55	2
Practical activities	60	2