STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Advanced concrete structures**		Code **1010125121010123058**
Field of study **Transportation Engineering Extramural Second-**	Profile of study (general academic, practical) **general academic**	Year /Semester **1 / 2**
Elective path/specialty **Road Engineering**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **part-time**	
No. of hours Lecture: **15** Classes: **-** Laboratory: **-** Project/seminars: **15**		No. of credits **4**
Status of the course in the study program (Basic, major, other) **other**	(university-wide, from another field) **university-wide**	
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**	Knowledge of the strength of materials, structural mechanics and concrete structures in the field of engineering studies degree
2	**Skills**	Skills related to the static calculations and design of reinforced concrete bridge structures, self-learning skills
3	**Social competencies**	Ability to adapt of the type of any civil engineering structure to the communication requirements and social expectations, respect for the Polish language, understand the need for lifelong learning and group collaboration

Assumptions and objectives of the course:

Familiarizing of students with the issues of conceptual design, structural analysis and mechanical design of simple-supported beam bridges with pre-stressed concrete (in the post-tensioned technology) according to the system of European standards PN-EN

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

Knowledge:

1. Student knows the basics of the prestressed concrete structures - [K_W02, K_W04]
2. Student knows the basics of technology of prestressed structures used in civil engineering - [K_W05, K_W07]
3. Student knows the procedure for the static-strength calculations of prestressed structures according to the system of the PN-EN code - [K_W14, K_W16]

Skills:

1. Student can structurally form simple concrete bridge structures in the technology of prestressed concrete - [K_U01, K_U03]
2. Students can perform static-strength calculations of simple prestressed post-tensioned bridge structure - [K_U04]
3. Student can conduct calculations in accordance with the principles set out in the new system of European standards PN-EN - [K_U09, K_U16]

Social competencies:

1. Student can adapt the type of structure to the communication requirements and social expectations - [K_K09]
2. Student can collaborate and work together in a group, is aware of the need for self-education - [K_K01, K_K03, K_K06]
3. Student complies with the principles of the Polish language and the rules of preparation of technical documentation - [K_K02]

Assessment methods of study outcomes

1. Preparation of the design exercise in accordance with guidelines
2. Ongoing monitoring of the student's knowledge on every part of preparation of the design during the consultation
3. Oral test (talk) on completed design (demonstrating knowledge of issues relating to the formulation and calculation of bridge construction in the technology of post-tensioned concrete)
4. Written test of the student's knowledge in the field of material presented during the lectures

Course description

1. Basic theory of prestressed concrete structures
2. Pre- and post-tensioned concrete structures used in civil engineering
3. Various assembling systems of prestressed bridges
4. Formation and location designing of a single-geometry road viaduct in the technology of pre-stressed concrete
5. Carrying out the full structural analysis including phases of compressed bridge construction work (according to the system of PN-EN)
6. Calculation of the required prestressing force and the selection of the proper compression system
7. Verification of the requirements the ultimate limit state and serviceability limit state of prestressed sections
8. Design of anchorage zone
9. Analysis of losses of prestressing force

Basic bibliography:

1. Arkadiusz Madaj, Witold Wołowicki, Mosty betonowe WKŁ 1980/2002/...
2. Arkadiusz Madaj, Witold Wołowicki, Projektowanie mostów betonowych, WKiŁ Warszawa 2010
3. Andrzej Ajdukiewicz, Jakub Mames, Konstrukcje sprężone, Państwowe Wydawnictwo Naukowe, Warszawa 1979
4. Jacek M. Skarżewski, Witold Wołowicki, Krzysztof Sturzbecher, Mosty sprężone, Przewodnik do ćwiczeń projektowych, Wydawnictwo PP, Poznań, 1989

Additional bibliography:

1. Arkadiusz Madaj, Witold Wołowicki, Podstawy projektowania budowli mostowych, WKiŁ Warszawa 2003/2007
2. Andrzej Łapko, Bjarne Christian Jensen, Podstawy projektowania i algorytmy obliczeń konstrukcji żelbetowych, Arkady, Warszawa 2005
3. Włodzimierz Starosolski, Konstrukcje żelbetowe wg PN-B-03264:2002 i Eurokodu 2, Wydawnictwo Naukowe PWN, Warszawa 2009

Result of average student's workload

Activity	Time (working hours)
1. Participation in lecture	15
2. Participation in projects	15
3. Studying	10
4. Project realization	35
5. Preparation to pass the project	5
6. Preparation to the final test	20

Student’s workload

Source of workload	hours	ECTS
Total workload	100	4
Contact hours	30	1
Practical activities	55	2