STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Concrete Bridges**		Code **1010102121010120221**
Field of study **Civil Engineering Second-cycle Studies**	Profile of study (general academic, practical) **general academic**	Year /Semester **1 / 2**
Elective path/specialty **Bridges and Underground Engineering**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **full-time**	
No. of hours Lecture: **2** Classes: **-** Laboratory: **-** Project/seminars: **2**		No. of credits **5**
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 **technical sciences** **Technical sciences**		ECTS distribution (number and %) **5 100%** **5 100%**

Responsible for subject / lecturer:

dr hab.inż. Arkadiusz Madaj
email: arkadiusz.madaj@put.poznan.pl
tel. 61 647 5830
Faculty of Civil an Environmental Engineering
61-138 Poznań, Piotrowo 5

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Construction systems and cross-section shapes of concrete bridges. The design of reinforced concrete bridges. Calculations of simply supported prestressed concrete bridges. Slab statics. The basics of construction mechanics and the strength of materials.
2	**Skills**	Cross-section forming of a concrete bridge, choosing the construction system, the design of a reinforced concrete and prestressed concrete bridge construction.
3	**Social competencies**	The awareness of constant gaining knowledge. The ability to form ideas and communicate among the group. The proper use of polish language. Appropriate behavior.

Assumptions and objectives of the course:

-To gain the skills to design statistically undetermined prestressed constructions. The design of the details of prestressed concrete bridges. The design of slab spans ? rectangular and slanting. The design of composite concrete ? concrete bridges.

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

Knowledge:

1. The rules of designing statistically undetermined prestressed constructions - [K_W03]
2. The rules of designing composite concrete ? concrete bridges. - [K_W02]
3. The rules of designing untypically concrete Bridges (slanting slabs, box cross-sections, etc.) - [K_W04]

Skills:

1. To design a statistically undetermined prestressed concrete construction. - [K_U03]
2. To design a span of a composite concrete ? concrete bridge. - [K_U09]
3. To design an untypically bridge (slanting slab bridges, box cross-sections, etc.) - [K_U04]

Social competencies:

1. The awareness of constant gaining knowledge. - [K_K03]
2. The communication among the group in terms of communicational engineering. - [K_K01]
3. The ability to justify the chosen construction al solutions. - [K_K08]

Assessment methods of study outcomes

-The exam, constant verification of the realization of the project, oral defence of the prestressed brigde project.

Course description

-Synthesis of the knowledge of statics systems and forming of concrete bridges. The basics of the design of concrete bridges. Statistically undetermined prestressed concrete constructions. The static results of prestress. Bridges with external prestress. The design of anchorage in prestressed bridges. Composite concrete-concrete bridges. Box bridges. Fatigue calculation in concrete bridges.

Basic bibliography:

1. A.Madaj, W.Wołowicki: Mosty betonowe. Wymiarowanie i konstruowanie, WkŁ, Warszawa1998, 2002
2. A.Madaj, W.Wołowicki: Projektowanie mostów betonowych, WKŁ, Warszawa, 2010
3. A.Madaj, W.Wołowicki: żelbetowe konstrukcje mostowe. Wymiarowanie. Wyd. PP, Poznań, 1995
4. PN-EN 1991-2 Eurokod 2. Projektowanie konstrukcji z betonu. Część 2: Mosty z betonu. Obliczanie i reguły konstrukcyjne
5. PN-EN-1991-1-1 Eurokod 2. Projektowanie konstrukcji z betonu. Część 1-1 Reguły ogólne i reguły dla budynków
6. PN-91/S-10042 Obiekty mostowe . Konstrukcje betonowe, żelbetowe i sprężone. Projektowanie

Additional bibliography:

1. Szczygieł J. Mosty z betonu zbrojonego i sprężonego, WKŁ, Warszawa, 1978
2. Czerski Z., Zieliński J,: Prefabrykowane mosty sprężone, WKŁ, Warszawa 1981
3. Skarżewski J., Wołowicki W., Sturzbecher K.: Mosty sprężone. Przewodnik do ćwiczeń projektowych, Wyd. Pol. Poznańskiej, Poznań 1989
4. Budownictwo betonowe, t.III. Konstrukcje sprężone, Praca zbiorowa, Arkady. Warszawa 1963
5. Podstawy projektowania konstrukcji żelbetowych i sprężonych wg Eurokodu 2, Dolnośląskie Wydawnictwo Edukacyjne, Wrocław 2006
6. . Leonhardt F.: Podstawy budowy mostów betonowych, WKŁ, Warszawa 1982
7. Łapko A.: Projektowanie konstrukcji żelbetowych wg Eurokodu 2, i PN-B-03264:1999, Arkady, Warszawa 2000

Result of average student's workload

Activity	Time (working hours)

Student's workload

Source of workload	hours	ECTS
Total workload	90	5
Contact hours	60	3
Practical activities	30	2