STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Modernization of Bridges**			Code **1010125141010120225**
Field of study **Structural Engineering**	Profile of study (general academic, practical) **(brak)**		Year /Semester **2 / 4**
Elective path/specialty **Road-Train 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: **8** Classes: **-** Laboratory: **-** Project/seminars: **8**			No. of credits **1**
Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**		
Education areas and fields of science and art **technical sciences**			ECTS distribution (number and %) **1 100%**

Responsible for subject / lecturer:

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Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Principles of technical drawing Principles of shaping of steel and concrete bridges Knowledge on static analysis of beams and columns Principles of design of steel and reinforced concrete members
2	**Skills**	Arranging loads on bridges Creating computational models for structural analysis Ability to take notes during lectures
3	**Social competencies**	Ability to work single-handedly Respect for the rules of ethics

Assumptions and objectives of the course:

--passing the knowledge on design of modernization of bridge supports and spans of concrete and steel bridges

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

Knowledge:

1. 1. Knowledge on causes, aims and types as well as principles of design of bridge modernization - [-KW02,W04,W14,W16]
2. 2. Knowledge on methods of strengthening of steel bridges and concrete supports of bridges - [--KW02,W04,W14,W16]
3. 3. Knowledge on kinds of bridge refurbishment - [--KW02,W04,W14,W16]

Skills:

1. 1. Is able to characterize kinds of bridge modernization - [-KU01,U03]
2. 2. Is able to characterize methods of strengthening and refurbishment of steel and concrete bridges - [-KU04,U09]
3. 3. Is able to design of RC bridge modernization - [-KU04,U09]

Social competencies:

1. 1. Ability to work single-handedly - [-KK01]
2. 2. Responsibility for honesty of computation results - [-KK02]
3. 3. Awareness of necessity of constant professional education - [-KK03,K06]

Assessment methods of study outcomes

--Written test on general causes and methods of bridge modernization and principles of modernization design
An exercise concerning design of modernization of RC bridge
Written exam

Course description

--1. General causes, aims and types of bridge modernization
2. Procedure of design of bridge modernization
3. Bridge condition cataloguing
4. Connection used for bridge modernization
5. Direct and indirect strengthening of steel bridges
6. Direct and indirect strengthening of concrete supports
7. Types of bridge refurbishment

Basic bibliography:

1. 1. Rybak M., Przebudowa i wzmacnianie mostów. WKiŁ, Warszawa, 1983
2. 2. Madaj A., Wołowicki W., Budowa i utrzymanie mostów. WKiŁ, Warszawa, 1994

Additional bibliography:

1. 1. Bartoszewski J., Wzmacnianie i poszerzanie mostów. WKiŁ, Warszawa, 1962
2. 2. Spal L., Przebudowa konstrukcji stalowych. Arkady, Warszawa, 1973
3. 3. Współczesne metody wzmacniania i przebudowy mostów - referaty corocznego seminarium (od 1993r.) organizowanego przez IIL PP oraz Oddział Wielkopolski ZMRP

Result of average student's workload

Activity	Time (working hours)

Student's workload

Source of workload	hours	ECTS
Total workload	60	1
Contact hours	10	1
Practical activities	10	0