



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Design of bridges and tunnels [S2Bud1-BDMiK>PMT]

Course

Field of study

Civil Engineering

Year/Semester

1/1

Area of study (specialization)

Road, Bridge and Railway Engineering

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

45

Laboratory classes

0

Other

0

Tutorials

15

Projects/seminars

30

Number of credit points

6,00

Coordinators

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Lecturers

Prerequisites

KNOWLEDGE: Student beginning this course should: - have knowledge of the strength of materials, structural mechanics, soil mechanics, concrete structures, steel structures, foundation design and foundation laying; - know basics of bridges in the range of the concrete and steel bridge structures and underground structures. SKILLS: Student should be able to: - statically calculate and design concrete and steel structures; - perform basic static calculations of simple bridge structures; - self-learn. SOCIAL COMPETENCIES: Student should: - be able to adapt type of any civil engineering structure to transport requirements and social expectations; - respect Polish language; - understand the need for lifelong learning and group collaboration.

Course objective

Understanding the terminology used to describe bridge structure. Understanding the structural elements of selected types of spans and bridge supports and their functions. Knowing selected loads used to calculate the bridge structures. Understanding of selected issues in the field of static and strength calculations of bridge structures.

Course-related learning outcomes

Knowledge:

1. Student knows the definitions of parameters characterizing the position and dimensions of bridge structures, he knows the names of components of structure and equipment of bridges and knows their functions
2. Student knows the classifications of different types of bridge spans, their supports and equipment elements
3. Student knows the permanent and moving loads appearing on bridges according to European standard PN-EN

Skills:

1. Student can name components of spans and supports of bridges and can describe every bridge using the correct terminology
2. Student can draw: cross-section and longitudinal view of different type of bridge structure, as well as a abutment and a bridge intermediate support
3. Student is able to determine permanent and moving loads of bridge structure or part thereof

Social competences:

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

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

Written exam of the student's knowledge in the field of basics of bridges and material presented during the lectures.

The results of the final exam depend on the percentage of correct answers on the test in relation to the maximum number of 100%. The obtained points are converted into the final grade.

Test result: Points: FINAL GRADE:

- (0 – 57%) (0-17) 2,0
<57 – 67%) <17-20) 3,0
<67– 75%) <20-22,5) 3,5
<75 – 83%) <22,5-25) 4,0
<83 – 90%) <25-27) 4,5
<90 – 100%) <27-30> 5,0

Written test of the student's knowledge in the field of material presented during the tutorials.

Preparation of some static-strength calculation of chosen bridge (project) and oral test of knowledge of the range of this project.

Programme content

Issues concerning shaping of simple bridge structures and carrying out static and strength calculations of such structures.

The most important terms and definitions used in bridge construction.

Fundamental principles of shaping bridge structures as transport infrastructure.

Multi-aspect classification of bridge structures.

Basic elements of bridge structures - bridge spans and bridge supports.

Essential elements of equipment for typical bridge structures.

Issues related to the load-bearing capacity and durability of bridge structures.

Methods of analysing bridge structures. ULS and SLS method.

Bridge loads according to old and current standards. Eurocodes.

Prefabrication in bridge construction.

Course topics

Lectures:

Basic definitions, main elements of bridge structure, types and elements of bridge spans, types and

element of bridge supports, bridge span equipment, bridge structure dimensions, bridge classifications, issues related to the connection of bridge structures to the road and rail embankments, permanent and moving loads on bridges, basic methods of bridge span and support analysis, selected issues of structural design of bridges, issues related to the specifics of bridged constructions (among others fatigue and dynamic analysis of structures, joints in steel structures, layout of reinforcement bars in concrete elements, prefabricated bridges, etc.)

Tutorials and project:

static-strength analysis of spans and supports of bridge

Teaching methods

Lectures: problem lecture/lecture with presentations/ case study

Tutorials: method based on usage of various source of knowlegde such us: film, photos, source files and presentations/ case study

Project method includes designing and performing simulation model and result testing

Bibliography

Basic

1. Jankowiak I., Podstawy budownictwa mostowego, Wydawnictwo PP, Poznań 2019
2. Madaj A., Wołowicki W.: Podstawy projektowania budowli mostowych, WKiŁ, Warszawa 2007
3. Czudek H., Radomski R.: Podstawy mostownictwa, PWN Warszawa 1983

Additional

1. Madaj A., Wołowicki W.: Projektowanie mostów betonowych, WKiŁ, Warszawa 2010
2. Madaj A., Wołowicki W.: Mosty betonowe, WKiŁ 1980/2002
3. Ryżyński A., Wołowicki W.: Karlikowski J., Skarżewski J.: Mosty stalowe, PWN, Warszawa 1985
4. Karlikowski J., Sturzbecher K.: Mosty stalowe, Wydawnictwo PP 1993
5. Gałczyński S.: Podstawy budownictwa podziemnego, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2001
6. PN-EN 1991-2:2007 Eurokod 1: Oddziaływania na konstrukcje, Część 2: Obciążenia ruchome mostów
7. Furtak K., Kędracki M.: Podstawy budowy tuneli, Wydawnictwo Politechniki Krakowskiej, Kraków 2005
8. Leonhardt F.: Podstawy budowy mostów betonowych, WKiŁ, Warszawa 1982
9. Biliszczuk J.: Mosty podwieszane. Projektowanie i realizacja, Arkady 2005
10. Furtak K.: Mosty zespolone, PWN 1999

Breakdown of average student's workload

	Hours	ECTS
Total workload	160	6,00
Classes requiring direct contact with the teacher	90	3,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	70	2,50