COURSE DESCRIPTION CARD - SYLLABUS

Course name
Structural mechanics [S1Bud1>MB1]

Course

Field of study
Civil Engineering

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
15

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Student has basic knowledge of the following subjects: mathematics, theoretical mechanics, strength of materials in the scope from Civil Engineering or related.

Course objective

Knowledge of theoretical foundations and models in mechanics of plane bar structures. Ability to compute internal forces and generalized displacements in statically determinate and indeterminate systems. Ability to compute influence lines of static and kinematic quantities in bar structures.

Course-related learning outcomes

Knowledge:
1. Student knows basic theorems and principles of linear structural mechanics.
2. Student knows the relations between displacements and loads in statics of straight beams.
3. Student knows the methods to build the computational models of plane bar structures.

Skills:
1. Student can compute the distributions of internal forces, displacements due to external loads,

temperature change and imposed displacements in plane bar structures.
2. Student can determine the functions of static and kinematic quantities due to movable load.
3. Student can choose correct methods to solve plane bar structures.

Social competences:
1. Student can work individually as well as in a team.
2. Student is aware of the responsibility for the correctness of the obtained solutions and can give their interpretation.
3. Student has the consciousness of necessity of continuous expansion of knowledge.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
1) lecture
written test
2) tutorial
two written tests during the semester
3) laboratory classes
two individual projects for each student

Programme content

During the course, the following topics are discussed: the work of forces on displacements; the application of virtual work to calculate displacements; the flexibility method, which allows the calculation of reactions and internal forces in statically indeterminate systems; and the influence lines of reactions, internal forces, and displacements.

Course topics

Lecture 1 - Models of civil engineering structures. Work of external and internal forces.
Lecture 2-3 - Principle of virtual work. Calculation of displacements in statically determine bar structures using the principle of virtual work.
Lecture 4-5 - Solving the statically indeterminate systems using the flexibility method.
Lecture 6 - Reciprocity theorems.
Lecture 7 - Influence lines of static and kinematic quantities.
Tutorial 1-2 - Calculation of displacements in statically determinate bar structures using the principle of virtual work.
Tutorial 3 - Test 1
Tutorial 4-6 - Solving statically indeterminate structures using the flexibility method.
Tutorial 7 - Test 2
Project 1-3 - Exercise 1 - Calculation of displacements in statically determinate bar structures using the principle of virtual work.
Project 4-7 - Exercise 2 - Solving statically indeterminate structures using the flexibility method.

Teaching methods

Lecture - monographic, tutorials and projects - exercise and project method.

Bibliography

Basic
1. W. Nowacki, Mechanika budowli, PWN, Warszawa 1974
2. Z. Dyląg i in., Mechanika budowli (t.I+II), PWN, Warszawa 1989
3. Z. Cywiński, Mechanika budowli w zadaniach (t.I+II), PWN, Warszawa 1976
4. J. Rakowski, Mechanika budowli, Zadania cz.1, Wydawnictwo PP, Poznań 2007
5. M. Guminiak, J. Rakowski, Zbiór zadań z mechaniki budowli, Wydawnictwo PWSZ, Piła 2008
Additional
1. M. Guminiak, J. Rakowski, Mechanika budowli. Zbiór zadań z elementami ujęcia komputerowego, Wydawnictwo PWSZ, Piła 2011
2. Skrypt internetowy, Mechanika budowli, https://sites.google.com/view/iak-put-poznan-

pl/dydaktyka/almamater/materia%C5%82y-dydaktyczne

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,00
Classes requiring direct contact with the teacher	45	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	45	1,50