



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Structural Mechanics

### Course

Field of study

Civil Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

Tutorials

15

Projects/seminars

15

Other (e.g. online)

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

dr inż. Magdalena Łasecka-Plura

Responsible for the course/lecturer:

### 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:

- 1) lecture

written test

- 2) tutorial

two written tests during the semester

- 3) project

two individual projects for each student, form of checking: individual consultations, the final mark based on the verification of knowledge at the submission date and during the tutorial test

### Programme content

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 determinate 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	3,0
Classes requiring direct contact with the teacher	45	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	45	1,5

<sup>1</sup> delete or add other activities as appropriate