



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Structural Mechanics II

### Course

Field of study

Civil Engineering

Area of study (specialization)

Structural Engineering

Level of study

Second-cycle studies

Form of study

part-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

10

Laboratory classes

0

Other (e.g. online)

0

Tutorials

10

Projects/seminars

10

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

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### Prerequisites

Knowledge. The student knows the analytical methods of calculating forces and displacements in statically determinate and indeterminate bar systems. The student has basic knowledge of buckling in compression and loss of stability of planar bar systems. The student has knowledge of the state of stresses and deformations in the cross-sections of bars.

Skills. The student is able to calculate forces and displacements in statically determinate and indeterminate bar systems. He is able to calculate stresses and deformations in the sections of bars.

Social competence. The student understands the need to constantly expand his knowledge, and can apply his skills in practice.



### Course objective

Acquainting with matrix methods of analysis of statics, dynamics and stability of simple bar systems as well as statics of axisymmetric shells.

### Course-related learning outcomes

#### Knowledge

The student will learn analytical and numerical methods of calculating internal forces and displacements in bar systems, also taking into account the influence of large axial forces, and methods of analyzing the initial stability of bar systems.

#### Skills

The student is able to calculate the internal forces and displacements in bar systems using various methods, also taking into account the influence of large axial forces.

The student is able to calculate the critical load and the form of stability loss of bar systems.

The student is able to critically evaluate the results of the conducted analyzes.

#### Social competences

The student is responsible for the correctness of the calculations made.

The student is able to describe the performed calculations and draw conclusions from their results.

The student is aware of the need to systematically supplement and expand his knowledge.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written exam checking the knowledge and skills of the subject, including tasks for independent solution and theoretical basis.

One design exercise for an individual solution.

Scale for the evaluation of results for the test and exam:

$\geq 90\%$  - 5.0 (very good)

$\geq 85\%$  - 4.5 (good plus)

$\geq 75\%$  - 4.0 (good)

$\geq 65\%$  - 3.5 (sufficient plus)

$\geq 55\%$  - 3.0 (satisfactory)

### Programme content

1. The matrix approach to the displacement method.
2. Statics analysis of bar systems: lattice bars, beams and flat frames.



3. Initial frame stability in terms of the matrix.

### Teaching methods

Monographic lectures covering theoretical foundations and simple numerical examples.

Auditorium exercises including numerical examples. The examples are solved by the teacher using the "chalk and blackboard" method.

Exercises for self-solution covering two design tasks. The tutor consults the tasks given to students and, as needed, solves similar tasks on the blackboard.

### Bibliography

#### Basic

1. Mechanika konstrukcji prętowych w ujęciu macierzowym, M. Guminiak, J. Rakowski, Wydawnictwo Politechniki Poznańskiej, Poznań, 2012.
2. Wybrane zagadnienia zaawansowanej mechaniki budowli, P. Litewka, R. Sygulski, Wydawnictwo Politechniki Poznańskiej, Poznań, 2012.

#### Additional

1. Mechanika budowli - ujęcie komputerowe, t. 1, 2 i 3, Z. Waszczyszyn i in., Arkady, Warszawa, 1995.
2. Computer Analysis of Structural Systems, J. F. Fleming, Mc Graw - Hill, 1989.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	45	2,0

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