

Title Structural mechanics	Code 1010101131010110031
Field Civil Engineering First-cycle Studies	Year / Semester 2 / 3
Specialty -	Course core
Hours Lectures: 3 Classes: 2 Laboratory: - Projects / seminars: 2	Number of credits 10
	Language polish

Lecturer:

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Status of the course in the study program:

The subject belongs to the main course subjects.

Assumptions and objectives of the course:

Theoretical background and knowledge of models in plane bar systems mechanics. Skill in calculation of internal forces and generalized displacements in statically determinate and indeterminate structures. Calculation of critical loading for elastic frames. Knowledge of basic concepts in dynamics of bar systems and determination of natural frequencies and dynamic coefficients.

Contents of the course (course description):

Models of structural systems. Statically determinate bar systems: internal forces, influence lines, displacements. Principle of virtual work, reciprocal theorems. Maxwell-Mohr formula. Statically indeterminate bar systems. Solution of frames, continuous beams, trusses and arches by the flexibility method. Influence of generalized forces, temperature changes and support displacements. Influence lines of reactions, internal forces and displacements. Reduction theorems. Slope-deflection formulae for beams. Equations of kinematic chain. Stiffness method for kinematically indeterminate frames. Slope-deflection formulae for beams with axial force. Second order theory and determination of critical loading. Stability of plane frames. Foundations of structural dynamics. Free and forced vibrations with and without damping for one-degree-of-freedom system. Dynamics of simple frames with discrete mass distribution. Vibrations of beams with continuous mass distribution. Slope-deflection formulae for beams in the case of harmonic excitation of supports.

Introductory courses and the required pre-knowledge:

Basic knowledge in mechanics, strength of materials and applied mathematics: differential and integral calculus, vector and matrix calculus.

Courses form and teaching methods:

Lectures illustrated with slides, tutorials (calculation examples) and projects (complex examples for individual calculation).

Form and terms of complete the course - requirements and assessment methods:

Written examination, written tests in tutorials, individual examples.

Basic Bibliography:

Additional Bibliography: