Title	Code
(Elasticity and Plasticity)	**1010102111010100233**
Field: **Civil Engineering II stopień**	Year / Semester: **1 / 1**
Specialty: **-**	Course: **core**
Hours: Lectures: **2** Classes: **-** Laboratory: **-** Projects / seminars: **2**	Number of credits: **6**
	Language: **polish**

Lecturer:

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Status of the course in the study program:

Elasticity and Plasticity: obligatory course for students of the 2nd degree Faculty of Civil and Environmental Engineering

Assumptions and objectives of the course:

The goal is focussed on use the theory to solve 2-D elastostatic problems such as torsion and bending of bars, calculation of in- and out-of-plane plates and spherical shells. The students should capture the knowledge of limit-load method in structure projecting.

Contents of the course (course description):

Basic concept and definitions. Analysis of stress. Equilibrium and boundary conditions. Finite deformations and strains. Analysis of strain. Lagrange and Euler coordinates. Strain tensor and its interpretation. Geometrical and constitutive equations. Elastic constants. Conservation of mass and energy. Lame and Michell's-Beltrami's equations. Energy principles. 2-D stress and strain problems. Airy's stress function. Planar problems in polar coordinates. Boundary problems and methods of calculation. Torsion and bending. Boussinesq's and Flamant's solutions. Theory of thin plates: differential equations, boundary conditions and internal forces. Rectangular and circular plates. Methods of calculations and examples. Thin shells of revolution with symmetric rotational load: membrane theory. Plastic behavior of materials-basic concepts. Plastic deformations and plastic flow. Idealized models of elasto-plastic materials. Yield conditions. Tresca and Huber-von Mises criteria. Elasto-plastic bending of beams, spherical shell subjected to an increasing pressure. Limit load theory. Theorems and examples of calculations.

Introductory courses and the required pre-knowledge:

Knowledge with mathematical analysis,theoretical and structural mechanics and strength of materials is expected.

Courses form and teaching methods:

Lectures (multimedia presentations),example classes.

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

Written tests and exercises. The lectures will be summerised by written exam.

Basic Bibliography:

Additional Bibliography: