Course Unit Descriptor

Study Programme: Civil Engineering

Course Unit Title: Theory of Structures

Course Unit Code: A520

Name of Lecturer(s): Rašeta Andrija, Džolev Igor

Type and Level of Studies: bachelor

Course Status (compulsory/elective): elective

Semester (winter/ summer): winter

Language of instruction: english

Mode of course unit delivery (face-to-face/distance learning): face-to-face

Number of ECTS Allocated: 5

Prerequisites: none

Course Aims:.

Obtaining knowledge in analysis principles and calculations of 1D structural elements, in linear-elastic material behavior domain, using analytical methods, numerical methods and software tools.

Learning Outcomes:
The course provides basic knowledge of static analysis and calculation of 1D structural elements. Obtained knowledge is used in specialized courses that follow, as well as in professional engineering practice.

Syllabus.
Euler-Bernoulli beam theory. Elements and nodes of the structural systems. Classification of the structural systems. Statically determinate plane systems composed of line elements: simply supported beam, overhanging beam, cantilever beam, Gerber beam, three hinged arch, truss and frame systems. Decomposition method. Application of the principle of virtual forces for the calculation of displacements of statically determinate systems. Force method: basic determinate system and governing equations. Statically indeterminate plane structural systems composed of line elements: beams fixed at one and both ends, two hinged arch, fixed arch, continuous beam, truss and frame systems. Direct Finite Element Method. One-dimensional (line) finite elements: truss (axial stress) and beam finite elements (Euler-Bernoulli beam theory). Plane systems composed of line elements. Boundary conditions, governing equations of the finite element systems and solving methods. Overview and application of finite-element computer software tools.

Required Reading:
Relevant literature in English, tbd

Weekly Contact Hours:2	**Lectures: 3**	**Practical work: 2**

Teaching Methods:
Lectures. Auditory and computer exercise. Consultation. Continuous monitoring of students knowledge level, colloquium and exam.

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	points	**Final exam**	points
Attendance			
Computer exercises			
Tests (4x)			