

Study programmes: MASTER STUDIES - Mathematics			
Course name: Continuum mechanics			
Lecturers: Andjelka Kovačević			
Status: Optional			
ECTS: 8			
Attendance prerequisites: -			
Course aims: Acquiring knowledge from mechanics of continuum as applied form of classical mechanics.			
Course outcome: Students have knowledge about basic principles: Euler and Lagrange formalisms and how to apply them to problems of mechanics of fluids and theory of elasticity.			
Course content: Continuum hypothesis. Lagrange and Euler's approach to the study of continuum. Material derivative. Surface and volume forces. Stress tensor. Symmetry of stress sensor. Cauchy principle. Main stress and main stress directions. Extreme values of main stress. Gradients of deformation. Tensor of deformation. Vector of movement. Infinitesimal deformation and rotation. Energy deformation. Hook's Law. Properties of the fluid-rheological diagram. The states. The viscosity of the stretch. The velocity of propagation of the sound. Static pressure. The properties of the fluid. The Pascal law. The incompressible and compressible fluid in the Earth's gravitational field. Basic kinematic characteristics of the flow - a field, a stream, a trajectory. Circulation. Laminar and turbulent flow regimes. Diagram and rotator of velocity vectors. First Helmholtz theorem. Speed of deformation. Acceleration. - Kelvin's theorem. Turbulent and non-turbulent currents. The law of mass conservation. Euler's equation. Bernoulli integral of Euler's equation. Laws on the change of the momentum. Inner forces. The Navier-Stokes equations. Models of turbulence. The d'Alembert paradox. Construction of a compressible fluid. - Mach number. Normal and angles shock waves.			
Literature:			
1. Rohan Abeyaratne, Continuum Mechanics, MIT, 2012.			
Number of hours: 7	Lectures: 3	Tutorials: 2	Laboratory: -
Research: 2			
Teaching and learning methods: Frontal / Individual / Interactive / Tutorials / Lectures / Exercises			
Assessment (maximal 100 points)			
Course assignments	points	Final exam	points
Lectures	-	Written exam	30
Exercises / Tutorials	-	Oral exam	50
Colloquia	10	Written-oral exam	-
Essay / Project	10		