M135	**Continuum mechanics**	L	P	S	ECTS
		3	2	0	7

Course objectives. To familiarize students with modern axiomatic continuum mechanics, with emphasis on elasticity theory and fluid mechanics.

Course content.

1. Introduction: tensor algebra and analysis. Deformation and infinitesimal deformation. Motion: Lagrange and Euler description, types of motions.
2. Conservation laws and balance laws, continuity equation. Cauchy theorem, strain tensor and equation of motion.
3. Constitutive laws: incompressible material, elastic body, viscous and inviscid fluid: ideal and Newtonian fluid.
4. Linearized elasticity: stationary and evolution problems, variational formulation. Lower-dimensional models: rods and plates.
5. Ideal fluid: irrotational flow, complex potentials, surface oscillations. Newtonian fluid: Navier-Stokes equations, Reynolds number, laminar and turbulent flow, Stokes flow. Euler's barotropic fluid: speed of sound.

LEARNING OUTCOMES

No.	LEARNING OUTCOMES
1.	Identify the real-world problems and derive corresponding mathematical models of continuum mechanics.
2.	Understand and explain fundamental notions, such as deformation, motion and strain.
3.	Explain main difference between conservation, balance and constitutive laws.
4.	Use elementary methods for solving equations.
5.	Interpret physical implications of different constitutive laws and recognize materials that are approximated by them.
6.	Derive equation of motion and main qualitative properties of considered models.
7.	Formulate conjectures related to the subject and prove or deny them.

RELATING THE LEARNING OUTCOMES, ORGANIZATION OF THE EDUCATIONAL PROCESS AND ASSESSMENT OF THE LEARNING OUTCOMES

TEACHING ACTIVITY	ECTS	LEARNING OUTCOME **	STUDENT ACTIVITY*	EVALUATION METHOD	POINTS	
					min	max
Attending lectures	1	1-7	Lecture attendance, discussion, team work and independent work on given tasks	Attendance lists, tracking activities	0	4
Written exam (Mid-terms)	3	1-7	Preparing for written exam	Evaluation	25	48
Final exam	3	1-7	Revision	Oral exam	25	48
TOTAL	7				50	100

Teaching methods and student assessment. Lectures and exercises are obligatory. The exam consists of a written and an oral part. Upon completion of the course, students can take the exam. Successful midterm exam scores replace the written exam.
Can the course be taught in English: Yes

Basic literature:

1. I. Aganović, Uvod u rubne zadaće mehanike kontinuuma, Element, Zagreb, 2003.
2. M. E. Gurtin, An Introduction to Continuum Mechanics, Academic Press, 1981.

Recommended literature:

1. P. G. Ciarlet, Mathematical Elasticity, Vol. 1, 2, 3, North-Holland, 1993; Elsevier, 2000.
2. P. K. Kundu, I. M. Cohen, D. R. Dowling, Fluid Mechanics, Academic Press, Elsevier, 2012.