UČNI NAČRT PREDMETA / COURSE SYLLABUS			
Predmet:	Mehanika kontinuuma		
Course title:	Continuum mechanics		

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Magistrski študijski program Matematika	ni smeri	1 ali 2	prvi ali drugi
Master's study programme Mathematics	none	1 or 2	first or second

Vrsta predmeta / Course type	izbirni
Univerzitetna koda predmeta / University course code:	M2121

Predavanja **Lectures**	**Seminar** **Seminar**	**Vaje** **Tutorial**	**Klinične vaje** **work**	**Druge oblike študija**	**Samost. delo** **Individ. work**	**ECTS**
30	**15**	**30**			**105**	**6**

Nosilec predmeta / Lecturer:	doc. George Mejak	
Jeziki / Languages:	**Predavanja / Lectures:**	slovenski/Slovene, angleški/English
	Vaje / Tutorial:	slovenski/Slovene, angleški/English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Vsebina:	**Content (Syllabus outline):**

Kinematika kontinuuma. Deformacijski gradient. Mere deformacije, deformacijski tenzor. Homogena deformacija, razteg, strig. Deformacija ločnega, površinskega in volumskega elementa. Lagrangeev in Eulerjev opis gibanja. Materialni odvod. Transportni izreki.		Kinematics of deformation. Deformation gradient. Deformation measures. Deformation tensor. Homogeneous deformation, dilatation, shear. Deformation of arc, surface and volume elements. Lagrangian and Euler description. Material time derivative. Transport theorems.
Ohranitveni zakoni. Zakon o ohranitvi mase. Princip o gibalni količini. Princip o vrtilni količini. Napetostni tenzor. Enačba gibanja. Termodinamika. Energija, entropija. Prvi in drugi zakon termodinamike.		Balance laws. Conservation of mass. Balance of linear momentum. Stress tensor. Balance of angular momentum. Cauchy momentum equation. Thermodynamics. Energy and the first law. Entropy and the second law.
Konstitutivne zveze. Princip koordinatne indiferentnosti. Materialne simetrije, izotropija. Reprezentacija konstitucijskih funkcij.		Constitutive relations. Material frame indifference. Material symmetry, isotropy. Representation of constitutive functions. Basic models, elasticity, viscoelasticity, plasticity, fluids
Osnovni modeli. Elastičnost, viskoelastičnost, plastičnost, fluidi.		Boundary value problem. Variational principles. Stability of the equilibrium. Universal equilibrium solutions.
Robna naloga. Variacijski principi. Stabilnost ravnovesja. Univerzalne ravnovesne rešitve.		

Temeljni literatura in viri / Readings:

Bertram A. Elasticity and Plasticity of Large Deformations, Springer, 2008.

Chadwick P. Continuum Mechanics : Concise Theory and Problems, Dover, 1999.

Gurtin M.E. An Introduction to Continuum Mechanics, Academic Press, 1981.

Liu I.S. Continuum Mechanics, Springer, 2002.

Tadmor E.B., Miller R.E. Elliot R.S. Continuum Mechanics and Thermodynamics, Cambridge, 2012.

Cilji in kompetence: **Objectives and competences:**

Predstavitev osnovnih pojmov in vsebin mehanike kontinuuma s poudarkom na korektni matematični formulaciji in povezovanju predhodno osvojenih matematičnih znanj.	An overview of fundamental facts and ingredients of continuum mechanics with emphasis on correct mathematical formulation based on previously mastered mathematical knowledge.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Poznavanje in razumevanje osnovnih pojmov in principov mehanike kontinuuma. Uporaba: Osnova za nadaljnje raziskovalno delo in specialistični študij na področju mehanike. Refleksija: Povezovanje osvojenega matematičnega znanja v okviru enega predmeta in njegova uporaba na področju mehanike. Prenosljive spretnosti – niso vezane le na en predmet: Študentje nadgradijo svoje znanje uporabe matematike za reševanje problemov s področja naravoslovja in tehnike.	Knowledge and understanding: To establish knowledge and understanding of fundamental principles of continuum mechanics. Application: Mastered coursework represents a foundation for specialized research in the field of mechanics. Reflection: Connecting acquired mathematical knowledge within the course with application of that knowledge in a general field of mechanics. Transferable skills: To enhance knowledge and understanding of mathematical methods for solving problems from natural science and technology.

Metode poučevanja in učenja:	**Learning and teaching methods:**

Predavanja, vaje, uporaba računalniške algebre, domače naloge, konzultacije.	Lectures, exercises, usage of computer algebra, homework and consultations.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Tedenske domače naloge: 50% Zagovor domačih nalog: 50% Ocene: 1-5(negativno), 6- 10 (pozitivno) (po Statutu UL)	100%	Regular homework assignments: 50%. Oral presentation of homework: 50%. Grading: 1-5(fail), 6- 10 (pass) (Statute of UL)

Reference nosilca / Lecturer's references:

George Mejak:

– MEJAK, George. Finite element solution of a model free surface problem by the optimal shape design approach. International journal for numerical methods in engineering, ISSN 0029-5981. [Print ed.], 1997, vol. 40, str. 1525-1550 [COBISS.SI-ID 9983833]

– MEJAK, George. Eshebly tensors for a finite spherical domain with an axisymmetric inclusion. European journal of mechanics. A, Solids, ISSN 0997-7538. [Print ed.], 2011, vol. 30, iss. 4, str. 477-490 [COBISS.SI-ID 16025177]

– MEJAK, George. Variational formulation of the equivalent eigenstrain method with an application to a problem with radial eigenstrains. International journal of solids and structures, ISSN 0020-7683. [Print ed.], 2014, vol. 51, iss. 7-8, str. 1601-1616. [COBISS.SI-ID 17128281]