UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2017/18)			
Predmet:	Mehanika deformabilnih teles		
Course title:	Mechanics of deformable bodies		

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

Vrsta predmeta / Course type	izbirni / elective
Univerzitetna koda predmeta / University course code:	M2119

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. dr. 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:**
Vpis v letnik študija.	Enrolment in the programme.
Vsebina:	**Content (Syllabus outline):**

Kinematika deformacije. Mere deformacije. Deformacijski tenzorji. Osnovni načini deformacije. Kompatibilnostni pogoji. Geometrična linearizacija. Teorija majhnih pomikov. Materialni odvod. Transportni izreki. Ohranitveni zakoni. Osnovni fizikalni principi. Napetostni tenzor. Termodinamika. Prostorski in materialni zapis vodilnih enačbe. Konstitutivne zveze. Princip koordinatne indiferentnosti. Elastičnost. Elastične simetrije, Izotropična elastičnost. Hiperelastičnost. Osnovni modeli hiperelastičnosti. Variacijski principi. Infinitezimalna elastičnost. Navierova enačba. Greenova funkcija. Ravninske naloge. Osnovne primeri prostorskih nalog. Elastično valovanje. Linearna mehanika loma. Neelastični modeli; termoelastičnost, viskoelastičnost, plastičnost. Osnove mehanike materialov. Princip ekvivalentne lastne deformacije. Efektivne materialne lastnosti. Homogenizacija.	Kinematics of deformation. Deformation measures. Deformation tensors. Basic types of deformation. Compatibility conditions. Geometric linearization. Small strain theory. Material derivative. Transport theorems Balance laws. Basic physical principles. Stress tensors. Thermodynamics. Material and space form of governing equations. Constitutive relations. Material frame indifference. Elasticity. Elastic symmetries. Isotropic elasticity. Hyperelasticity. Basic models of hyperelasticity. Variational principles. Infinitesimal elasticity. Navier equation. Green function. Plane problems. Basic examples of three dimensional problems. Elastic waves. Linear fracture mechanics. Inelasticity; thermoelasticity, viscoelasticity, plasticity. Introduction to mechanics of materials. Equivalent eigenstrain principle. Effective material properties. Homogenization.

Temeljni literatura in viri / Readings:

Bertram A. Elasticity and Plasticity of Large Deformations, Springer, 2008.
Bigoni D. Nonlinear Solid Mechanics: Bifurcation Theory and Material Instability, Cambridge, 2012.
Holzapfel G.A. Nonlinear Solid Mechanics: A Continuum approach for Engineering, Wiley, 2000.
Gross D., Seelig T. Fracture Mechanics: With an Introduction to Micromechanics. Springer, 2011
Slaughter W.S. The Linearized Theory of Elasticity. Birkhäuser, 2002.

Cilji in kompetence:	**Objectives and competences:**
Predstavitev osnovnih pojmov in vsebin mehanike deformabilnih teles s poudarkom na korektni matematični formulaciji in povezovanju predhodno osvojenih matematičnih znanj.	An overview of fundamental facts and ingredients of mechanics of deformable bodies 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 deformabilnih teles. 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 mechanics of deformable bodies. 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:

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]
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. 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]