

UČNI NAČRT PREDMETA / COURSE SYLLABUS							
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		
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			180	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):			

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

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.

Holzappel 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:

Predstavitev osnovnih pojmov in vsebin mehanike deformabilnih teles s poudarkom na korektni matematični formulaciji in povezovanju predhodno osvojenih matematičnih znanj.

Objectives and competences:

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:

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.

Intended learning outcomes:

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.

Delež (v %) /

Weight (in %) **Assessment:**

Načini ocenjevanja:

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]