

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 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:				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. 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 deformacije. Mere deformacije. Deformacijski tenzorji. Osnovni načini deformacije. Kompatibilnostni pogoji. Geometrična linearizacija. Teorija majhnih				Kinematics of deformation. Deformation measures. Deformation tensors. Basic types of deformation. Compatibility conditions. Geometric linearization. Small strain theory.		

<p>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>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>
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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:

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:

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.
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Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

Tedenske domače naloge: 50% Zagovor domačih nalog: 50%		Regular homework assignments: 50%. Oral presentation of homework: 50%.
Ocene: 1-5(negativno), 6- 10 (pozitivno) (po Statutu UL)	100%	Grading: 1-5 (fail), 6- 10 (pass) (Statute of UL)

Reference nosilca / Lecturer's references:

<p>George Mejak:</p> <ul style="list-style-type: none"> - 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]
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