

UČNI NAČRT PREDMETA / COURSE SYLLABUS						
Predmet:		Analitična mehanika				
Course title:		Analytical mechanics				
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:				M2118		
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):		
Lagrangeeva mehanika: Konfiguracijski prostor. Holonomni, neholonomni sistemi vezi. Princip virtualnega dela. D'Alembertov princip. Lagrangeeve enačbe. Konstante gibanja,				Lagrangian mechanics: Configurational space. Holonomic and nonholonomic constraints. Principle of virtual work. D'Alembert principle. Lagrangian equations. Constant of motion.		

<p>ciklične spremenljivke, Jacobijeva energijska funkcija, izrek Emmy Noether. Variacijski princip. Majhna nihanja okoli ravnovesne lege. Posplošen potencial.</p> <p>Hamiltonova mehanika: Legendrova transformacija. Hamiltonova funkcija, kanonski sistem. Poissonov oklepaj, odvajanje vzdolž rešitve kanonskega sistema, konstante gibanja, Poissonov izrek. Kanonska transformacija, simplektična matrika, simplektični pogoj. Rodovne funkcije. Hamilton-Jacobijeva enačba</p>	<p>Cyclic variables, Jacobi energy function, Emmy-Noether theorem. Variational principles. Small oscillations. Generalized potential.</p> <p>Hamiltonian mechanics: Legendre transformation. Hamiltonian function, canonical system. Poisson bracket, differentiation along solution of the canonical system, integrals of motion, Poisson theorem. Canonical transformation, symplectic matrix, symplectic condition. Generating functions. Hamilton-Jacobi equation.</p>
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Temeljni literatura in viri / Readings:

<p>V. I. Arnold: Mathematical Methods of Classical Mechanics, 2nd edition, Springer, New York, 1997.</p> <p>H. Goldstein, C. P. Poole, J. L. Safko: Classical Mechanics, 3rd edition, Addison-Wesley, Reading, 2002.</p> <p>A. Fasano, S. Marmi, Analytical Mechanics: An Introduction, Oxford University Press, Oxford, 2006</p> <p>J. V. José, E. J. Saletan: Classical Dynamics : A Contemporary Approach, Cambridge Univ. Press, Cambridge, 1998.</p>

Cilji in kompetence:

<p>Cilj predmeta je pridobiti osnovna znanja s področja analitične mehanike. Vsebine predmeta omogočajo uspešno reševanje dinamičnih problemov in ponazarjajo uporabo različnih matematičnih področij pri reševanju problemov s področja mehanike.</p>
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Objectives and competences:

<p>The goal is to obtain basic knowledge of principles of analytical mechanics. Mastering them enables problem solving of dynamical problems and to understand the role of mathematics in mechanics</p>

Predvideni študijski rezultati:

<p>Znanje in razumevanje: Poznavanje in razumevanje osnovnih metod analitične mehanike</p> <p>Uporaba: Osnova za nadgraditev osvojenega znanja s specifičnimi modeli iz področja klasične mehanike. Temelj za nadaljnji poglobljeni študij metod klasične in relativistične mehanike.</p> <p>Refleksija: Povezovanje osvojenega matematičnega znanja v okviru enega</p>

Intended learning outcomes:

<p>Knowledge and understanding: Knowledge and understanding of basic principles and methods of analytical mechanics.</p> <p>Application: Application of the learnt methods in solving dynamical real word problems. First step for further graduate level study of methods of classical and relativistic mechanics.</p> <p>Reflection: Crossbreeding of different mathematical subjects within a single course</p>
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predmeta in njegova uporaba na področju analitične mehanike.

Prenosljive spretnosti – niso vezane le na en predmet: študent razvija sposobnost predstavitve problema na jasn in logičen način. Nauči se formulirati problem, izbrati ustrezeni model, analizirati rešitev in preveriti veljavnost modela in rešitve.

and their application.

Transferable skills: Students develop abilities to clearly and logically formulate problems. They learn to critically assess modeling by analyzing their predictions and comparing them with real examples.

Metode poučevanja in učenja:

predavanja, vaje, seminar, domače naloge, konzultacije

Learning and teaching methods:

Lectures, exercises, seminar, homeworks, consultations

Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

<p>Način (pisni izpit, ustno izpraševanje, naloge, projekt): izpit iz vaj (2 kolokvija ali pisni izpit)</p> <p>ustni izpit</p> <p>Ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL)</p>	<p>50%</p> <p>50%</p>	<p>Type (examination, oral, coursework, project): 2 midterm exams instead of written exam, written exam</p> <p>oral exam</p> <p>Grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)</p>
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Reference nosilca / Lecturer's references:

George Mejak:

- MEJAK, George. On extension of functions with zero trace on a part of boundary. Journal of mathematical analysis and applications, ISSN 0022-247X. [Print ed.], 1993, let. 175, str. 305-314 [COBISS.SI-ID 5828441]
- 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. Eshelby 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]