UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2016/17)			
Predmet:	Mehanika		
Course title:	Mechanics		
Študijski program in stopnja Study programme and level	**Študijska smer Study field**	**Letnik Academic year**	**Semester Semester**
Visokošolski strokovni študijski program Praktična matematika	ni smeri	3	prvi
First cycle professional study programme Practical Mathematics	none	3	first

Vrsta predmeta / Course type	obvezni / compulsory
Univerzitetna koda predmeta / University course code:	M0431

Predavanja Lectures	**Seminar Seminar**	**Vaje Tutorial**	**Klinične vaje work**	**Druge oblike študija**	**Samost. delo Individ. work**	**ECTS**
30		**30**			**90**	**5**

Nosilec predmeta / Lecturer:	prof. dr. Igor Dobovšek

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Vpis v letnik študija.	Enrolment in the programme.
Vsebina:	**Content (Syllabus outline):**

Kinematika. Definicija osnovnih kinematičnih količin. Opis gibanja v krivočrtnih koordinatnih sistemih, polarni, cilindrični in krogelni koordinatni sistem. Diferencialna geometrija krivulj v prostoru z vidika kinematike gibanja. Naravni koordinatni sistem. Koncept kotne hitrosti. Osnove Newtonove mehanike. Galilejeve transformacije. Newtonovi zakoni. Delo, energija, izrek o ohranitvi energije. Izrek o gibalni in vrtilni količini. Premočrtno gibanje. Kvalitativni opis gibanja. Fazna ravnina. Periodično gibanje. Harmonični oscilator. Problem dveh teles. Relativno gibanje. Absolutni in relativni koordinatni sistem. Relativna hitrost in relativni pospešek. Coriolisov pospešek in neinercialne sile. Lagrangejeva mehanika. Vezi: geometrijska definicija in časovna odvisnost vezi. Pojem integrabilnosti: holonomna in neholonomna vez. Posplošene sile in koordinate. Virtualno delo. D'Alembertov princip. Lagrangeeve enačbe. Celotna energija sistema. Lagrangeeva in Hamiltonova funkcija.	Kinematics. Fundamental elements of Description of motion in curvilinear coordinates, Polar, cylindrical, spherical coordinate system. Diferential geometry of space curves from the perspective of kinematics of motion. Natural coordinate system. The concept of angular velocity. Foundations of Newtonian mechanics. Galileian transformations. Newton's laws. Work and energy. Energy conservation. Principle of linear and angular momentum. Rectilinear motion. Qualitative description of motion. Phase plane. Periodic motion. Harmonic oscillator. Two body problem. Relative motion. Absolute and relative coordinate system. Relative velocity and relative acceleration. Coriolis acceleration and noninertial forces. Lagrangian mechanics. Constraints: geometric definition and time dependence. Integrability: Holonomic and nonholonomic constraints. Generalized forces and coordinates. Principle of Virtual work. D'Alembert's principle. Lagrange equations. Total energy of the system. Lagrangian and Hamiltonian function.

Temeljni literatura in viri / Readings:

G.R. Fowles in G.L. Cassiday: Analytical mechanics, Fort Worth [etc.] : Saunders College, Harcourt Brace College, 1999.

M. Lunn: A first Course in Mechanics, Oxford University Press, 2006.

H. Knudsen: Elements of Newtonian Mechanics, Springer, Berlin, 1995.

N. M. J. Woodhouse: Introduction to Analytical Dynamics, Springer Undergraduate Mathematics Series, 2009.

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

Študentje bodo seznanjeni z osnovnimi pojmi in vsebinami klasične mehanike s poudarkom na korektni matematični formulaciji in povezovanju že osvojenih matematičnih znanj. Probleme v praksi, ki so povezani z mehaniko, bodo znali formulirati v matematičnem jeziku.	Students will acquire fundamental knowledge and general overview about ingredients of classical mechanics with emphasis on strict mathematical formulation based on previously mastered mathematical knowledge.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Poznavanje in razumevanje osnovnih pojmov in principov klasične analitične mehanike. Uporaba: Temelj za nadgraditev osvojenega znanja s specifičnimi znanji iz prakse s področja mehanike. Osnova za razumevanje splošnih problemov s področja naravoslovja in tehnike. Refleksija: Povezovanje osvojenega matematičnega znanja v okviru enega predmeta in njegova uporaba na področju mehanike. Prenosljive spretnosti – niso vezane le na en predmet: Celovit pogled na matematične metode v okviru klasične mehanike. Reševanje nalog in problemov iz sorodnih področij uporabne matematike.	Knowledge and understanding: To establish knowledge and understanding of fundamental principles of classical analytical mechanics. Application: Mastered coursework represents a foundation for specialized research in the field of mechanics and related areas of natural sciences and technology. Reflection: Connecting acquired mathematical knowledge within the course with application of that knowledge in a general field of mechanics. Transferable skills: An overview of classical mechanics within the realm of mathematical apparatus mastered by student during this and other related courses. Solving problems from related areas of applied mathematics.

Metode poučevanja in učenja:	**Learning and teaching methods:**
predavanja, vaje, domače naloge, konzultacije	Lectures, exercises, homeworks, consultations

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt):	50%	Type (examination, oral, coursework, project):

izpit iz vaj (2 kolokvija ali pisni izpit) ustni izpit Ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL)	50%	2 midterm exams instead of written exam, written exam oral exam Grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL)

Reference nosilca / Lecturer's references:

DOBOVŠEK, Igor. The influence of dislocation distribution density on curvature and interface stress in epitaxial thin films on a flexible substrate. V: Advances in Modeling and Evaluation of Materials in Honor of Professor Tomita : a symposium to mark the occasion of Prof. Tomita's retirement from Kobe University, (International journal of mechanical sciences, ISSN 0020-7403, Vol. 52, iss. 2, 2010). Oxford [etc.]: Pergamon Press, 2010, issue 2, vol. 52, str. 212-218. [COBISS.SI-ID 15261529]

DOBOVŠEK, Igor. A theoretical model of the interaction between plastic distortion and configurational stress on the phase transformation front. V: Proceedings of the 7th European Symposium on Martensitic Transformations, ESOMAT 2006, (Materials science & engineering. A, ISSN 0921-5093, Vol. 481-482). Amsterdam: Elsevier, 2008, str. 956-361. [COBISS.SI-ID 14629209]

DOBOVŠEK, Igor. Problem of a point defect, spatial regularization and intrinsic length scale in second gradient elasticity. V: ZENG, Kai (ur.). Mechanical Behaviour of Micro- and Nano-scale Systems, (Materials Science and Engineering, ISSN 0921-5093, Vol. 423, Issue 1-2). Amsterdam: Elsevier, 2006, str. 92-96. [COBISS.SI-ID 13962841]

DOBOVŠEK, Igor. Micromechanical modeling of nanostructured materials by polyclustering techniques. International journal of nanoscience, 2005, vol. 4, no. 4, str. 623-629. [COBISS.SI-ID 13904473]