



Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	<b>Mehanika kontinuov</b>
<b>Course title:</b>	<b>Mechanics of Continuous Media</b>

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Enovit magistrski študijski program druge stopnje Predmetni učitelj		4	8
Five-year master's degree program Subject Teacher			

**Vrsta predmeta / Course type**

**Univerzitetna koda predmeta / University course code:**

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Terenske vaje Field work	Samost. delo Individ. work	ECTS
45		15			90	5

**Nosilec predmeta / Lecturer:**

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

**Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:**

Pogojev ni.  
Priporočljivo predznanje na področjih mehanike, termodinamike in matematičnih metod v fiziki.

**Prerequisites:**

None.  
Recommended preknowledge in the field of mechanics, thermodynamics and mathematical methods in physics.

**Vsebina:**

- Deformacije in napetosti v trdnih telesih  
- Termodinamika deformacije  
- Strižne deformacije  
- Statika nosilca, konzole, plošče in oboka  
- Statika in napetosti v podprtih nosilcih in ploščah

**Content (Syllabus outline):**

- deformations and strains in condensed matter  
- thermodynamics of deformation  
- shear deformations  
- statics of carriers, consoles, plates and arch  
- statics and strains in underpinned carriers and plates

- Statika in dinamika navpičnih nosilcev, homogeni in nehomogeni (protipotresna gradnja)  
 - Napetosti v tlačnih posodah  
 - Napetosti in obremenitve v oseh in gredeh  
 - Gibalne enačbe za tekočine  
 - Mehanika tekočin – valovanje na vodni površini  
 - Sile in navori v tekočinah, obremenitve sten

- statics and dynamics of vertical carriers, homogenous and non-homogenous (earthquake safe building)  
 - strains in pressure containers  
 - strains in axes and shafts  
 - equations for fluid motion  
 - fluid mechanics – waves on water surface  
 - forces and torques in fluids, strains in the walls

### Temeljni literatura in viri / Readings:

- P. K. Kundu, Fluid mechanics, Academic Press, San Diego, 1990.
- L.D. Landau, E.M. Lifshitz, Fluid mechanics, Pergamon Press, New York, 1989.
- D.J. Acheson, Elementary fluid dynamics, Clarendon Press, Oxford, 1990.
- T. E. Faber, Fluid dynamics for physicists, Cambridge University Press, Cambridge 1997.
- L.D. Landau, E.M. Lifshitz, Theory of Elasticity, Pergamon Press, New York 1986.
- R.J. Atkin, An introduction to the theory of elasticity, Longman, London, 1980.
- Borštnik, R. Podgornik, M. Vencelj, Rešene naloge iz mehanike kontinuov, DMFA, Ljubljana, 2001.

### Cilji in kompetence:

Študent usvoji kompleksno razumevanje fizikalnih zakonitosti in sposobnost le-te kvantitativno opisati, napovedati in izračunati rezultate.

### Objectives and competences:

Student gains complex understanding of physical laws and ability to qualitatively describe them, predict and calculate results.

### Predvideni študijski rezultati:

#### Znanje in razumevanje:

Po uspešno zaključeni učni enoti je študent zmožen:

- uporabiti pridobljena teoretična znanja za obravnavo pojavov pri mehaniki kontinuov,
- uporabiti ustrezna matematična orodja in principe za reševanje fizikalnih problemov povezanih z deformacijami trdnin in tekočin,
- tvoriti ustrezne matematične modele za fizikalne probleme,
- formulirati ustrezne robne pogoje,
- vrednotiti in interpretirati dobljene rezultate.

### Intended learning outcomes:

#### Knowledge and understanding:

On completion of this course student will be able to:

- use theoretical knowledge to study phenomena in mechanics of continuous media,
- use demanding mathematical tools to solve physical problems,
- form appropriate mathematical models for physical problems,
- formulate boundary conditions,
- evaluate and interpret obtained solutions.

**Prenesljive/ključne spretnosti in drugi atributi:**

Reševanje fizikalnih in tehničnih problemov z matematičnimi orodji in postopki.

**Transferable/Key Skills and other attributes:**

Solution of physical and technical problems using the mathematical tools and methods.

**Metode poučevanja in učenja:**

Predavanja (razlaga, razgovor, demonstracija) in eksperimentalna predavanja  
 Problemski pouk (postavitev problema, izbira potrebnih matematičnih orodij za reševanje, postavitev matematičnega modela, analitično in numerično reševanje, interpretacija dobljenih rešitev)

Seminarske vaje (metoda dela s tekstom, metoda pisnih in grafičnih del, uporaba programskih orodij)  
 Projektno delo

Poučevanje in učenje potekata z didaktično uporabo informacijsko-komunikacijske tehnologije.

**Learning and teaching methods:**

Lectures (explanation, discussion, demonstration) and experimental lectures  
 Problem based learning (setting up physical problem, selection of appropriate mathematical tools, setting up a mathematical model, finding of an analytical or numerical solution, interpretation of obtained solutions)

Seminar work (work with text, work with graphic elements, use of computer tools)  
 Project work

Teaching and learning are done through the didactic use of ICT.

Delež (v %) /

Weight (in %) /

**Assessment:****Načini ocenjevanja:**

Način (pisni izpit, ustno izpraševanje, naloge, projekt):	Delež (v %) / Weight (in %)	Assessment:
Pisni izpit	40	Written exam
Ustni izpit	40	Oral exam
Seminarska naloga in predstavitev	20	Seminar paper and oral presentation
Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno.		Each of the mentioned commitments must be assessed with a passing grade.
Pozitivna ocena iz pisnega izpita in pozitivna ocena seminarske naloga sta pogoja za pristop k ustnemu izpitu.		Positive grade of written exam and positive grade of seminar work are prerequisite for access to the oral exam.

**Reference nosilca / Lecturer's references:**

WEI, Zhouchao, ZHU, Bin, YANG, Jing, PERC, Matjaž, SLAVINEC, Mitja. Bifurcation analysis of two disc dynamos with viscous friction and multiple time delays. *Applied mathematics and computation*, ISSN 0096-3003. [Print ed.], 2019, vol. 347, str. 265-281, doi: [10.1016/j.amc.2018.10.090](https://doi.org/10.1016/j.amc.2018.10.090). [COBISS.SI-ID [24361480](https://www.cobiss.si/id/24361480)]

FISTER, Iztok, IGLESIAS, Andres, GÁLVEZ, Akemi, DEL SER, Javier, OSABA, Eneko, FISTER, Iztok, PERC, Matjaž, SLAVINEC, Mitja. Novelty search for global optimization. *Applied mathematics and computation*, ISSN 0096-3003. [Print ed.], 2019, vol. 347, str. 865-881, doi: [10.1016/j.amc.2018.11.052](https://doi.org/10.1016/j.amc.2018.11.052). [COBISS.SI-ID [24211976](https://www.cobiss.si/id/24211976)]

ŪLEN, Simon, GERLIČ, Ivan, SLAVINEC, Mitja, REPNIK, Robert. Evaluating the effectiveness of physlet-based materials in supporting conceptual learning about electricity. *Journal of science education and technology*, ISSN 1059-0145, 2017, vol. 26, iss. 2, str. 151-160, tabele, doi: [10.1007/s10956-016-9661-1](https://doi.org/10.1007/s10956-016-9661-1). [COBISS.SI-ID [22803208](#)]