

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Mehanika kontinuov
Course title:	Mechanics of Continuous Media

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Fizika, 1. stopnja Physics, 1st cycle		3	6

Vrsta predmeta / Course type izbirni/elective

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			120	6

Nosilec predmeta / Lecturer: Mitja Slavinec

Jeziki / Predavanja / Lectures:	slovensko / Slovenian
Languages: Vaje / Tutorial:	slovensko / Slovenian

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

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

Vsaka izmed naštetih obveznosti v načinih ocenjevanja mora biti opravljena s pozitivno oceno. Opravljen projekt je pogoj za pristop k pisnemu izpitu. Pozitiven pisni izpit je pogoj za pristop k ustnemu izpitu.

Prerequisites:

Recommended is preknowledge in the field of mechanics, thermodynamics and mathematical methods in physics.

Each of the listed obligations in the assessment methods must be completed with a positive grade. Completed project is a prerequisite for taking the written exam. A positive grade of the written exam is a prerequisite for taking the oral exam.

Vsebina:

- Deformacije in napetosti v trdnih telesih
- Strižne deformacije
- Statika nosilca, konzole, plošče in oboka

Content (Syllabus outline):

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

- Statika in napetosti v podprtih nosilcih in ploščah
- Napetosti v tlačnih posodah
- Gibalne enačbe za tekočine
- Mehanika tekočin – valovanje na vodni površini

- statics and strains in underpinned carriers and plates
- strains in pressure containers
- equations for fluid motion
- fluid mechanics – waves on water surface

Temeljni literatura in viri / Readings:

- R. Podgornik, Mehanika kontinuov, 2002; prosto dostopno na <http://www-f1.ijs.si/~rudi/lectures/mk-1.9.pdf>
- L.D. Landau, E.M. Lifshitz, Theory of Elasticity, Pergamon Press, New York 1986.
- D.J. Acheson, Elementary fluid dynamics, Clarendon Press, Oxford, 1990.
- T. E. Faber, Fluid dynamics for physicists, Cambridge University Press, Cambridge 1997.

Dodatna literatura / Additional Readings

- P. K. Kundu, Fluid mechanics, Academic Press, San Diego, 1990.
- L.D. Landau, E.M. Lifshitz, Fluid mechanics, Pergamon Press, New York, 1989.
- R.J. Atkin, An introduction to the theory of elasticity, Longman, London, 1980.
- A. 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 teoretično znanje za obravnavo deformacij v trdnih telesih in statike,
- uporabiti enačbe za gibanje tekočin pri obravnavi pojavov v tekočinah,
- uporabiti matematična orodja in metode za reševanje fizikalnih problemov povezanih z deformacijami trdnin in tekočin,
- tvoriti ustrezne matematične modele za reševanje problemov pri izbranih

Intended learning outcomes:

On completion of this course student will be able to:

- use theoretical knowledge to study phenomena of deformations of solids and statics,
- use equation for fluid movement to research mechanics of continuous media,
- use mathematical tools and methods to solve problems in the field of deformation of solids and fluids.
- form appropriate mathematical models to solve problems in the field of fluid

primerih s področja gibanja tekočin, deformacij trdnin in statike, • oblikovati ustrezne robne pogoje matematičnih modelov, • vrednotiti in interpretirati dobljene rezultate in aplikacija v realne sisteme. Prenesljive/ključne spretnosti in drugi atributi: Reševanje fizikalnih in tehničnih problemov z matematičnimi orodji in postopki.	movement, deformation of solids and statics, • formulate boundary conditions for mathematical models, • evaluate and interpret obtained solutions and apply them to realistic systems. Transferable/Key Skills and other attributes: Solution of physical and technical problems using the mathematical tools and methods.
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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.
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Delež (v %) / Weight (in %) Assessment:		
Načini ocenjevanja:		
Pisni izpit	40	Written exam
Ustni izpit	40	Oral exam
Projekt	20	Project

Opombe:

Pisni izpit se lahko nadomesti z dvema pisnima kolokvijema.

Comments:

Written exam can be replaced by two written midterm examinations.

Reference nosilca / Lecturer's references:

HÖLBL, Arbresha, PAL, Kaushik, SLAVINEC, Mitja, KRALJ, Samo. Slave-master mechanism of thermotropic liquid crystal phase transitional behavior. *Physica. B, Condensed matter*. [Print ed.]. Oct. 2022, vol. 642, str. 1-8. ISSN 0921-4526. DOI: [10.1016/j.physb.2022.414142](https://doi.org/10.1016/j.physb.2022.414142). [COBISS.SI-ID [117878531](https://cobiss.si/id/117878531)]

KLEMENČIČ, Eva, ZAVEC PAVLINIČ, Daniela, SLAVINEC, Mitja. Modelling the impact of moisture on the thermal conductivity of cotton jersey. *Fibres & textiles in Eastern Europe : an international magazine devoted to current problems of the textile industries in Central and Eastern Europe*. 2021, vol. 29, iss. 2 (146), str. 61-65. ISSN 1230-3666. <http://www.fibtex.lodz.pl/article2286.html>, DOI: [10.5604/01.3001.0014.6083](https://doi.org/10.5604/01.3001.0014.6083). [COBISS.SI-ID [60647427](https://cobiss.si/60647427)]

LI, Wen-Jing, JIANG, Luo-Luo, CHEN, Zhi, PERC, Matjaž, SLAVINEC, Mitja. Optimization of mobile individuals promotes cooperation in social dilemmas. *Chaos, solitons and fractals*. [Print ed.]. Dec. 2020, vol. 141, str. 1-7. DOI: [10.1016/j.chaos.2020.110425](https://doi.org/10.1016/j.chaos.2020.110425). [COBISS.SI-ID [37159939](https://cobiss.si/37159939)]

HÂNCEAN, Marian-Gabriel, SLAVINEC, Mitja, PERC, Matjaž. The impact of human mobility networks on the global spread of COVID-19. *Journal of complex networks*. [Online ed.]. Dec. 2020, vol. 8, iss. 6, 14 str. ISSN 2051-1329. DOI: [10.1093/comnet/cnaa041](https://doi.org/10.1093/comnet/cnaa041). [COBISS.SI-ID [55149571](https://cobiss.si/55149571)]