| UČNI NAČRT PREDMETA / COURSE SYLLABUS | |
|---|---|
| **Predmet:** | Mehanika kontinuov |
| **Course title:** | Continuum mechanics |

| Študijski program in stopnja<br>Study programme and level | Študijska smer<br>Study field | Letnik<br>Academic year | Semester<br>Semester |
|---|---|---|---|
| Fizika 2. st. | | 1,2 | 2,3 |
| Physics 2nd degree | | 1,2 | 2,3 |

**Vrsta predmeta / Course type** izbirni/ optional

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

| Predavanja<br>Lectures | Seminar<br>Seminar | Sem. vaje<br>Tutorial | Lab. vaje<br>Laboratory work | Teren. vaje<br>Field work | Samost. delo<br>Individ. work | ECTS |
|---|---|---|---|---|---|---|
| 45 | 0 | 15 | 0 | 0 | 90 | **5** |

**Nosilec predmeta / Lecturer:** Mitja Slavinec

| **Jeziki / Languages:** | **Predavanja / Lectures:** | Slovensko / Slovene |
|---|---|---|
| | **Vaje / Tutorial:** | Slovensko / Slovene |

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

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

**Prerequisits:**

preknowledge in the fields 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
- Statika in dinamika navpičnih nosilcev, homogeni in nehomogenih (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

**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
- 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:**


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


**Cilji in kompetence:**

**Objectives and competences:**

| | |
|---|---|
| Študentje ponovijo osnovna matematična orodja in principe ter razširijo uporabo na fizikalne probleme, povezane z deformacijami trdnin in tekočin. Tvorijo ustrezne matematične modele za fizikalne probleme, formulirajo ustrezne robne pogoje in fizikalno interpretirajo dobljene rezultate. | The students refresh their knowledge about several mathematical tools and expand their application to physical problems connected to deformations and fluids. They form appropriate mathematical models for physical problems, formulate boundary conditions and interpret the obtained solutions. |

| **Predvideni študijski rezultati:** | **Intended learning outcomes:** |
|---|---|
| Znanje in razumevanje:<br><br>Kompleksno razumevanje fizikalnih zakonitosti in sposobnost le-te kvantitativno opisati, napovedati in izračunati rezultate.<br>Prenesljive/ključne spretnosti in drugi atributi:<br><br>Reševanje fizikalnih in tehničnih problemov z matematičnimi orodji in postopki. | Knowledge and Understanding:<br><br>Complex understanding of physical laws and ability to qualitatively describe them, predict and calculate results.<br>Transferable/Key Skills and other attributes:<br><br>Solution of physical and technical problems using the mathematical tools and methods. |

| **Metode poučevanja in učenja:** | **Learning and teaching methods:** |
|---|---|
| Postavitev problema, izbira potrebnih matematičnih orodij za reševanje, postavitev matematičnega modela, analitično in numerično reševanje. Interpretacija dobljenih rešitev. | Setting up of a physical problem, selection of appropriate mathematical tools, setting up a mathematical model, finding of an analytical or numerical solution. Interpretation of obtained solutions. |

| **Načini ocenjevanja:** | Delež (v %) / Weight (in %) | **Assessment:** |
|---|---|---|
| Pisni izpit | 40 | Written exam |
| Ustni izpit | 40 | Oral exam |
| Seminarska naloga | 20 | Seminar paper |

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


SLAVINEC, Mitja, CRAWFORD, G. D., KRALJ, Samo, ŽUMER, Slobodan. Determination of the nematic alignment and anchoring strength at the curved nematic-air interface. *J. appl. phys.*, 1997, vol. 81, str. 2153-2156. [COBISS.SI-ID 5769736]

SLAVINEC, Mitja, KRALJ, Samo. Annihilation of nematic point defects within a cylindrical tube = Anihilacija nematičnih točkovnih defektov v cilindrični kapilari. *Znan. rev. (Maribor)*, 1997, letn. 9, št. 1, str. 19-25, ilustr. [COBISS.SI-ID 77702144]

SLAVINEC, Mitja, KRALJ, Samo, ŽUMER, Slobodan. Formation of edge dislocations in the surface constrained smectic a film. *Mol. cryst. liq. cryst. sci. technol., A Mol. cryst. liq. cryst.*, 2000, vol. 351, str. 153-160, ilustr. [COBISS.SI-ID 10579464]

SLAVINEC, Mitja, KRALJ, Samo, ŽUMER, Slobodan, SLUCKIN, T. J. Surface depinning of smectic-A edge dislocations. *Phys. rev., E Stat. phys. plasmas fluids relat.*, 2001, 63, str. 031705-1-031705-6. [COBISS.SI-ID 1277796]

SVETEC, Milan, SLAVINEC, Mitja. Structural transition of nematic liquid crystal in cylindrical capillary as a result of the annihilation of two point defects. *J. chem. phys.*, 2008, vol. 128, no. 8, str. 084704-1-084704-6, ilustr. http://link.aip.org/link/?JCPSA6/128/084704/1, http://dx.doi.org/10.1063/1.2839301. [COBISS.SI-ID 15899400]