



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	<b>Mehanika trdne snovi</b>
<b>Course title:</b>	<b>Mechanics of solid state materials</b>

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
FIZIKA		1. ali 2.	1., 2. ali 3.
PHYSICS		1. or 2.	1., 2. or 3.

**Vrsta predmeta / Course type**

Izbirni za modula Biofizika 3 in Fizika 1, 2, 3

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

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Mentorstvo Mentorship	Samost. delo Individ. work	ECTS
5					145	5

**Nosilec predmeta / Lecturer:**

Milan Ambrožič

**Jeziki /**

**Languages:**

**Predavanja /** slovenski/Slovenian

**Lectures:**

**Vaje / Tutorial:**

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

Predznanje osnovne fizike

**Prerequisites:**

Preknowledge of basic physics

**Vsebina:**

- Osnove iz elastomehanike
- Inženirski in konstrukcijski materiali (kovine, keramika, cementi, beton...): temeljni pojmi o mehanskih lastnostih teh materialov
- Izdelava inženirskih in konstrukcijskih

**Content (Syllabus outline):**

- Fundamentals of elastomechanics
- Engineering and construction materials (metals, ceramics, cement, concrete...): basic facts about mechanical properties of these materials

materialov in njihova optimizacija

• Fabrication of engineering and construction materials and their optimization

### Temeljni literatura in viri / Readings:

- 1) Drago Kolar: Tehnična keramika, Zavod Republike Slovenije za šolstvo in šport, 1993, Ljubljana.
- 2) Neil W. Ashcroft, N. David Mermin: Solid State Physics, Saunders College (W. B. Saunders Company), 1976, Philadelphia.
- 3) Brian Lawn, Fracture of Brittle Solids, Cambridge University Press, 1993, Cambridge.
- 4) C. Kittel: Introduction to Solid State Physics, John Wiley, 2005.
- 5) J. R. Hook, H. E. Hall: Solid State Physics, John Wiley, 1991.

### Cilji in kompetence:

Študentje poglobijo znanje iz mehanskih lastnosti trdne snovi.

### Objectives and competences:

Students acquire advanced knowledge on mechanical properties of solid state materials.

### Predvideni študijski rezultati:

Znanje in razumevanje:

Razumevanje procesov v mehaniki trdnih materialov.

Prenesljive/ključne spretnosti in drugi atributi:

Rešitev problemov z matematičnimi orodji, numeričnimi metodami, univerzalnosti v fiziki in celosten pristop k reševanju problemov.

### Intended learning outcomes:

Knowledge and understanding:

Understanding of processes in solid state materials.

Transferable/Key Skills and other attributes:

Solving of problems with mathematical tools, numerical methods, universalities in physics and gained global approach on solving a problem.

### Metode poučevanja in učenja:

Metodika obsega teoretičen uvod v problematiko in reševanje posameznih problemov.

### Learning and teaching methods:

They are based on theoretical introduction and solving of specific problems.

### Načini ocenjevanja:

Način (pisni izpit, ustno izpraševanje, naloge, projekt)

Seminar

Ustni izpit

Delež (v %) /

Weight (in %) **Assessment:**

Type (examination, oral, coursework, project):

Seminar

Oral exam

**50%**

**50%**

### Reference nosilca / Lecturer's references:

1. AMBROŽIČ, Milan, GORJAN, Lovro, GOMILŠEK, Maša. Bend strength variation of ceramics in serial fabrication. *Journal of the European ceramic society*, ISSN 0955-2219. [Print ed.], 2014,

vol. 34, iss. 7, str. 1873-1879. <http://dx.doi.org/10.1016/j.jeurceramsoc.2013.12.045>. [COBISS.SI-ID 20422664]

2. RANJKESH SIAHKAL, Amid, AMBROŽIČ, Milan, KRALJ, Samo, SLUCKIN, T. J. Computational studies of history dependence in nematic liquid crystals in random environments. *Physical review. E, Statistical, nonlinear, and soft matter physics*, ISSN 1539-3755, 2014, vol. 89, iss. 2, str. 022504-1-022504-14, doi: [10.1103/PhysRevE.89.022504](https://doi.org/10.1103/PhysRevE.89.022504). [COBISS.SI-ID 20347912]
3. RANJKESH SIAHKAL, Amid, AMBROŽIČ, Milan, CORDOYIANNIS, George, KUTNJAK, Zdravko, KRALJ, Samo. History-dependent patterns in randomly perturbed nematic liquid crystals. *Advances in condensed matter physics*, ISSN 1687-8108, 2013, vol. 2013, str. 505219-1-505219-10, doi: [10.1155/2013/505219](https://doi.org/10.1155/2013/505219). [COBISS.SI-ID 26806567]
4. RANJKESH SIAHKAL, Amid, AMBROŽIČ, Milan, SLAVINEC, Mitja. Study of phase transitions and structural order in perturbed nematic liquid crystals = Študij faznega prehoda in strukturnega reda v perturbiranemu nematičnemu tekočemu kristalu. *Anali PAZU*, ISSN 2232-416X, 2013, letn. 3, št. 2, str. 57-67, graf. prikazi. [http://www.anali-pazu.si/sites/default/files/Separat\\_Ranjkesht\\_et.al\\_.pdf](http://www.anali-pazu.si/sites/default/files/Separat_Ranjkesht_et.al_.pdf). [COBISS.SI-ID 20496136]
5. REPNIK, Robert, RANJKESH SIAHKAL, Amid, ŠIMONKA, Vito, AMBROŽIČ, Milan, BRADAČ, Zlatko, KRALJ, Samo. Symmetry breaking in nematic liquid crystals: analogy with cosmology and magnetism. *Journal of physics, Condensed matter*, ISSN 0953-8984, 2013, vol. 25, no. 40, str. 404201-1-404201-10, doi: [10.1088/0953-8984/25/40/404201](https://doi.org/10.1088/0953-8984/25/40/404201). [COBISS.SI-ID 20050952]