

UČNI NAČRT PREDMETA / COURSE SYLLABUS

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|----------------------|------------------------|
| Predmet: | Materiali in ekologija |
| Course title: | Materials and Ecology |

| Študijski program in stopnja Study programme and level | Študijska smer Study field | Letnik Academic year | Semester Semester |
|---|-------------------------------|-------------------------|----------------------|
| Ekotehnologije, 3. stopnja | / | 1 | 1 |
| Ecotechnologies, 3 rd cycle | / | 1 | 1 |

Vrsta predmeta / Course type Izbirni / Elective

Univerzitetna koda predmeta / University course code: EKO3-757

| Predavanja Lectures | Seminar Seminar | Vaje Tutorial | Klinične vaje work | Druge oblike študija | Samost. delo Individ. work | ECTS |
|------------------------|--------------------|------------------|-----------------------|-------------------------|-------------------------------|------|
| 15 | 15 | | | 15 | 105 | 5 |

**Navedena porazdelitev ur velja, če je vpisanih vsaj 15 študentov. Drugače se obseg izvedbe kontaktnih ur sorazmerno zmanjša in prenese v samostojno delo. / This distribution of hours is valid if at least 15 students are enrolled. Otherwise the contact hours are linearly reduced and transferred to individual work.*

Nosilec predmeta / Lecturer: Doc. dr. Srečo Davor Škapin

Jeziki / Predavanja / Lectures: slovenščina, angleščina / Slovenian, English
Languages: Vaje / Tutorial: slovenščina, angleščina / Slovenian, English

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

Zaključen študij druge stopnje naravoslovne ali tehniške smeri ali zaključen študij drugih smeri z dokazanim poznavanjem osnov področja predmeta (pisna dokazila, pogovor).

Prerequisites:

Completed second level studies in natural sciences or engineering or completed second level studies in other fields with proven knowledge of fundamentals in the field of this course (certificates, interview).

Vsebina:

1. Osnove znanosti o materialih:
 - fizikalne in kemijske lastnosti materialov v povezavi z zgradbo, kristalno strukturo in mikrostrukturo.
 2. Vpliv materialov in proizvodnje materialov na okolje:
 - ekološko sporni funkcionalni materiali in njihova alternativa,
 - ekološko sporni procesi proizvodnje materialov in njihova alternativa,
 - ekološko sporni nanomateriali,
 - recikliranje materialov.
 3. Ekološki aspekti v povezavi z materiali za trajnostni razvoj:
 - materiali za obnovljive in trajnostne energetske vire,
 - trajnostni konstrukcijski materiali,
 - trajnostni biomateriali.

Content (Syllabus outline):

1. Basics of materials science:
 - physical and chemical properties of materials in relation to composition, crystal structure and microstructure.
 2. Environmental impact of materials and production of materials:
 - environmentally questionable functional materials and their alternatives,
 - ecologically questionable materials production processes and their alternatives,
 - ecologically questionable nanomaterials
 - recycling of materials.
 3. Ecological aspects in relation to materials for sustainable development:
 - materials for renewable and sustainable energy,
 - sustainable building materials,
 - sustainable biomaterials.

Temeljni literatura in viri / Readings:

W. D. Callister, D. G. Rethwisch. Materials Science and Engineering. John Wiley & Sons (2010). ISBN-13: 978-1118319222.

J. R. Groza, J. F. Shackelford, E. J. Lavernia, M. T. Powers. Materials Processing Handbook. CRC Press (2007). ISBN-13: 978-0849332166.

Y. Gogotsi. Nanomaterials Handbook. CRC Press (2006). ISBN-13: 978-8123902470.

M. Ashby. Materials and Sustainable Development. Butterworth-Heinemann (2015). ISBN-13: 978-0081001769.

F. D. Bloss. Crystallography and Crystal Chemistry: An Introduction. Holt, Rinehart and Winston (1994). ISBN-13: 978-09399950379.

Cilji in kompetence:

Pri predmetu se študenti seznanijo z osnovami vede o materialih in vplivom materialov ter proizvodnje materialov na okolje.

Predmet študente pripravi za raziskovalno in aplikativno delo na področju vpliva materialov na okolje.

Objectives and competences:

In the scope of the course students become acquainted with the basics of materials science and influence of materials and production of materials on environment.

The course prepares students for basic and applied research in the field of environmental impact of materials.

Predvideni študijski rezultati:

Znanje in razumevanje:

- osnov vpliva strukture na funkcionalne lastnosti materialov,
- vpliva materialov in procesov proizvodnje materialov na okolje,
- vpliva nanomaterialov na okolje,
- potrebe po materialih za trajnostni razvoj.

Študent bo na osnovi pridobljenega znanja pridobil sposobnost za raziskovalno in aplikativno delo na področju vpliva materialov na okolje.

Intended learning outcomes:

Knowledge and understanding:

- basics of structure-properties relationship in functional materials,
- influence of materials and their production on environment,
- Influence of nanomaterials on environment
- the need for materials for sustainable development.

The student will be prepared for basic and applied research in the field of environmental impact of materials.

Metode poučevanja in učenja:

- predavanja
- seminarji
- konzultacije

Learning and teaching methods:

- lectures
- seminar work
- consultations

Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

| | | |
|--------------------------------|------|----------------------|
| Ustni izpit | 50 % | Oral exam |
| Predstavitev seminarske naloge | 50 % | Seminar presentation |

Reference nosilca / Lecturer's references:

- SEVER ŠKAPIN, Andrijana, ŠKRLEP, Luka, SUVOROV, Danilo, ŽUNIČ, Vojka, ŠKAPIN, Srečo D. Photocatalytic activity of hierarchically structured, thermally stable, anatase particles. RSC advances, 2015, vol. 5, issue 34, str. 26769-26776.

- ŠKAPIN, Srečo D., ČADEŽ, Vida, SUVOROV, Danilo, SONDI, Ivan. Formation and properties of nanostructured colloidal manganese oxide particles obtained through the thermally controlled transformation of manganese carbonate precursor phase. *Journal of colloid and interface science*, 2015, vol. 457, str. 35-42,
- REMŠKAR, Maja, TAVČAR, Gašper, ŠKAPIN, Srečo D. Sparklers as a nanohazard : size distribution measurements of the nanoparticles released from sparklers. *Air quality, atmosphere & health*, 2015, vol. 8, no. 2, str. 205-211,
- MANDRINO, Djordje, PAULIN, Irena, MAČEK, Marjeta, ŠKAPIN, Srečo D. Physical and chemical treatments influence on the thermal decomposition of a dolomite used as a foaming agent. *Journal of thermal analysis and calorimetry* 2017, vol. 131, str. 1125-1134
- ŠKAPIN, Srečo D., PIRNAT, Urša, JANČAR, Boštjan, SUVOROV, Danilo. Microwave dielectric properties, crystal structure, and microstructure of the $\text{Bi}_3\text{Nb}_{1-x}\text{Ta}_x\text{O}_7$ solid solution. *Journal of the American Ceramic Society*, 2015, vol. 98, no. 12, str. 3818-3823,