Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Nanostrukturirani materiali in polimerni nanokompoziti**
Course title:	**Nanostructured Materials and Polymer Nanocomposites**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
FIZIKA, 3. stopnja		**1. ali 2.**	**1., 2. ali 4.**
PHYSICS, 3rd cycle		**1. or 2.**	**1., 2. or 4.**

Vrsta predmeta / Course type	Izbirni za vse module/ Optional for all modules
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
15					165	6

Nosilec predmeta / Lecturer:	**Sabu Thomas**

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Pogojev ni. Priporočljiva so predznanje s področja kondenzirane materije	None. Recommended is preknowledge of condensed matter science

Vsebina:	**Content (Syllabus outline):**

• Zgodovinski razvoj nanoznanosti in nanotehnologije • Osnovne zakonitosti nanoznanosti • Sinteza nanomaterialov • Karaterizacija nanomaterialov • Aplikacije nanomaterialov Polimerni nanokompoziti	• Historic development of nanoscience and nanotechnology • Fundamental aspects of nanoscience • Synthesis of nanomaterials • Characterization of nanomaterials • Applications of nanomaterials Polymer nanocomposites

Temeljni literatura in viri / Readings:

1. Cao, G. (2004). Nanostructures and nanomaterials: Synthesis, properties and applications. Singapore: World Scientific Publishing Company. ISBN - 1-86094-415-9; 1-86094-480-9; 9786611347444; 1-86094-596-1; 1-281-34744-2; 1-59124-997-X Celotno besedilo dostopno v EBSCOhost Ebook Academic Collection - World Wide.
2. Abe, A. (2005). Inorganic polymeric nanocomposites and membranes [e-knjiga]. Berlin; Heidelberg: Springer. ISBN 978-3-540-31572-8. [COBISS.SI-ID 31603973] https://plus.cobiss.net/cobiss/si/sl/bib/pefmb/31603973
3. Pomogailo, A. D., & Kestelman, V. N. (2005). Metallopolymer nanocomposites [e-knjiga]. Berlin; Heidelberg: Springer. ISBN 978-3-540-26523-8. [COBISS.SI-ID 31195653] https://plus.cobiss.net/cobiss/si/sl/bib/pefmb/31195653
4. Ghosal, K., Augustine, R., Zaszczynska, A., Barman, M., Jain, A., Hasan, A., ... Thomas, S. (2021). Novel drug delivery systems based on triaxial electrospinning based nanofibers. *Reactive and Functional Polymers*, 163, 104895. https://doi.org/10.1016/j.reactfunctpolym.2021.104895

Dodatna literatura / Additional readings:

1. Koo, J. H. (2006). Polymer nanocomposites: Processing, characterization, and applications. New York [etc.]: McGraw-Hill. [COBISS.SI-ID 27635205]
2. Guo, Z., & Tan, L. (2009). Fundamentals and applications of nanomaterials. Boston; London: Artech House. [COBISS.SI-ID 33515269]
3. Cao, G. (2007). Nanostructures & nanomaterials: Synthesis, properties & applications (Reprinted ed.). London: Imperial College Press. [COBISS.SI-ID 15268630]
4. Guo, Z., & Tan, L. (2009). Fundamentals and applications of nanomaterials. Boston; London: Artech House. [COBISS.SI-ID 33515269]
1.

Cilji in kompetence:	**Objectives and competences:**
Študenti pridobijo poglobljeno znanje s področja materialnih znanosti in različnih tehnoloških aplikacij	Students acquire advanced knowledge on material science and various technological application.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Sinteza nanomaterialov in ustezne strategije Prenesljive/ključne spretnosti in drugi atributi: Prilagoditev ustreznih metod za sintezo nanomaterialov. Razumevanje modernih instrumentalnih metod za karakterizacijo nanostrukturiranih materialov in polimernih nanokompozitov.	Knowledge and understanding: Nano materials synthesis methods and strategies Transferable/Key Skills and other attributes: Various methods adopted for the synthesis of Nano materials. Understating of modern instrumental techniques for the characterization of nanostructure materials and polymer nanocomposites

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja in reševanje zastavljenih problemov.	Lectures and solving of defined problems.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
~~Seminar.~~	**50%**	~~Seminar.~~
~~Ustni izpit.~~	**50%**	~~Oral exam.~~
Seminarska naloga		Seminar paper
Ustni izpit		Oral exam

Reference nosilca / Lecturer's references:

~~1.~~

~~*Joseph, T. M., Kar Mahapatra, D., Esmaeili, A., Piszczyk, Ł., Hasanin, M. S., Kattali, M., ... & Thomas, S. (2023). Nanoparticles: Taking a unique position in medicine. Nanomaterials, 13(3), 574. https://doi.org/10.3390/nano13030574*~~

~~*Joseph, B., Sagarika, V. K., Sabu, C., Kalarikkal, N., & Thomas, S. (2020). Cellulose nanocomposites: Fabrication and biomedical applications. Journal of Bioresources and Bioproducts, 5(4), 223-237. https://doi.org/10.1016/j.jobab.2020.10.001*~~

~~*Ghosal, K., Augustine, R., Zaszczynska, A., Barman, M., Jain, A., Hasan, A., ... & Thomas, S. (2021). Novel drug delivery systems based on triaxial electrospinning based nanofibers. Reactive and Functional Polymers, 163, 104895. https://doi.org/10.1016/j.reactfunctpolym.2021.104895*~~

- JOSEPH, T. M., KAR MAHAPATRA, D., ESMAEILI, A., PISZCZYK, Ł., HASANIN, M. S., KATTALI, M., ... THOMAS, S. Nanoparticles: Taking a unique position in medicine. Nanomaterials, 2023, vol. 13, no. 3, art. no. 574. doi: 10.3390/nano13030574.

- JOSEPH, B., SAGARIKA, V. K., SABU, C., KALARIKKAL, N., THOMAS, S. Cellulose nanocomposites: Fabrication and biomedical applications. Journal of Bioresources and Bioproducts, 2020, vol. 5, no. 4, str. 223–237. doi: 10.1016/j.jobab.2020.10.001.

- GHOSAL, K., AUGUSTINE, R., ZASZCZYNSKA, A., BARMAN, M., JAIN, A., HASAN, A., ... THOMAS, S. Novel drug delivery systems based on triaxial electrospinning based nanofibers. Reactive and Functional Polymers, 2021, vol. 163, art. no. 104895. doi:10.1016/j.reactfunctpolym.2021.104895.