



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		1. ali 2.	1., 2. ali 4.
PHYSICS		1. or 2.	1., 2. or 4.

Vrsta predmeta / Course type

Izbirni za vse module

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Mentorstvo Mentorship	Samost. delo Individ. work	ECTS
15					165	6

Nosilec predmeta / Lecturer:

Sabu Thomas

**Jeziki /
Languages:**

**Predavanja /
Lectures:** angleško/English

Vaje / Tutorial:

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

Predznanje s področja kondenzirane materije

Prerequisites:

Pre-knowledge of condensed matter science

Vsebina:

- Zgodovinski razvoj nanoznanosti in nanotehnologije
- Osnovne zakonitosti nanoznanosti
- Sinteza nanomaterialov
- Karakterizacija nanomaterialov
- Aplikacije nanomaterialov
- Polimerni nanokompoziti

Content (Syllabus outline):

- 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. Nanostructures and Nanomaterials: Synthesis, Properties, and Applications, Guozhong Cao, Ying Wang, Imperial College Press, London, 2004.
2. Nanotechnology: Importance and Applications- M.H. Fulekar, International Publishing House Pvt. Ltd., New Delhi, 2010
3. Fundamentals and Applications of Nanomaterials- Zhen Guo, Li Tan, Artech House, Boston, 2009
4. Polymer Nanocomposites: Processing, Characterization, And Applications- Joseph Koo, McGraw Hill Professional, 2006
5. Nanomaterials: Synthesis, Properties and Applications, Second Edition edited by A.S Edelstein, R.C Cammaratra, Taylor&Francis Group, New York, 1996

Cilji in kompetence:

Študenti pridobijo poglobljeno znanje s področja materialnih znanosti in različnih tehnoloških aplikacij

Objectives and competences:

Students acquire advanced knowledge on material science and various technological application.

Predvideni študijski rezultati:

Znanje in razumevanje:

Sinteza nanomaterialov in ustezne strategije

Prenosljive/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:

Predavanja in reševanje zastavljenih problemov.

Learning and teaching methods:

Lectures and solving of defined problems.

Načini ocenjevanja:

Delež (v %) /

Weight (in %) **Assessment:**

Način (pisni izpit, ustno izpraševanje, naloge, projekt)		Type (examination, oral, coursework, project):
Seminar	50%	Seminar
Ustni izpit	50%	Oral exam

Reference nosilca / Lecturer's references:

1. Meldrums Acid Modified Cellulose Nanofiber-Based Polyvinylidene Fluoride Microfiltration Membrane for Dye Water Treatment and Nanoparticle Removal, Gopakumar D. A., Pasquini, D., Henrique, M. A., Luis, de Morais., C. Grohens Y. and **Thomas, S.**,(2017) ACS sustainable chemistry and Engineering, DOI: 10.1021/acssuschemeng.6b02952
2. A high-performance BaTiO₃-grafted-GO-laden poly (ethylene oxide)-based membrane as an electrolyte for all-solid lithium-batteries Angulakshmi, N., Kar, G. P., Bose, S., Gowd, E. B., **Thomas, S.**, & Stephan, A. M. (2017).. Materials Chemistry Frontiers.
3. Electrochemical studies on composite gel polymer electrolytes for lithium sulfur-batteries Natarajan, A., Stephan, A. M., Chan, C. H., Kalarikkal, N., & **Thomas, S.** (2017). Journal of Applied Polymer Science, 134(11).
4. Enhanced photocatalytic performance of ZnO nanostructures produced via a quick microwave assisted route for the degradation of rhodamine in aqueous solution. Thankachan, R. M., Joy, N., Abraham, J., Kalarikkal, N., **Thomas, S.**, & Oluwafemi, O. S. (2017). Materials Research Bulletin, 85, 131-139.
5. Presence of Vacuoles in Natural Rubber/Cloisite 15A Nanocomposites. Didović, M. P., Klepac, D., Meera, A. P., **Thomas, S.**, & Valić, S. (2017). Journal of applied polymer science.
6. Smart in-plane switching of nano-wires embedded liquid crystal matrix, K. Pala, H.J. Maria, **S. Thomas**, M.L.N.M. Mohan, (2017). Organic Electronics, 42, 256–268