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. 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:	**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. Ustni izpit.	**50%** **50%**	Seminar. 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 BaTiO 3-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