UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Materiali in tehnologije
Course title:	Materials and technologies

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Znanost o materialih (2. stopnja)	**/**	**2**	**3**
Materials science (2nd level)	**/**	**2**	**3**

Vrsta predmeta / Course type	obvezni / mandatory
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
25	**0**	**5**	**0**	**10**	**120**	**6**

Nosilec predmeta / Lecturer:	prof. dr. Nataša Novak Tušar

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Potrebno predhodno znanje, ki ga študentje pridobijo pri predmetu Kemija materialov.	Required prerequisit knowledge from courses: Materials chemistry.

Vsebina:	**Content (Syllabus outline):**
1. Materiali 1.1 Delitev materialov kovine, nekovine, kompozitni materiali 1.2 Lastnosti materialov kemijske, fizikalne, mehanske, tehnološke 1.3 Klasični izdelovalni postopki 1.4 Sodobni izdelovalni postopki 2. Osnove tehnološkega postopka 2.1 Proizvodna linija 2.2 Proizvodno tehnične operacije 2.3 Stroji in aparature	1. Materials 1.1 Division of Materials metals, non-metals, composite materials 1.2 Properties of materials chemical, physical, mechanical, technological 1.3 Classical manufacturing processes 1.4 Modern manufacturing processes 2. Basics of technological process 2.1 Production line 2.2 Production and technical operations 2.3 Machinery and apparatus

2.4 Tehnike merjenja in regulacije	2.4 Techniques of measurement and regulation
3. Osnovne tehnologije	3. Basic technologies
3.1 Tehnologije kovinskih in nekovinskih materialov.	3.1 Technologies of metallic and non-metallic materials
Pridobivanje osnovnih kovin in nekovin ter njihovih spojin in njihova nadaljna predelava v potrošniške produkte (npr. jeklo, cement).	Acquisition of base metals, non-metals and their compounds as well as further acquisition of consumer products (e.g. steel, cement).
3.2 Tehnologije rafinerij in biorafinerij	3.2 Technologies of rafineries and biorafineries
Pridobivanje osnovnih kemikalij in intermediatov iz nafte in biomase ter njihova nadaljna predelava v potrošniške produkte (npr. plastične mase, zdravila).	Acquisition of basic chemicals and intermediates from oil and biomass as well as further acquisition of consumer products (eg. plastics, pharmaceuticals).
4. Integrirana zaščita okolja v tehnološkem postopku	4. Integrated environmental protection in technological process
4.1 Zmanjševanje odpadkov	4.1 Waste reduction
4.2 Uporaba odpadkov kot surovine v drugih procesih	4.2. Use of wastes as raw materials in other processes
4.3 Ravnanje z odpadki	4.3 Waste management
4.3.1 Trdni odpadki	4.3.1 Solid waste
4.3.2 Odpadna voda	4.3.2 Wastewater
4.3.3 Odpadni zrak	4.3.3 Waste gas
5. Osnove načrtovanja novega proizvoda	5. New product design
5.1 Potreba	5.1 Need
5.2 Ideja	5.2 Idea
5.3 Izbira	5.3 Choice
5.4 Proizvodnja	5.4 Production
6. Izobraževanje na terenu (ekskurzija v tovarno)	6. Education on-site (field trip to the factory)

Temeljna literatura in viri / Readings:

- E. Ignatowitz, Kemijska tehnika, Založništvo Jutro, Ljubljana, 1996
- S.Kalpakjian, S.Schmid, Manufacturing processes for engineering materials, Prentice Hall, 2008
- E.L. Cussler, G.D. Moggridge, Chemical Product Design, Cambridge University Press, 2001
- Izbrane spletne strani in pregledni znanstveni članki za posamezna področja

Cilji in kompetence:	Objectives and competences:
Cilji: Cilj predmeta je študente naučiti razumevanja osnovnih sodobnih materialov in tehnologij, integrirane zaščite okolja v tehnološkem postopku in načrtovanja novega produkta. Obravnavana snov je dopolnjena s številnimi praktičnimi primeri in ekskurzijo. Študentje v okviru predmeta pripravijo seminar, ki podrobneje osvetli eno izmed obravnavanih tem. Študenti pridobijo naslednje kompetence: Okolju prijazno in ekonomično upravljanja s sodobnimi tehnologijami.	**Aims:** The aim of this course is to teach the students understanding of basic modern materilas and technologies, integrated environmental protection in technological process and new product design. Discussed issues are complemented by a number of practical examples and excursion. Students in this course prepare seminar, with a more detailed discussion on the issues addressed. Students will acquire the following competences: Environmentally-friendly and economical management of modern technologies.

Predvideni študijski rezultati:	Intended learning outcomes:
Znanje in razumevanje: Razumevanje osnovnih lastnosti materialov. Razumevanje sodobnih tehnologij. Znanje o integrirani zaščiti okolja v tehnološkem postopku. Znanje o načrtovanju novega produkta.	Knowledge and understanding: Understanding of basic characteristics of materials. Understanding of modern technologies. Knowledge of integrated environmental protection in technological process. Knowledge of new product design.

Metode poučevanja in učenja:	Learning and teaching methods:
• Predavanja • Predstavitev seminarja ostalim študentom	• Lectures • Presentation of seminary to other students

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
• Pisni izpit iz teorije	80	• Written exam from theory.
• Javna predstavitev in zagovor seminarja	20	• Public presentation and defense of seminar work

Reference nosilca / Lecturer's references:

Prof. dr. Nataša Novak Tušar:

Izredna profesorica za področje kemije na Univerzi v Novi gorici
Associate Professor for Chemistry at the University of Nova Gorica

Nataša Novak Tušar je vodja skupine za katalizo v Laboratoriju za anorgansko kemijo in tehnologijo na Kemijskem inštitutu v Ljubljani. Trenutno se pri svojih raziskavah osredotoča na razvoj novih katalizatorjev za izboljšanje proizvodnih sistemov okoljskih tehnologij kot so pridobivanje kemikalij in goriv iz biomase ter čiščenje vode in zraka.
Nataša Novak Tušar is a group leader for catalysis in the Laboratory for Inorganic Chemistry and Technology at the National Institute of Chemistry in Ljubljana. Her current research focuses on development of new catalysts for improving manufacturing systems for environmental technologies (production of chemicals and fuels from biomass and purification of water and air).

Izbrane objave / Selected bibliography:

1. ŠULIGOJ, Andraž, LAVRENČIČ ŠTANGAR, Urška, RISTIĆ, Alenka, MAZAJ, Matjaž, VERHOVŠEK, Dejan, NOVAK TUŠAR, Nataša. TiO [sub] 2-SiO [sub] 2 films from organic-free colloidal TiO [sub] 2 anatase nanoparticles as photocatalyst for removal of volatile organic compounds from indoor air. *Applied catalysis. B, Environmental*, ISSN 0926-3373. [Print ed.], May 2016, vol. 184, str. 119-131, ilustr. doi: 10.1016/j.apcatb.2015.11.007. [COBISS.SI-ID 5823258]
IF = 7.43

2. BIRSA ČELIČ, Tadeja, GRILC, Miha, LIKOZAR, Blaž, NOVAK TUŠAR, Nataša. In situ generation of Ni nanoparticles from metal-organic framework precursors and their use for biomass hydrodeoxygenation. *ChemSusChem*, ISSN 1864-564X. Online izd., May 2015, vol. 8, iss. 10, str. 1703-1710. doi: 10.1002/cssc.201403300. [COBISS.SI-ID 5667866]
IF = 7.66

3. LAPORNIK, Vida, NOVAK TUŠAR, Nataša, RISTIĆ, Alenka, KUMAR CHELLAPPAN, Rajesh, FOIX, Dominique, DEDRYVÈRE, Rémi, GABERŠČEK, Miran, DOMINKO, Robert. Manganese modified zeolite silicalite-1 as polysulphide sorbent in lithium sulphur batteries. *Journal of power sources*, ISSN 0378-7753, Jan. 2015, vol. 274, str. 1239-1248. doi: 10.1016/j.jpowsour.2014.10.184. [COBISS.SI-ID 5591322]
IF = 6.22

4. POPOVA, Margarita, SZEGEDI, Agnes, RISTIĆ, Alenka, NOVAK TUŠAR, Nataša. Glycerol acetylation on mesoporous KIL-2 supported sulphated zirconia catalysts. *Catalysis science & technology*, ISSN 2044-4753, Nov. 2014, vol. 4, iss. 11, str. 3993-4000. doi: 10.1039/C4CY00548A. [COBISS.SI-ID 5518362]
IF = 5.43

5. POPOVA, Margarita, RISTIĆ, Alenka, LAZAR, Karoly, MAUČEC, Darja, VASSILEVA, Mihaela, NOVAK TUŠAR, Nataša. Iron-functionalized silica nanoparticles as a highly efficient adsorbent and catalyst for toluene oxidation in the gas phase. *ChemCatChem*, ISSN 1867-3880, 2013, vol. 5, issue 4, str. 986-993, doi: 10.1002/cctc.201200562. [COBISS.SI-ID 5150746]
IF = 5.04

6. NOVAK TUŠAR, Nataša, MAUČEC, Darja, RANGUS, Mojca, ARČON, Iztok, MAZAJ, Matjaž, COTMAN, Magda, PINTAR, Albin, KAUČIČ, Venčeslav. Manganese functionalized silicate nanoparticles as a fenton-type catalyst for water purification by advanced oxidation processes (AOP). *Adv. funct. mater. (Print)*, 2012, vol. 22, issue 4, str. 820-826. doi: 10.1002/adfm.201102361. [COBISS.SI-ID 4863514]
IF = 9.77