BIOINŽENIRING V ZDRAVSTVU – TEORETIČNI PREDMETI

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Bioznanost in kirurgija
Course title:	Biosciences and surgery

Študijski programi in stopnja	Študijska smer	Letnik	Semestri
Bioznanosti, tretja stopnja, doktorski	Ni členitve (študijski program)		Celoletni

Univerzitetna koda predmeta/University course code:	0640280

Predavanja	Seminar	Vaje	Klinične vaje	Druge oblike študija	Samostojno delo	ECTS
10	15	5	0	0	95	5

Nosilec predmeta/Lecturer:	Saba Battelino

Izvajalci predavanj:	Saba Battelino, Drago Dolinar
Izvajalci seminarjev:	
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type:	teoretični /theoretical

Jeziki/Languages:	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Diplomanti enovitih magistrskih študijskih programov in študijskih programov 2. stopnje s področja biomedicinskih, biotehniških znanosti. Splošni pogoji za vpis na doktorski študij.	Graduates of unified master's degree programs and 2nd degree programs of biomedical and biotechnical sciences. General conditions for enrollment in doctoral studies.

Vsebina:	Content (Syllabus outline):

1. Pregled najpogostejših kirurških načinov zdravljenja bolezni ušes ter lateralne in sprednje lobanjske baze 2. Pregled vloge tujih in telesu lastnih materialov in substanc v otorinolaringologiji 3. Sestava, priprava in uporaba plazme, bogate s trombociti in zunajceličnimi vezikli v medicini. 4. Pregled uporabe mitomicina v zdravljenju zoženosti zunanjega sluhovoda 5. Pregled uporabe vsadkov v otorinolaringologiji 1. polžev vsadek 2. kostno-vsidran slušni pripomoček 6. Merila za oceno izida zdravljenja 1. objektivna: merjenje površin, klinični točkovniki, itd.. 2. subjektivna: merila za oceno z zdravjem povezane kakovosti življenja 7. Pregled najpogostejših biokompatibilnih materialov in novih tehnologij v ortopedski kirurgiji 8. Pregled pojavov na površinah brezcementnih endoprotez kolka (omočljivost, hrapavost in odziv celic) 9. Pregled procesov osteointegracije deponiranih multifunkcijskih nanostrukturiranih plasti na površini kovinskih biokompatibilnih materialov z namenom izboljšati osteointegracijo vsadka s kostjo.	1. An overview of the most common surgical treatments for ear disease and the lateral and anterior skull-base 2. Review of the role of foreign and the body's own materials and substances in otorhinolaryngology 3. Composition, preparation and use of platelet-rich plasma and extracellular vesicles in medicine. 4. Review of the use of mitomycin in the treatment of external auditory canal narrowing 5. Review of the use of implants in otorhinolaryngology 1. cochlear implant 2. bone-anchored hearing aid 6. Criteria for assessing treatment outcome 1. objective: surface measurement, clinical scores etc. 2. subjective: health-related quality of life questionnaires 7. An overview of the most common biocompatible materials used in orthopedic surgery j 8. Review of phenomena the surface of uncemented hip endoprostheses (surface wetting and roughness and cell response) 9. Review of osteointegration proceses of multifuncion coatings on nanostructructured surface of metalliic materials with the aim to improve osteointegration between implant and bone.

Temeljna literatura in viri/Readings:

- Battelino S. Avdiometrija, vestibulometrija in avdiološka elektroakustika v vsakdanji praksi: učbenik za tečajnike avdiometrije in vestibulometrije, avdiološke elektroakustike, logopede, študente splošne in dentalne medicine, specializante otorinolaringologije, klinične logopedije in nevrologije ter specializante medicine dela, prometa in športa [Internet]. Katedra za otorinolaringologijo Medicinske fakultete; 2017.
- Battelino S, Hocevar-Boltezar I, Zargi M. Intraoperative use of mitomycin C in fibrous atresia of the external auditory canal. Ear Nose Throat J. 2005 Dec;84(12):776-9. PMID: 16408556.
- Vozel D, Steiner N, Božanić Urbančič N, Mladenov D, Battelino S. Slovenian Cross-Cultural Adaptation and Validation of Health-Related Quality of Life Measures for Chronic Otitis Media (COMQ-12), Vertigo (DHI, NVI) and TINNITUS (THI). Zdr Varst. 2020 Jun 25;59(3):120-127. doi: 10.2478/sjph-2020-0016. PMID: 32952712; PMCID: PMC7478096.
- Vozel D, Božič D, Jeran M, Jan Z, Pajnič M, Pađen L, idr. Treatment with platelet- and extracellular vesicle-rich plasma in otorhinolaryngology-a review and future perspectives. V: Advances in Biomembranes and Lipid Self-Assembly [Internet]. Academic Press; 2020. Dostopno na: http://www.sciencedirect.com/science/article/pii/S2451963420300224
- Vozel D, Battelino S. Preparation of platelet- and extracellular vesicle-rich gel and its role in the management of cerebrospinal fluid leak in anterior and lateral skull-base surgery. V: Zbornik recenziranih prispevkov [Internet]. Ljubljana: Zdravstvena fakulteta; 2020. str. 47–58. Dostopno na:

http://www2.zf.uni-lj.si/images/stories/datoteke/Zalozba/Sokratska_2019.pdf, https://repozitorij.uni-lj.si/IzpisGradiva.php?id=113167&lang=slv
- Vozel D, Božič D, Jeran M, Jan Z, Pajnič M, Pađen L, idr. The role of platelet-and extracellular vesicle-rich plasma in the treatment of temporal bone cavity inflammation : a randomized controlled trial. V: Zbornik recenziranih prispevkov [Internet]. Ljubljana: Zdravstvena fakulteta; 2020. str. 41–52. Dostopno na: https://repozitorij.uni-lj.si/IzpisGradiva.php?id=113109&lang=slv
- DOLINAR, Drago. Novosti v endoprotetiki kolčnega in kolenskega sklepa. V: PAVLOVČIČ, Vinko (ur.). *Novosti v ortopediji*. Ljubljana: Ortopedska klinika, Klinični center. 2008, str. 99-105. [COBISS.SI-ID 24231129]
- LOTRIČ-FURLAN, Stanka, DOLINAR, Drago, KOŠAK, Robert, KOTAR, Tadeja. Kirurške okužbe sklepov in kosti = Surgical infections of joints and bones. V: BEOVIĆ, Bojana (ur.), STRLE, Franc (ur.), ČIŽMAN, Milan (ur.). *Zbornik predavanj : [okužbe, ki potrebujejo kirurško zdravljenje]*. Ljubljana: Sekcija za kemoterapijo SZD: Klinični center, Klinika za infekcijske bolezni in vročinska stanja: Univerza v Ljubljani, Medicinska fakulteta, Katedra za infekcijske bolezni in epidemiologijo. 2007, str. 185-201. [COBISS.SI-ID 23114201]
- Park J. B., & Bronzino J. D.(eds.) (2003) "Biomaterials Principles and Applications", CRC Press Beer F., Johnston E., & Dewolf J. (2001) "Mechanics of Materials" 3rd Edition McGraw- Hill

Budinski K. G., & Budinski M. K.(2001) Edition, "Engineering Materials Properties and Selection" 7th Edition, Prentice Hall.
- Benham P. P., Crawford R. J., & Armstrong C. G.(1996) "Mechanics of Engineering Materials" 2nd Edition, Addison Wesley Longman LTD
- Bronzino J. D. (Ed) (1999), "The Biomedical Engineering Handbook", 2nd Edition

Cilji in kompetence:	Objectives and competences:
Spoznava uporabe biokemičnih, bioaktivnih pripravkov, mehanskih ter elektromagnetnih vsadkov ter pripravkov iz telesnih tekočin ljudi pri izboljševanju rezultatov klasičnih kirurških tehnik na področju: • Kroničnih vnetij senčnične kosti • Zdravljenju kroničnih vnetij srednjegta ušesa • Zagotavljanju sluha gluhim osebamo • Zapori oparativnih pristopov na stranski in sprednji lobanjski bazi. Študent pridobi osnovno znanje za razumevanje na področju bio inženirskih materialov in tkiv za aplikacije v ortopedski kirurgiji in rehabilitaciji	Learns about the use of biochemical, bioactive preparations, mechanical and electromagnetic implants and preparations from human body fluids in improving the results of classical surgical techniques in the field of: • Chronic temporal bone inflammation • Treatment of chronic otitis media • Hearing rehabilition in deaf people • Closure of surgical approaches to the lateral and anterior skull-base. Student get the basic knowledge and understanding in the field of bio engineering materials and tissues for the applications in orthopredic surgery and rechabilitation

Predvideni študijski rezultati:	Intended learning outcomes:
Znanje in razumevanje: • Interdisciplinarni znanstveni pristopi pri kirurškem zdravljenju • Pomen izboljševanja klasičnih kirurških tehnik • Metode sledenja kirurškim rezultatov • Identifikacija neuspehov klasičnih kirurških tehnik • Iskanje področij in načinov za izboljševanje končnih rezultatov • Metode sledenja kirurškh rezultatov na osnovi raziskav predčasno odpovedanih endoprotez kolka in kolena	Knowledge and understanding: • Interdisciplinary scientific approaches in surgical treatment • The importance of improving classical surgical techniques • Methods of tracking surgical results • Identification of failures of classical surgical techniques • Finding areas and ways to improve the treatment outcome

• Iskanje novih kombinacij biomaterialov za izboljšanje dobe trajanja vsadkov	--Methods of following surgical results on the base of the investigations of prematurely failed hip and knee endoprosthesis Finding new biomaterials combiinations with the aim to improve lifetime of implants

Metode poučevanja in učenja:	Learning and teaching methods:
Predavanja, diskusijske delavnice predstavljenih seminarjev Demostracija že vpeljanih biomedicinskih metod v kirurgiji Predstavitev dosedaj obstoječe literature Seznanitev z potekajočimi raziskavami Smernice za nadaljne razvijanje področja	Lectures, discussion workshops of presented seminars Demonstration of already introduced biomedical methods in surgery Presentation of existing literature Familiarization with ongoing research Guidelines for further development of the field

Načini ocenjevanja:	Delež/Weight	Assessment:
Ustni in ali pisni izpit	50,00 %	Written or oral examination;
Priprava in zagovor seminarja	20,00 %	Written seminar and its presentation;
Vsebinska priprava manjšega projekta	30,00 %	Preparation of the short project.

Reference nosilca/Lecturer's references:

Saba Battelino

- Vozel D, Steiner N, Božanić Urbančič N, Mladenov D, Battelino S. Slovenian Cross-Cultural Adaptation and Validation of Health-Related Quality of Life Measures for Chronic Otitis Media (COMQ-12), Vertigo (DHI, NVI) and TINNITUS (THI). Zdr Varst. 2020 Jun 25;59(3):120-127. doi: 10.2478/sjph-2020-0016. PMID: 32952712; PMCID: PMC7478096.
- Orzan E, Muzzi E, Marchi R, Falzone C, Battelino S, Ciciriello E. Achieving early functional auditory access in paediatric cochlear implantation. Acta Otorhinolaryngol Ital. 2016 Feb;36(1):45-50. doi: 10.14639/0392-100X-1075. Epub 2016 Feb 29. PMID: 27054390; PMCID: PMC4825059.
- Kordiš Š, Vozel D, Hribar M, Urbančič NB, Battelino S. The Outcome of Prompt Concomitant Single-Dose High-Concentration Intratympanic and Tapered Low-Dose Oral Systemic Corticosteroid Treatment for Sudden Deafness. J Int Adv Otol. 2020;16(2):201-206. doi:10.5152/iao.2020.8341
- Zupan A, Fakin A, Battelino S, Jarc-Vidmar M, Hawlina M, Bonnet C, Petit C, Glavač D. Clinical and Haplotypic Variability of Slovenian USH2A Patients Homozygous for the c. 11864G>A Nonsense Mutation. Genes. 2019; 10(12):1015. https://doi.org/10.3390/genes10121015
- Klarendic M, Hribar M, Urbancic NB, Zupancic N, Kramberger MG, Trost M, idr. Central nystagmus in progressive supranuclear palsy: A neglected clinical feature? Parkinsonism & Related Disorders. 1. marec 2021;84:15–22.
- Fakin A, Šuštar M, Brecelj J, Bonnet C, Petit C, Zupan A, Glavač D, Jarc-Vidmar M, Battelino S, Hawlina M. Double Hyperautofluorescent Rings in Patients with USH2A-Retinopathy. Genes. 2019; 10(12):956. https://doi.org/10.3390/genes10120956

Drago Dolinar

- BOŠNJAK, Klemen, KOCJANČIČ, Boštjan, DOLINAR, Drago, POMPE, Borut. The use of an intra-oral scanner for patellar surface analysis in total knee arthroplasty = Uporaba intraoralnega skenerja za analizo površin pogačice pri totalni artroplastiki kolena. *Materiali in tehnologije*, ISSN 1580-2949. [Tiskana izd.], 2021, vol. 55, iss. 1, str. , doi: 10.17222/mit.2020.115
- AVSEC, Klemen, CONRADI, Marjetka, JENKO, Monika, KOCJANČIČ, Boštjan, DEBELJAK, Mojca, GORENŠEK, Matevž, DOLINAR, Drago. Effect of sterilization on the surface properties of Ti6Al7Nb alloy femoral stems = Vpliv sterilizacije na površinske lastnosti femoralnih kolčnih komponent endoprotez iz Ti6Al7Nb zlitine. *Materiali in tehnologije*, ISSN 1580-2949. [Tiskana izd.], 2021, vol. 55, no. 1, str. 59-64, , doi: 10.17222/mit.2020.141

- JENKO, Monika, GODEC, Matjaž, KOCIJAN, Aleksandra, RUDOLF, Rebeka, DOLINAR, Drago, OVSENIK, Maja, GORENŠEK, Matevž, ZAPLOTNIK, Rok, MOZETIČ, Miran. A new route to biocompatible Nitinol based on a rapid treatment with H2/O2H2/O2 gaseous plasma. *Applied Surface Science*, ISSN 0169-4332. [Print ed.], April 2019, vol. 473, str. 976-984, doi:
- AVSEC, Klemen, JENKO, Monika, CONRADI, Marjetka, KOCIJAN, Aleksandra, VESEL, Alenka, KOVAČ, Janez, GODEC, Matjaž, BELIČ, Igor, ŠETINA, Barbara, DONIK, Črtomir, GORENŠEK, Matevž, KOCJANČIČ, Boštjan, DOLINAR, Drago. Surface properties of retrieved cementless femoral hip endoprostheses produced from a Ti6Al7Nb alloy. *Coatings*, ISSN 2079-6412, December 2019, vol. 9, iss. 12, str. 1-15, , doi: 10.3390/coatings9120868.
- MOLIČNIK, Andrej, JANŠA, Jošt, KOCJANČIČ, Boštjan, KRALJ-IGLIČ, Veronika, DOLINAR, Drago. Secondary hip dysplasia increases risk for early coxarthritis after Legg-Calve-Perthes disease. A study of 255 hips. *Computer methods in biomechanics and biomedical engineering*, ISSN 1025-5842, 2019, vol. 22, no. 14, str. 1107-1115, ilustr., doi: 10.1080/10255842.2019.1634193.
- KOCJANČIČ, Boštjan, LAPOŠA, Andrej, DOLINAR, Drago. The importance of sonication and pre-operative antimicrobial therapy = Pomen sonikacije pri predoperativni antibiotični terapiji. *Materiali in tehnologije*, ISSN 1580-2949. [Tiskana izd.], 2019, letn. 53, št. 6, str. 913-918, , doi: 10.17222/mit.2019.130
- DOLINAR, Drago, GORENŠEK, Matevž, JENKO, Monika, GODEC, Matjaž, ŠETINA, Barbara, DONIK, Črtomir, KOCIJAN, Aleksandra, DEBELJAK, Mojca, KOCJANČIČ, Boštjan. Biomaterials in endoprosthetics = Biomateriali v endoprotetiki. *Materiali in tehnologije*, ISSN 1580-2949. [Tiskana izd.], jan.-feb. 2018, letn. 52, št. 1, str. 89-98, doi: 10.17222/mit.2017.196.
- KOCJANČIČ, Boštjan, SUHODOLČAN, Lovro, AVSEC, Klemen, GODEC, Matjaž, ŠETINA, Barbara, DONIK, Črtomir, JENKO, Monika, DOLINAR, Drago. Impaction grafting of large acetabular defects = Rekonstrukcija velikih acetabularnih defektov z metodo impaktiranja kostnih presadkov. *Materiali in tehnologije*, ISSN 1580-2949. [Tiskana izd.], nov.-dec. 2018, letn. 52, no. 6, str. 695-702, ilus, doi: 10.17222/mit.2018.036.
- JENKO, Monika, GORENŠEK, Matevž, GODEC, Matjaž, HODNIK, Maxinne, ŠETINA, Barbara, DONIK, Črtomir, GRANT, John T., DOLINAR, Drago. Surface chemistry and microstructure of metallic biomaterials for hip and knee endoprostheses. *Applied Surface Science*, ISSN 0169-4332. [Print ed.], Avg. 2017, vol. 427, str. 584-doi: 10.1016/j.apsusc.2017.08.007.,

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Biokompatibilni materiali
Course title:	Biocompatible materials

Študijski programi in stopnja	Študijska smer	Letnik	Semestri
Bioznanosti, tretja stopnja, doktorski	Bioinženiring v zdravstvu		Celoletni

Univerzitetna koda predmeta/University course code:	3769

Predavanja	Seminar	Vaje	Klinične vaje	Druge oblike študija	Samostojno delo	ECTS
10	15	10	0	0	90	5

Nosilec predmeta/Lecturer:	Monika Jenko

Izvajalci predavanj:	Monika Jenko
Izvajalci seminarjev:	
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type:	teoretični/theoretical

Jeziki/Languages:	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Splošni pogoji za vpis na doktorski študij	General conditions for enrolment in doctoral studies.

Vsebina:	Content (Syllabus outline):
Sodobni trendi na področju biomaterialov (implanti kot podlaga za vzgojo celičnih kultur, kompatibilnost biomaterialov, tehnike za moduliranje biokompatibilnosti)	Modern trends in biomaterials (implants as a basis for bringing cell cultures compatibility of biomaterials, techniques to modulate the biocompatibility)

Temeljna literatura in viri/Readings:
Znanstveni članki na tem področju/ state of the art papers.

Cilji in kompetence:	Objectives and competences:
Osnovni cilj predmeta je podati študentom teoretična in praktična znanja s področja tehnik za študij biokompatibilnosti in moduliranje biokompatibilnosti.	The main objective of the course is to give students theoretical and practical knowledge in the field of biocompatibility and its modulation.

Predvideni študijski rezultati:	Intended learning outcomes:
Znanje in razumevanje na področju inženirskih materialov in tkiv.	Knowledge and understanding in the field of engineered materials and tissues.

Metode poučevanja in učenja:	Learning and teaching methods:
• Predavanja • Individualno delo na projektih • Predstavitve in interpretacije rezultatov projektov ostalim študentom v skupini v seminarski obliki • Diskusija o objavljenih člankih iz izbranih tem (kritično vrednotenje znanstvene literature, predstavitev »case studies«)	• lectures • Individual project work • Presentation and interpretation of results of project work to the other students in open discussion • Journal club – discussion of published research articles on selected topics (critical evaluation of scientific literature, presentation of the "case studies")

Načini ocenjevanja:	Delež/Weight	Assessment:
Preverjanje znanja poteka v obliki projektne naloge na realnih primerih iz raziskovalne prakse, v kateri študentje pripravijo rešitve za izbrani predlog raziskovalnega projekta. Projektne naloge oddajo v pisni obliki in jih zagovarjajo v ustni obliki, v diskusiji z nosilcem predmeta in sodelujočimi profesorji ter ostalimi študenti.	50,00 %	During the course students prepare individual projects of real cases from research practice, where students prepare solutions for determined research project proposal. They prepare final project work and defend it in the classroom in discusion with professors and other students.
Študent pripravi tudi seminar iz tematike doktorata v povezavi z eno od vsebin predmeta. Pri tem sodelujeta mentor in nosilec predmeta oz. drugi izvajalci predmeta. Zagovor opravlja študent pred mentorjem in nosilcem in/ali drugim izvajalcem.	50,00 %	Student prepares a doctoral seminar on the topic related to one of the course. In this cooperate menthor and lecturer or/and other professors. Student defend the seminar in front of mentor and lecturer and/or other professors.

Reference nosilca/Lecturer's references:

Jenko Monika

1. VODOPIVEC, Franc, STEINER PETROVIČ, Darja, ŽUŽEK, Borut, JENKO, Monika. Coarsening rate of M23C6 and MC particles in a high chromium creep resistant steel. *Steel research international*, 2013, vol. 84, [5] str., doi: 10.1002/srin.201200150. [COBISS.SI-ID 984490]

2. KOCIJAN, Aleksandra, KEK-MERL, Darja, JENKO, Monika. The corrosion behaviour of austenitic and duplex stainless steels in artificial saliva with the addition of fluoride. *Corros. sci.*. [Print ed.], 2011, vol. 53, no. 2, str. 776-783. [COBISS.SI-ID 24275239], [JCR, WoS do 8. 10. 2013: št. citatov

(TC): 23, čistih citatov (CI): 20, normirano št. čistih citatov (NC): 26, Scopus do 6. 11. 2013: št. citatov (TC): 29, čistih citatov (CI): 25, normirano št. čistih citatov (NC): 33]

3. ČOLIĆ, Miodrag, RUDOLF, Rebeka, STAMENKOVIĆ, Dragoslav, ANŽEL, Ivan, VUČEVIĆ, Dragana, JENKO, Monika, LAZIĆ, Vojkan, LOJEN, Gorazd. Relationship between microstructure, cytotoxicity and corrosion properties of a Cu-Al-Ni shape memory alloy. *Acta biomaterialia*, Jan. 2010, vol. 6, iss. 1, str. 308-317, doi: 10.1016/j.actbio.2009.06.027. [COBISS.SI-ID 13247254], [JCR, WoS do 29. 10. 2013: št. citatov (TC): 6, čistih citatov (CI): 4, normirano št. čistih citatov (NC): 2, Scopus do 1. 10. 2013: št. citatov (TC): 11, čistih citatov (CI): 8, normirano št. čistih citatov (NC): 4]

4. GODEC, Matjaž, KOCIJAN, Aleksandra, DOLINAR, Drago, MANDRINO, Djordje, JENKO, Monika, ANTOLIČ, Vane. An investigation of the aseptic loosening of an AISI 316L stainless steel hip prosthesis. *Biomedical materials*, 2010, vol. 5, no. 4, 8 str., doi: 10.1088/1748-6041/5/4/045012. [COBISS.SI-ID 817066], [JCR, WoS do 12. 3. 2013: št. citatov (TC): 5, čistih citatov (CI): 3, normirano št. čistih citatov (NC): 2, Scopus do 23. 3. 2011: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0]

5. AKESSO, Laurent, PETTITT, Michala E., CALLOW, James A., CALLOW, Maureen E., STALLARD, Joanne, TEER, Dennis, LIU, Chen, WANG, Su, ZHAO, Qi, D'SOUZA, Fraddry, WILLEMSEN, Peter R., DONNELLY, Glen T., DONIK, Črtomir, KOCIJAN, Aleksandra, JENKO, Monika, JONES, Lathe A., GUINALDO, Patricia Calvillo. The potential of nano-structured silicon oxide type coatings deposited by PACVD for control of aquatic biofouling. *Biofouling (Chur Switz.)*, 2009, vol. 25, iss. 1, str. 55-67, doi: 10.1080/08927010802444275. [COBISS.SI-ID 707754], [JCR, WoS do 18. 11. 2013: št. citatov (TC): 20, čistih citatov (CI): 18, normirano št. čistih citatov (NC): 12, Scopus do 5. 11. 2013: št. citatov (TC): 20, čistih citatov (CI): 18, normirano št. čistih citatov (NC): 12]

6. MILLAKU, Agron, LEŠER, Vladka, DROBNE, Damjana, GODEC, Matjaž, TORKAR, Matjaž, JENKO, Monika, MILANI, Marziale, TATTI, Francesco. Surface characteristics of isopod digestive gland epithelium studied by SEM. *Protoplasma*, 2010, vol. 241, no. 1-4, str. 83-89. http://dx.doi.org/10.1007/s00709-010-0110-3, doi: 10.1007/s00709-010-0110-3. [COBISS.SI-ID 6240377], [JCR, WoS do 12. 11. 2013: št. citatov (TC): 4, čistih citatov (CI): 4, normirano št. čistih citatov (NC): 2, Scopus do 5. 11. 2013: št. citatov (TC): 4, čistih citatov (CI): 4, normirano št. čistih citatov (NC): 2]

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Biomehanika in biofizika v zdravstvenih znanostih
Course title:	Biomechanics and biophysics in health sciences

Študijski programi in stopnja	Študijska smer	Letnik	Semestri
Bioznanosti, tretja stopnja, doktorski	Bioinženiring v zdravstvu		Celoletni

Univerzitetna koda predmeta/University course code:	3770

Predavanja	Seminar	Vaje	Klinične vaje	Druge oblike študija	Samostojno delo	ECTS
20	30	20	0	0	180	10

Nosilec predmeta/Lecturer:	Veronika Kralj Iglič

Izvajalci predavanj:	Klemen Bohinc, Aleš Iglič, Veronika Kralj Iglič, Peter Veranič
Izvajalci seminarjev:	
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type:	teoretični/theoretical

Jeziki/Languages:	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Splošni pogoji za vpis na doktorski študij	General conditions for enrolment in doctoral studies.

Vsebina:	Content (Syllabus outline):
• Medcelična komunikacija v bioinženirstvu • Biomehanika in biofizika endoprotez • Interakcije različnih kemikalij z biološkimi sistemi (zwitterionske lipidne plasti, eksplicitni model vode, večvalentni ioni in korelacije, ionsko specifični pojavi, kondenzacija DNK na lipidne plasti, sila med naelektrenimi površinami)	• Intracellular communication in bioengineering • Biomechanics of endoprostheses • Interactions of different chemicals with biological systems (zwitterionic lipid layer, explicit water model, multivalent ions and correlations, ion specific effects, DNA condensation, force between charged surfaces)

Temeljna literatura in viri/Readings:
1. J. N. Israelachvili: Intermolecular and Surface Forces, Elsevier, Amsterdam, 2011 2. Veronika Kralj-Iglič: DANIEL, Matej, IGLIČ, Aleš, KRALJ-IGLIČ, Veronika. *Human hip joint loading - mathematical modeling : reaction forces and contact pressures*. Saarbrücken: VDM Verlag Dr. Müller, cop. 2011. V, 133 str., ilustr. ISBN 978-3-639-26120-2. 3. GONGADZE, Ekaterina, PERUTKOVÁ, Šárka, KRALJ-IGLIČ, Veronika, VAN RIENEN, Ursula, BECK, U., IGLIČ, Aleš, KABASO, Doron. Electromechanical basis for the interaction between osteoblasts and negatively charged titanium surface. V: IGLIČ, Aleš (ur.). *Advances in planar lipid bilayers and liposomes*, (Advances in planar lipid bilayers and liposomes, vol. 13). Amsterdam [etc.]; Elsevier: Academic Press, cop. 2011, str. 199-221, ilustr. Znanstveni članki na tem področju / state of the art papers.

Cilji in kompetence:	Objectives and competences:
Osnovni cilj predmeta je podati študentom teoretična in praktična znanja s področja interakcije nanostrukturiranih površin s celično membrano in vloge biomehanike in biofizike pri funkciji endoprotez.	The main objective of the course is to give students theoretical and practical knowledge in techniques for the study of biocompatibility and its modulation, interactions of nanostructured surfaces with the cell membrane and the role of biomechanics and biophysics in the function of endoprostheses.

Predvideni študijski rezultati:	Intended learning outcomes:
• poznavanje biofizikalnih procesov in njihovih matematičnih modelov stika inžinerskih materialov in tkiv • uporaba matematičnih modelov pri načrtovanju zdravljenja z endoprotezamin in pri rehabilitaciji	• knowledge on biophysical processes and their matematical models of junction of engeneered materials and tissues • use of mathematical models of the interface between engineered materials and tissues in planning of treatment and rehabilitation

Metode poučevanja in učenja:	Learning and teaching methods:
• Predavanja • Individualno delo na projektih • Predstavitve in interpretacije rezultatov projektov ostalim študentom v skupini v seminarski obliki • Diskusija o objavljenih člankih iz izbranih tem (kritično vrednotenje znanstvene literature, predstavitev »case studies«)	• lectures • Individual project work • Presentation and interpretation of results of project work to the other students in open discussion • Journal club – discussion of published research articles on selected topics (critical evaluation of scientific literature, presentation of the "case studies")

Načini ocenjevanja:	Delež/Weight	Assessment:
Preverjanje znanja poteka v obliki projektne naloge na realnih primerih iz raziskovalne prakse, v kateri študentje pripravijo rešitve za izbrani predlog raziskovalnega projekta. Projektne naloge oddajo v pisni obliki in jih zagovarjajo v ustni obliki, v diskusiji z	50,00 %	During the course students prepare individual projects of real cases from research practice, where students prepare solutions for determined research project proposal. They prepare final project work and defend

nosilcem predmeta in sodelujočimi profesorji ter ostalimi študenti.		it in the classroom in discusion with professors and other students.
Študent pripravi tudi seminar iz tematike doktorata v povezavi z eno od vsebin predmeta. Pri tem sodelujeta mentor in nosilec predmeta oz. drugi izvajalci predmeta. Zagovor opravlja študent pred mentorjem in nosilcem in/ali drugim izvajalcem.	50,00 %	Student prepares a doctoral seminar on the topic related to one of the course. In this cooperate menthor and lecturer or/and other professors. Student defend the seminar in front of mentor and lecturer and/or other professors.

Reference nosilca/Lecturer's references:

Veronika Kralj Iglič

1. GONGADZE, Ekaterina, VELIKONJA, Aljaž, PERUTKOVÁ, Šárka, KRAMAR, Peter, MAČEK LEBAR, Alenka, KRALJ-IGLIČ, Veronika, IGLIČ, Aleš. Ions and water molecules in an electrolyte solution in contact with charged and dipolar surfaces. V: SCHUHMANN, Wolfgang (ur.). *Bioelectrochemistry 2013 : selection of papers from the 12th ISE Topical Meeting, 17-21 March 2013, Bochum, Germany : special volume*, (Electrochimica acta, ISSN 0013-4686, vol. 126). [S. l.]: Elsevier, 2014, vol. 126, str. 42-60.
2. BUDIME SANTHOSH, Poornima, VELIKONJA, Aljaž, PERUTKOVÁ, Šárka, GONGADZE, Ekaterina, KULKARNI, Mukta Vishwanath, GENOVA, Julia, ELERŠIČ, Kristina, IGLIČ, Aleš, KRALJ-IGLIČ, Veronika, POKLAR ULRIH, Nataša. Influence of nanoparticle-membrane electrostatic interactions on membrane fluidity and bending elasticity. *Chemistry and physics of lipids*, ISSN 0009-3084. [Print ed.], Feb. 2014, vol. 178, str. 52-62,
3. RIJAVEC, Boris, KOŠAK, Robert, DANIEL, Matej, KRALJ-IGLIČ, Veronika, DOLINAR, Drago. Effect of cup inclination on predicted contact stress-induced volumetric wear in total hip replacement. *Computer methods in biomechanics and biomedical engineering*, ISSN 1025-5842, 2014, str. 1-6.
4. KOCJANČIČ, Boštjan, MOLIČNIK, Andrej, ANTOLIČ, Vane, MAVČIČ, Blaž, KRALJ-IGLIČ, Veronika, VENGUST, Rok. Unfavorable hip stress distribution after Legg-Calvé-Perthes syndrome : a 25-year follow-up of 135 hips. *Journal of orthopaedic research*, ISSN 0736-0266. [Print ed.], 2014, iss. 1, vol. 32, str. 8-16.
5. GONGADZE, Ekaterina, VAN RIENEN, Ursula, KRALJ-IGLIČ, Veronika, IGLIČ, Aleš. Spatial variation of permittivity of an electrolyte solution in contact with a charged metal surface : a mini review. *Computer methods in biomechanics and biomedical engineering*, ISSN 1025-5842, 2013, vol. 16, no. 5, str. 463-480.
6. GONGADZE, Ekaterina, VELIKONJA, Aljaž, SLIVNIK, Tomaž, KRALJ-IGLIČ, Veronika, IGLIČ, Aleš. The quadrupole moment of water molecules and the permittivity of water near a charged surface. *Electrochimica Acta*, ISSN 0013-4686. [Print ed.], 2013, vol. 109, str. 656-662.
7. VELIKONJA, Aljaž, BUDIME SANTHOSH, Poornima, GONGADZE, Ekaterina, KULKARNI, Mukta Vishwanath, ELERŠIČ, Kristina, PERUTKOVÁ, Šárka, KRALJ-IGLIČ, Veronika, POKLAR ULRIH, Nataša, IGLIČ, Aleš. Interaction between dipolar lipid headgroups and charged nanoparticles mediated by water dipoles and ions. *International journal of molecular sciences*, ISSN 1422-0067, 2013, vol. 14, no. 8, str. 15312-15329.
8. VUKASINOVIC, Zoran, SPASOVSKI, Dusko, KRALJ-IGLIČ, Veronika, MARINKOVIC-ERIC, Jelena, SESLIJA, Igor, ZIVKOVIC, Zorica, SPASOVSKI, Vesna. Impact of triple pelvic osteotomy on contact stress pressure distribution in the hip joint. *International orthopaedics*, ISSN 0341-2695, 2013, vol. 37, no. 1, str. 95-98.
9. KOŠAK, Robert, KRALJ-IGLIČ, Veronika, IGLIČ, Aleš, DANIEL, Matej. Polyethylene wear is related to patient-specific contact stress in THA. *Clinical orthopaedics and related research*, ISSN 0009-921X, 2011, vol. 469, no. 12, str. 3415-3422.
10. KABASO, Doron, GONGADZE, Ekaterina, PERUTKOVÁ, Šárka, MATSCHEGEWSKI, Claudia, KRALJ-IGLIČ, Veronika, BECK, U., VAN RIENEN, Ursula, IGLIČ, Aleš. Mechanics and electrostatics of the interactions between osteoblasts and titanium surface. *Computer methods in biomechanics and biomedical engineering*, ISSN 1025-5842, May 2011, vol. 14, no. 5, str. 469-482.

Peter Veranič

1. IMANI, Roghayeh, KABASO, Doron, ERDANI-KREFT, Mateja, GONGADZE, Ekaterina, PENIČ, Samo, ELERŠIČ, Kristina, KOS, Andrej, VERANIČ, Peter, ZOREC, Robert, IGLIČ, Aleš. Morphological alterations of T24 cells on flat and nanotubular TiO[sub]2 surfaces. *Croat. med. j.*, 2012, vol. 53, no. 6, str. 577-585, doi: 10.3325/cmj.2012.53.577. [COBISS.SI-ID 26403623], [JCR, WoS up to 13. 3. 2013: no. of citations (TC): 1, without self-citations (CI): 1, weighted no. of citations (NC): 0, Scopus up to 6. 2. 2013: no. of citations (TC): 1, pure citations (CI): 1, normalized no. of pure citations (NC): 0]

1. KABASO, Doron, BOBROVSKA, Nataliya, GÓŹDŹ, Wojciech, GOV, Nir S., KRALJ-IGLIČ, Veronika, VERANIČ, Peter, IGLIČ, Aleš. On the role of membrane anisotropy and BAR proteins in the stability of tubular membrane structures. *J. biomech.*. [Print ed.], 2012, vol. 45, issue 2, str. 231-238, ilustr. [COBISS.SI-ID 29065945], [JCR, WoS up to 30. 10. 2013: no. of citations (TC): 6, without self-citations (CI): 1, weighted no. of citations (NC): 1, Scopus up to 25. 9. 2013: no. of citations (TC): 6, pure citations (CI): 0, normalized no. of pure citations (NC): 0]

1. LOKAR, Maruša, IGLIČ, Aleš, VERANIČ, Peter. Protruding membrane nanotubes : attachment of tubular protrusions to adjacent cells by several anchoring junctions. *Protoplasma*, 2010, vol. 246, št. 1/4, str. 81-87, doi: 10.007/s00709-010-0143-7. [COBISS.SI-ID 26823641], [JCR, WoS up to 29. 10. 2013: no. of citations (TC): 5, without self-citations (CI): 3, weighted no. of citations (NC): 2, Scopus up to 5. 11. 2013: no. of citations (TC): 5, pure citations (CI): 3, normalized no. of pure citations (NC): 2]

1. SCHARA, Karin, JANŠA, Vid, ŠUŠTAR, Vid, DOLINAR, Drago, PAVLIČ, Janez Ivan, LOKAR, Maruša, KRALJ-IGLIČ, Veronika, VERANIČ, Peter, IGLIČ, Aleš. Mechanisms for the formation of membranous nanostructures in cell-to-cell communication. *Cell. Mol. Biol. Lett.*, 2009, vol. 14, no. 4, str. 636-656, ilustr. [COBISS.SI-ID 7232852], [JCR, WoS up to 29. 10. 2013: no. of citations (TC): 12, without self-citations (CI): 8, weighted no. of citations (NC): 2, Scopus up to 25. 9. 2013: no. of citations (TC): 12, pure citations (CI): 8, normalized no. of pure citations (NC): 2]

1. VERANIČ, Peter, LOKAR, Maruša, SCHÜTZ, Gerhard J., WEGHUBER, Julian, WIESER, Stefan, HÄGERSTRAND, Henry, KRALJ-IGLIČ, Veronika, IGLIČ, Aleš. Different types of cell-to-cell connections mediated by nanotubular structures. *Biophys. j.*, 2008, letn. 95, št. 9, str. 4416-4425, doi: 10.1529/biophysj.108.131375. [COBISS.SI-ID 24674009], [JCR, WoS up to 18. 11. 2013: no. of citations (TC): 26, without self-citations (CI): 18, weighted no. of citations (NC): 6, Scopus up to 14. 10. 2013: no. of citations (TC): 29, pure citations (CI): 21, normalized no. of pure citations (NC): 7]

Klemen Bohinc

1. BOHINC, Klemen, BREZESINSKI, Gerald, MAY, Sylvio. Modeling the influence of adsorbed DNA on the lateral pressure and tilt transition of a zwitterionic lipid monolayer. *PCCP. Phys. chem. chem. phys. (Print)*, 2012, vol. 14, no. 30, str. 10613-10621, doi: 10.1039/c2cp40923b. [COBISS.SI-ID 4416363] , [JCR, WoS do 30. 10. 2013: št. citatov (TC): 3, čistih citatov (CI): 2, normirano št. čistih citatov (NC): 1, Scopus do 2. 10. 2013: št. citatov (TC): 3, čistih citatov (CI): 2, normirano št. čistih citatov (NC): 1]

2. MENGISTU, Demmelash H., BOHINC, Klemen, MAY, Sylvio. Binding of DNA to zwitterionic lipid layers mediated by divalent cations. *J. phys. chem., B Condens. mater. surf. interfaces biophys.*, 2009, vol. 113, str. 12277-12282, doi: 10.1021/jp904986j. [COBISS.SI-ID 3756907], [JCR, WoS do 28. 10. 2013: št. citatov (TC): 19, čistih citatov (CI): 15, normirano št. čistih citatov (NC): 5, Scopus do 1. 10. 2013: št. citatov (TC): 22, čistih citatov (CI): 17, normirano št. čistih citatov (NC): 6]

3. TEIF, Vladimir B., BOHINC, Klemen. Condensed DNA : condensing the concepts. *Prog. Biophys. Mol. Biol.*. [Print ed.], 2011, vol. 105, no. 3, str. 208-222, ilustr. [COBISS.SI-ID 4137067], [JCR, WoS do 12. 11. 2013: št. citatov (TC): 23, čistih citatov (CI): 20, normirano št. čistih citatov (NC): 6, Scopus do 6. 11. 2013: št. citatov (TC): 26, čistih citatov (CI): 21, normirano št. čistih citatov (NC): 6]

4. BOHINC, Klemen, SHRESTHA, Ahis, BRUMEN, Milan, MAY, Sylvio. Poisson-Helmholtz-Boltzmann model of the electric double layer : analysis of monovalent ionic mixtures. *Phys. rev., E Stat. nonlinear soft matter phys. (Print)*, 2012, vol. 85, no. 3, str. 031130-1-031130-12, doi: 10.1103/PhysRevE.85.031130. [COBISS.SI-ID 4353131], [JCR, WoS do 30. 10. 2013: št. citatov (TC): 3, čistih citatov (CI): 3, normirano št. čistih citatov (NC): 2, Scopus do 23. 10. 2013: št. citatov (TC): 3, čistih citatov (CI): 3, normirano št. čistih citatov (NC): 2]

5. BOHINC, Klemen, GRIME, John M. A., LUE, Leo. The interactions between charged colloids with rod-like counterions. *Soft matter*, 2012, vol. 8, no. 20, str. 5679-5686, doi: 10.1039/c2sm07463j. [COBISS.SI-ID 4366443], [JCR, WoS do 11. 4. 2013: št. citatov (TC): 3, čistih citatov (CI): 2, normirano št. čistih citatov (NC): 1, Scopus do 23. 10. 2013: št. citatov (TC): 6, čistih citatov (CI): 4, normirano št. čistih citatov (NC): 1]

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Ekološki inženiring
Course title:	Ecological engineering

Študijski programi in stopnja	Študijska smer	Letnik	Semestri
Bioznanosti, tretja stopnja, doktorski	Bioinženiring v zdravstvu		Celoletni

Univerzitetna koda predmeta/University course code:	3771

Predavanja	Seminar	Vaje	Klinične vaje	Druge oblike študija	Samostojno delo	ECTS
10	15	10	0	0	90	5

Nosilec predmeta/Lecturer:	Tjaša Griessler Bulc

Izvajalci predavanj:	Tjaša Griessler Bulc
Izvajalci seminarjev:	
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type:	teoretični/theoretical

Jeziki/Languages:	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Splošni pogoji za vpis na doktorski študij	General conditions for enrolment in doctoral studies.

Vsebina:	Content (Syllabus outline):
Ekološki inženiring (zelene tehnologije, vključujoč trajnostne stavbe, urbano kmetijstvo, okolju prijazne tehnologije v konceptih mest in vasi prihodnosti, ekosistemske storitve; ekonomski vidik za povečevanje kvalitete bivanja človeka-well being).	Ecological engineering (green technologies, including sustainable buildings, urban agriculture, green technology concepts in the towns and villages of the future, economic aspect for increasing the quality of living humans – well being).

Temeljna literatura in viri/Readings:
1. Sustainable Energy Technologies: Options and Prospects, eds. K. Hanjalić, R. van de Krol, A. Lekić, Springer, 2008. 2. Mitsch, W. J., Joergensen, S. E., 2003. Ecological Engineering and Ecosystem restoration John Wiley & Sons, Inc., 411 str. 3. Kangas P. C., 2004. Ecological Engineering. Principles and Practice. Lewis Publishers. 452 str. Znanstveni članki na tem področju / state of the art papers.

Cilji in kompetence:	Objectives and competences:
Poznavanje novosti na področju ekološkega inženirstva, ekosistemskih storitev, sprememb procesov v ekosistemih pod vplivom onesnaževanja in uporabe ekotehnologij pri ohranjanju ekološkega ravnotežja v naravi.	Knowledge on recent advances in environmental engineering, ecosystem services, changes in ecosystem processes under the influence of pollution and in application of eco-technology in maintaining ecological balance in nature.

Predvideni študijski rezultati:	Intended learning outcomes:
Razumevanje delovanja ekotehnologij (ekoremediacije, rastlinske čistilne naprave, druge zelene teh.; blažilna območja, zelene strehe, vertikalni vrtovi). Razumevanje postopkov sanacij v okolju z uporabo ekotehnologij.	Understanding of eco-technologies (ERM, wetlands, other green techol., buffer zones, green roofs, vertical gardens). Understanding the processes of remediation in the environment by using eco-technologies.

Metode poučevanja in učenja:	Learning and teaching methods:
• Predavanja • Individualno delo na projektih • Predstavitve in interpretacije rezultatov projektov ostalim študentom v skupini v seminarski obliki • Diskusija o objavljenih člankih iz izbranih tem (kritično vrednotenje znanstvene literature, predstavitev »case studies«)	• lectures • Individual project work • Presentation and interpretation of results of project work to the other students in open discussion • Journal club – discussion of published research articles on selected topics (critical evaluation of scientific literature, presentation of the "case studies")

Načini ocenjevanja:	Delež/Weight	Assessment:
Preverjanje znanja poteka v obliki projektne naloge na realnih primerih iz raziskovalne prakse, v kateri študentje pripravijo rešitve za izbrani predlog raziskovalnega projekta. Projektne naloge oddajo v pisni obliki in jih zagovarjajo v ustni obliki, v diskusiji z nosilcem predmeta in sodelujočimi profesorji ter ostalimi študenti.	50,00 %	During the course students prepare individual projects of real cases from research practice, where students prepare solutions for determined research project proposal. They prepare final project work and defend it in the classroom in discusion with professors and other students.
Študent pripravi tudi seminar iz tematike doktorata v povezavi z eno od vsebin predmeta. Pri tem sodelujeta	50,00 %	Student prepares a doctoral seminar on the topic related to one of the course. In this cooperate menthor and lecturer

mentor in nosilec predmeta oz. drugi izvajalci predmeta. Zagovor opravlja študent pred mentorjem in nosilcem in/ali drugim izvajalcem.		or/and other professors. Student defend the seminar in front of mentor and lecturer and/or other professors.

Reference nosilca/Lecturer's references:

Tjaša Griessler-Bulc

1. MAHNE, Dunja, LAVRENČIČ ŠTANGAR, Urška, TREBŠE, Polonca, GRIESSLER BULC, Tjaša. TiO[sub]2-based photocatalytic treatment of raw and constructed-wetland pretreated textile wastewater. *International journal of photoenergy*, 2012, vol. 2012, str. 1-12, doi: 10.1155/2012/725692. [COBISS.SI-ID 2299643]

2. GRIESSLER BULC, Tjaša, ISTENIČ, Darja, KRIVOGRAD-KLEMENČIČ, Aleksandra. The efficiency of a closed-loop chemical-free water treatment system for cyprinid fish farms. *Ecol. eng.*. [Print ed.], 2011, vol. 37, str. 873-882, doi: 10.1016/j.ecoleng.2011.01.004. [COBISS.SI-ID 4134251]

3. GRIESSLER BULC, Tjaša, KRIVOGRAD-KLEMENČIČ, Aleksandra. Run-off treatment of highly fluctuating waters with subsurface vegetated drainage ditch and river bed with meanders. *Fresenius environ. bull.*. [Print ed.], 2011, vol. 20, no. 4, str. 836-846. [COBISS.SI-ID 4145259]

4. GRIESSLER BULC, Tjaša, ŠAJN-SLAK, Alenka. Ecoremediations - a new concept in multifunctional ecosystem technologies for environment protection. *Desalination*. [Print ed.], str. 2-10, doi: 10.1016/j.desal.2008.03.039. [COBISS.SI-ID 3749995]
tipologija 1.08 -> 1.01

5. ZUPANČIČ JUSTIN, Maja, VRHOVŠEK, Danijel, STUHLBACHER, Arnold, GRIESSLER BULC, Tjaša. Treatment of wastewater in hybrid constructed wetland from the production of vinegar and packaging of detergents. *Desalination*. [Print ed.], 2009, str. 100-109, doi: 10.1016/j.desal.2008.03.045. [COBISS.SI-ID 25597401]
tipologija 1.08 -> 1.01

6. GRIESSLER BULC, Tjaša, OJSTRŠEK, Alenka. The use of constructed wetland for dye-rich textile wastewater treatment. *J. hazard. mater.*. [Print ed.], June 2008, vol. 155, iss. 1/2, str. 76-82. http://dx.doi.org/10.1016/j.jhazmat.2007.11.068, doi: 10.1016/j.jhaymat.2007.11.068. [COBISS.SI-ID 12026390]

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Materiali za dezinfekcijo v zdravstvu
Course title:	Disinfection materials in health sciences

Študijski programi in stopnja	Študijska smer	Letnik	Semestri
Bioznanosti, tretja stopnja, doktorski	Bioinženiring v zdravstvu		Celoletni

Univerzitetna koda predmeta/University course code:	3772

Predavanja	Seminar	Vaje	Klinične vaje	Druge oblike študija	Samostojno delo	ECTS
10	15	10	0	0	90	5

Nosilec predmeta/Lecturer:	Polonca Trebše

Izvajalci predavanj:	Polonca Trebše
Izvajalci seminarjev:	
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type:	teoretični/theoretical

Jeziki/Languages:	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Splošni pogoji za vpis na doktorski študij	General conditions for enrolment in doctoral studies.

Vsebina:	Content (Syllabus outline):
Razvoj in uporaba fotokatalitičnih materialov v zdravstvu (TiO2, uporaba AOMs, desinfekcijski postopki).	Development and application of photocatalytic materials in health sciences (TiO2 materials, AOMs, disinfection procedures).

Temeljna literatura in viri/Readings:
A. Mills, S. K. Lee: A web-based overview of semiconductor photochemistry-based current commercial applications, Journal of Photochemistry and Biology A: Chemistry 152 (2002) 233-247.

2. P.Boule, D.Bahnemann, P.Robertson, Environmental Photochemistry Part II (The Handbook of Environmental Chemistry / Reactions and Processes), Springer 2010 Znanstveni članki/ state of the art scientific papers

Cilji in kompetence:	Objectives and competences:
Osnovni cilj predmeta je podati študentom novosti na področju uporabe fotokatalitičnih materialov v zdravstvu. Kompetence: poznavanje pretvorb organskih in anorganskih spojin z različno kemijsko strukturo; poznavanje fotokatalitskih procesov.	The main objective of the course is to convey to students recent advances ob application of photocatalitic materials in health sciences. Competences: knowledge on the transformation of organic and inorganic compounds with different chemical structure and on photocalytic processes.

Predvideni študijski rezultati:	Intended learning outcomes:
Znanje in razumevanje: fotokatalitskih pretvorb (razumejo procese razgradnje onesnažil v okolju z uporabo polprevodniškega katalizatorja in ultravijoličnega sevanja), in z njimi povezanih naprednih analiznih metod detekcije(spektroskopske, biokemične, kontinuirne avtomatizirane metode).	Knowledge and understanding: photocatalytic trasfrotmations (they understand degradation processes of pollutants in the environment with the application of semicinductors and UV irradiation), on novel analytical methods (spectroscopic, electrochemical, separation, radioanalytical, biochemical, continuous automated methods).

Metode poučevanja in učenja:	Learning and teaching methods:
• Predavanja • Individualno delo na projektih • Predstavitve in interpretacije rezultatov projektov ostalim študentom v skupini v seminarski obliki • Diskusija o objavljenih člankih iz izbranih tem (kritično vrednotenje znanstvene literature, predstavitev »case studies«)	• lectures • Individual project work • Presentation and interpretation of results of project work to the other students in open discussion • Journal club – discussion of published research articles on selected topics (critical evaluation of scientific literature, presentation of the "case studies")

Načini ocenjevanja:	Delež/Weight	Assessment:
Preverjanje znanja poteka v obliki projektne naloge na realnih primerih iz raziskovalne prakse, v kateri študentje pripravijo rešitve za izbrani predlog raziskovalnega projekta. Projektne naloge oddajo v pisni obliki in jih zagovarjajo v ustni obliki, v diskusiji z nosilcem predmeta in sodelujočimi profesorji ter ostalimi študenti.	50,00 %	During the course students prepare individual projects of real cases from research practice, where students prepare solutions for determined research project proposal. They prepare final project work and defend it in the classroom in discusion with professors and other students.
Študent pripravi tudi seminar iz tematike doktorata v povezavi z eno od vsebin predmeta. Pri tem sodelujeta	50,00 %	Student prepares a doctoral seminar on the topic related to one of the course. In this cooperate menthor and lecturer

mentor in nosilec predmeta oz. drugi izvajalci predmeta. Zagovor opravlja študent pred mentorjem in nosilcem in/ali drugim izvajalcem.		or/and other professors. Student defend the seminar in front of mentor and lecturer and/or other professors.

Reference nosilca/Lecturer's references:

Polonca Trebše

1. LAVTIŽAR, Vesna, GESTEL, Cornelis A. M. van, DOLENC, Darko, TREBŠE, Polonca. Chemical and photochemical degradation of chlorantraniliprole and characterization of its transformation products. *Chemosphere (Oxford)*. [Print ed.], 7 str., doi: 10.1016/j.chemosphere.2013.09.057. [COBISS.SI-ID 2922491]

2. ŽABAR, Romina, KOMEL, Tilen, FABJAN, Jure, BAVCON KRALJ, Mojca, TREBŠE, Polonca. Photocatalytic degradation with immobilised TiO [sub] 2 of three selected neonicotinoid insecticides : imidacloprid, thiamethoxam and clothianidin. *Chemosphere (Oxford)*. [Print ed.], 2012, vol. 89, iss. 3, str. 293-301, doi: 10.1016/j.chemosphere.2012.04.039. [COBISS.SI-ID 2351867]

3.. MAHNE, Dunja, LAVRENČIČ ŠTANGAR, Urška, TREBŠE, Polonca, GRIESSLER BULC, Tjaša. TiO[sub]2-based photocatalytic treatment of raw and constructed-wetland pretreated textile wastewater. *International journal of photoenergy*, 2012, vol. 2012, str. 1-12, doi: 10.1155/2012/725692. [COBISS.SI-ID 2299643]

4.. ŽABAR, Romina, DOLENC, Darko, JERMAN, Tina, FRANKO, Mladen, TREBŠE, Polonca. Photolytic and photocatalytic degradation of 6-chloronicotinic acid. *Chemosphere (Oxford)*. [Print ed.], 2011, vol. 85, no. 5, str. 861-868, doi: 10.1016/j.chemosphere.2011.06.107. [COBISS.SI-ID 1964027]

5.. PRIYA, D. Neela, MODAK, Jayant M., TREBŠE, Polonca, ŽABAR, Romina, RAICHUR, Ashok M. Photocatalytic degradation of dimethoate using LbL fabricated TiO[sub]2/polymer hybrid films. *J. hazard. mater.*. [Print ed.], 2011, vol. 195, str. 214-222, doi: 10.1016/j.jhazmat.2011.08.030. [COBISS.SI-ID 1972987]

6. PIECHA, Malgorzata, SARAKHA, Mohamed, TREBŠE, Polonca. Photocatalytic degradation of cholesterol-lowering statin drugs by TiO [sub] 2-based catalyst : kinetics, analytical studies and toxicity evaluation. *J. photochem. photobiol.,A Chem.*. [Print ed.], 2010, vol. 213, no. 1, str. 61-69. [COBISS.SI-ID 1492219]

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Mikrofluidne naprave v bioinženirstvu
Course title:	Microfluidic devices in bioengineering

Študijski programi in stopnja	Študijska smer	Letnik	Semestri
Bioznanosti, tretja stopnja, doktorski	Bioinženiring v zdravstvu		Celoletni

Univerzitetna koda predmeta/University course code:	3773

Predavanja	Seminar	Vaje	Klinične vaje	Druge oblike študija	Samostojno delo	ECTS
10	15	10	0	0	90	5

Nosilec predmeta/Lecturer:	Polona Žnidaršič Plazl

Izvajalci predavanj:	Polona Žnidaršič Plazl
Izvajalci seminarjev:	
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type:	teoretični/theoretical

Jeziki/Languages:	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Zaključen drugostopenjski ali star univerzitetni študij biotehnologije, kemijskega inženirstva, biokemije, kemije, farmacije, mikrobiologije, živilske tehnologije, medicine in sorodnih programov.	Completed university or 2nd level Bologna studies of biotechnology, chemical engineering, biochemistry, chemistry, pharmacy, microbiology, food technology, medicine and other related programmes.

Vsebina:	Content (Syllabus outline):
Temeljna vsebinska področja predmeta so: - splošni pojmi in definicije mikroreaktorske tehnologije (MRT) in mikrofluidnih naprav, - sodobne tehnike izdelave mikrostrukturiranih naprav, obdelava in funkcionalizacija površin,	The basic contents of the subject are: - general concepts and definitions of microreactor technology (MRT) and microfluidic devices

- dinamika tekočin v mikrofluidnih napravah: paralelni tok mešljivih in nemešljivih tekočin v mikrokanalih, tokovni režimi večfaznih sistemov (tvorba kapljic, segmentiran tok) - prednosti miniaturiziranih naprav - uporaba mikrofluidnih naprav za bioanalizo, µTAS sistemi - uporaba mikrofluidnih naprav za razvoj in proizvodnjo farmacevtskih učinkovin - mikrobioreaktorji, encimski mikroreaktorji, imobilizacija encimov v mikrostrukturirane naprave - lab-on-a-chip-sistemi - uporaba mikrofluidnih naprav v zaključnih procesih in integracija procesov - uporaba mikrofluidnih naprav v biomedicini (diagnostika, dostava zdravil, hemodializa) - izbrani primeri biokatalitskih in separacijskih procesov v mikrofluidnih napravah, integrirani procesi	- contemporary techniques for manufacturing of microstructured devices; surface treatment and functionalization - fluid dynamics in microfluidic devices: parallel flow of miscible and non-miscible fluids in microchannels (droplet formation, segmented flow) - advantages of miniaturized devices - use of microfluidic devices for bioanalysis, µTAS systems - use of microfluidic devices for drug development and production - microbioreactors, enzymatic microreactors, enzyme immobilization in microstructured devices - lab-on-a-chip systems -use of microfluidic devices in downstream processing and process integration - use of microfluidic devices in biomedicine (diagnostics, drug delivery, hemodialysis) -selected case studies of biocatalytic and downstream processes in microfluidic devices, integrated processes

Temeljna literatura in viri/Readings:
Izbrana poglavja iz: Hessel, V., Renken, A., Schouten, J.C., Yoshida, J.-I., Eds., Micro Process Engineering: A Comprehensive Handbook, Vol. 1-3, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany, 2009 Izbrana poglavja iz: Dietrich, T.R., Ed., Microchemical engineering in practice, John Wiley & Sons, Hoboken, 2009 Izbrana poglavja iz: Wirth, T., Ed., Microreactors in Organic Chemistry and Catalysis, 2nd Ed., Completely Revised and Enlarged Edition, Wiley-VCH, Weinheim, 2013 Izbrana poglavja iz : Li, X., Zhou, Y., Eds., Microfluidic devices for biomedical applications, Woodhead Publishing, 2013 Tekoča znanstvena periodika./ Papers from current scientific journals.

Cilji in kompetence:	Objectives and competences:
Temeljni izobraževalni cilj je pridobitev teoretičnih in praktičnih znanj za samostojno načrtovanje in izvedbo bioanaliz, bioprocesov in/ali bioseparacij v mikrofluidnih napravah ter integriranih lab-on-a-chip sistemih.	The basic educational aim is gaining theoretical and practical knowledge for independent development and execution of bioanalysis, bioprocesses and/or bioseparations in microfluidic devices, as well as in integrated lab-on-a-chip systems.

Predvideni študijski rezultati:	Intended learning outcomes:
Poznavanje osnovnih tehnik izdelovanja mikrofluidnih naprav, tokovnih režimov v njih in načinov obdelovanja površin.	The intended learning outcomes consider knowledge about technologies for fabrication of microfluidic devices, fluid flow within them

Poleg tega je predvideno razumevanje prednosti uporabe mikrofluidnih naprav v bioanalitiki, razvoju in proizvodnji farmacevtskih učinkovin ter drugih bioprocesov in v biomedicini. Poznavanje mikrobioreaktorjev, osnov bioseparacijskih procesov v mikrofluidnih napravah in lab-on-a-chip sistemov.	and surface modifications. Besides, understanding of benefits of using microfludic devices in bioanalysis, drug development and production, in other bioprocesses and in biomedicine is intended. Gaining of expertise in microbioreactors, basics of bioseparations in microfluidic devices and in lab-on-a-chip systems.

Metode poučevanja in učenja:	Learning and teaching methods:
• Predavanja • Priprava seminarja in predstavitev ostalim študentom v okviru rednih seminarskih sestankov skupine (diskusija in kritično vrednotenje izbrane znanstvene literature). • Laboratorijsko delo z mikrofluidnimi napravami – spoznavanje tokovnih režimov v mikrokanalih, separacijskih procesov in miniaturiziranih integriranih sistemov.	• Lectures • Preparation of seminar work and oral presentation within regular journal club meetings of the research group (discussion and critical evaluation of selected scientific papers). • Laboratory work with microfluidic devices – observation of fluid flow within microchannels, separation processes and miniaturised integrated systems.

Načini ocenjevanja:	Delež/Weight	Assessment:
- Seminar (ocena teksta in predstavitve)	50,00 %	- Seminar (text and presentation)
- Ustni izpit	50,00 %	- Oral exam

Reference nosilca/Lecturer's references:

1. ŽNIDARŠIČ PLAZL, Polona. Enzymatic microreactors utilizing non-aqueous media. *Chimica oggi*, ISSN 0392-839X, 2014, vol. 32, no. 1, str. 54-61, ilustr. [COBISS.SI-ID 1681455],
2. CVJETKO, M., SABOTIN, Izidor, RADOŠ, Ivan, VALENTIČIČ, Joško, BOSILJKOV, Tomislav, BRNČIĆ, Mladen, ŽNIDARŠIČ PLAZL, Polona. A comparative study of ultrasound-, microwave-, and microreactor-assisted imidazolium-based ionic liquid synthesis. Green processing and synthesis, ISSN 2191-9542. [Print ed.], 2013, vol. 2, no. 6, str. 579-590, ilustr. http://www.degruyter.com/view/j/gps.2013.2.issue-6/gps-2013-0086/gps-2013-0086.xml?format=INT, doi: 10.1515/gps-2013-0086. [COBISS.SI-ID 1656367],
3. POHAR, Andrej, ŽNIDARŠIČ PLAZL, Polona, PLAZL, Igor. Integrated system of a microbioreactor and a miniaturized continuous separator for enzyme catalyzed reactions. Chem. eng. j., 2012, vol. 189/190, no. 1, 376-382, doi: 10.1016/j.cej.2012.02.035
4. CVJETKO, M., VORKAPIĆ-FURAČ, Jasna, ŽNIDARŠIČ PLAZL, Polona. Isoamyl acetate synthesis in imidazolium-based ionic liquids using packed bed enzyme microreactor. Process biochemistry, ISSN 1359-5113, 2012, vol. 47, no. 9, str. 1344-1350, doi: 10.1016/j.procbio.2012.04.028. [COBISS.SI-ID 35952389],
5. STOJKOVIČ, Gorazd, ŽNIDARŠIČ PLAZL, Polona. Continuous synthesis of L-malic acid using whole-cell microreactor. Process biochem, 2012, vol. 47, no. 7, 1102-1107, doi: 10.1016/j.procbio.2012.03.023.
6. ŽNIDARŠIČ PLAZL, Polona, PLAZL, Igor. Microbioreactors. V: MOO-YOUNG, Murray (ur.). Comprehensive biotechnology, 2nd Ed. Amsterdam [etc.]: Elsevier, cop. 2011, str. 289-301. [COBISS.SI-ID 35324421]
7. STOJKOVIČ, Gorazd, PLAZL, Igor, ŽNIDARŠIČ PLAZL, Polona. L-Malic acid production within a microreactor with surface immobilised fumarase. Microfluid. nanofluid. (Print), 2011, vol. 10, no. 3, str. 627-635, doi: 10.1007/s10404-010-0696-y. [COBISS.SI-ID 34517509],
8. CVJETKO, M., ŽNIDARŠIČ PLAZL, Polona. Ionic liquids within microfluidic devices. V: KOKORIN, Alexander (ur.). Ionic liquids: theory, properties, new approaches. Rijeka: Intech, 2011, str. 681-700. [COBISS.SI-ID 34846469]

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Javnozdravstveni vidiki higiene površin
Course title:	Public health aspects of surfaces hygiene

Študijski programi in stopnja	Študijska smer	Letnik	Semestri
Bioznanosti, tretja stopnja, doktorski	Bioinženiring v zdravstvu		Celoletni

Univerzitetna koda predmeta/University course code:	0

Predavanja	Seminar	Vaje	Klinične vaje	Druge oblike študija	Samostojno delo	ECTS
10	20	0	0	0	95	5

Nosilec predmeta/Lecturer:	Rok Fink

Izvajalci predavanj:	Rok Fink, Mojca Jevšnik, Martina Oder, Andrej Ovca
Izvajalci seminarjev:	
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type:	teoretični predmet /theoretical course

Jeziki/Languages:	Predavanja/Lectures:	Slovenščina
	Vaje/Tutorial:	Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Splošni pogoji za vpis na doktorski študij.	General conditions for enrolment in doctoral studies.

Vsebina:	Content (Syllabus outline):
• Stopnje čistosti površin iz sanitarno-higienskega vidika v bivalnem okolju, v živilski in zdravstveni dejavnosti, v farmacevtski industriji, javnih površinah ter ob izjemnih razmerah. • Kriteriji higiensko tehnične analize delovnega procesa z vidika javnega zdravja. • Mehanizmi obvladovanja dejavnikov tveganja v procesih živilsko-prehransko-oskrbovalne verige.	• Levels of surface cleanliness from sanitary point of view in the household environment, healthcare, food and pharmaceutical industry, public areas and emergency situations. • Criteria for the hygienic-technical analysis of the food process from public health point of view. • Mechanisms of risk factor management in food processes.

• Usmerjeno inženirsko reševanje higienske problematike v delovnih procesih. • Analiza tveganja s pomočjo različnih sodobnih orodij kakovosti na sanitarnem področju. • Metode dokazovanja higiene površin z indikatorskimi metodami na terenu in s standardnimi postopki v laboratoriju. • Dekontaminacija površin s poudarkom na fizikalnih, kemijskih in bioloških pristopih zagotavljanja čistosti površin. Metode za pripravo super čistih površin z upoštevanjem sprejemljivosti za okolje in zdravje ljudi.	• Focused engineering solutions for hygienic problems in processes. • Risk assessment using different modern tools of quality from sanitary point of view. • Methods of surface hygiene assessment with indicator methods, field methods and standard procedures in the laboratory. • Decontamination of surfaces with an emphasis on physical, chemical and biological approaches to ensuring clean surfaces. Methods for the preparation of super-clean surfaces, taking into account the acceptability for the environment and human health.

Temeljna literatura in viri/Readings:
• Kanematsu, Hideyuki, Barry, Dana M (Eds.). Biofilm and Materials Science. Springer International Publishing. ISBN 978-3-319-14565-5. 2015. 196 str. • Yasmine Motarjemi and Huub Lelieveld (2014) Food safety management: a practical guide for the food industry. Amsterdam [etc.]: Elsevier: Academic Press. 1192 str. revijalni članki s področja, tekoča periodika, druga učna gradiva.

Cilji in kompetence:	Objectives and competences:
• Presojanje različnih stopenj čistosti v bivalnem in delovnem okolju glede na ocenjeno tveganje. • Razumevanje metod dokazovanja higiene površin v specifičnih sanitarno-higienskih pogojih. • Načrtovanje, izvajanje in evalviranje ukrepov za dekontaminacijo površin v higiensko tveganih okoljih. • Poznavanje metod za pripravo super čistih površin v bivalnem in delovnem okolju. • Vzpostavitev mehanizmov in sistemov za obvladovanje prepoznanih dejavnikov tveganj.	• Assessment of different degrees of cleanliness in household and occupational environment according to the assessed risk. • Understanding methods for proving hygiene of surfaces in specific sanitary conditions. • Planning, implementation and evaluation of measures for surfaces decontamination in hygiene specific environments. • Knowing the methods for preparing super-clean surfaces in household and occupational environment. • Implementation of mechanisms and systems for management of identified risk factors.

Predvideni študijski rezultati:	Intended learning outcomes:
Znanje in razumevanje: • Presoditi pomen stopenj čistosti površin glede na ocenjeno tveganje v bivalnem in delovnem okolju. • Razlikovati metode dokazovanja čistosti površin glede na vrsto površin, namen analize, vrsto in obseg onesnažil. • Načrtovati, izvajati in evalvirati ukrepe za dekontaminacijo površin ob upoštevanju specifičnih pogojev okolja in naprednih tehnik obvladovanja sanitarno-higienskih tveganj. • Razvijati postopke za pripravo super čistih površin v delovnem in bivalnem okolju, zdravstveni dejavnosti in farmacevtski industriji, javnih površinah ter ob izjemnih razmerah. Študent:	Knowledge and understanding: • To assess the importance of the degree of surfaces cleanliness regarding the assessed risk in in household and occupational environment. • Distinguish methods of analysing the surfaces cleanliness by type of material, the purpose of analysis, type and extent of pollutants. • Plan, implement and evaluate measures for decontamination of surfaces, taking into account specific environmental conditions and advanced management techniques of hygiene risks. • Develop procedures for the preparation of super-clean surfaces in the occupational and household environment, healthcare, and

• Je usposobljen za presojo sanitarno-higienskega stanja v specifičnih okoljskih pogojih, zna načrtovati in izdelati ukrepe za obvladovanje higiene površin. • Razume javno-zdravstveni, tehnični in higienski vidik procesa V živilsko-prehransko-oskrbovalni verigi. • Identificira in oceni dejavnike tveganja za zdravje glede na delovni proces. Načrtuje preventivne in korektivne ukrepe v izbranem delovnem procesu.	pharmaceutical industry, public areas and in emergency situations. The student: • Is qualified to assess the hygienic condition in specific environmental conditions and to design and develop approached for the surface hygiene management. • Understands the public health, technical and hygienic aspect of the food process. • Identifies and evaluates risk factors originating from the process. Plans preventive and corrective measures in the selected process.

Metode poučevanja in učenja:	Learning and teaching methods:
Predavanja, seminarji, problemsko učenje	Lectures, seminars, problem learning

Načini ocenjevanja:	Delež/Weight	Assessment:
Ustni izpit	60,00 %	Oral exam
Seminar	40,00 %	Seminar

Reference nosilca/Lecturer's references:

Rok Fink:

1. ODER, Martina, ARLIČ, Mateja, BOHINC, Klemen, FINK, Rok. Escherichia coli biofilm formation and dispersion under hydrodynamic conditions on metal surfaces. International journal of environmental health research, ISSN 0960-3123, 2018, vol. 28, no. 1, str. 55-63, ilustr., doi: 10.1080/09603123.2017.1415309. [COBISS.SI-ID 5367147]
2. FINK, Rok, KULAŠ, Stefan, ODER, Martina. Efficacy of sodium dodecyl sulphate and natural extracts against E. coli biofilm. International journal of environmental health research, ISSN 0960-3123, 2018, vol. 28, no. 3, str. 306-314, ilustr., doi: 10.1080/09603123.2018.1470230. [COBISS.SI-ID 5422699]
3. FINK, Rok, ODER, Martina, STRAŽAR, Eva, FILIP, Sebastjan. Efficacy of cleaning methods for the removal of Bacillus cereus biofilm from polyurethane conveyor belts in bakeries. Food control, ISSN 0956-7135. [Print ed.], Oct. 2017, vol. 80, str. 267-272, ilustr., doi: 10.1016/j.foodcont.2017.05.009. [COBISS.SI-ID 5252459]
4. KURINČIČ, Marija, JERŠEK, Barbara, KLANČNIK, Anja, SMOLE MOŽINA, Sonja, FINK, Rok, DRAŽIĆ, Goran, RASPOR, Peter, BOHINC, Klemen. Effects of natural antimicrobials on bacterial cell hydrophobicity, adhesion, and zeta potential = Vpliv naravnih protimikrobnih snovi na bakterijsko hidrofobnost, adhezijo in zeta potencial. Arhiv za higijenu rada i toksikologiju, ISSN 0004-1254. [Print ed.], 2016, vol. 67, str. 39-45, ilustr. http://hrcak.srce.hr/index.php?show=clanak&id_clanak_jezik=227854, doi: 10.1515/aiht-2016-67-2720. [COBISS.SI-ID 4640632]
5. BOHINC, Klemen, DRAŽIĆ, Goran, FINK, Rok, ODER, Martina, JEVŠNIK, Mojca, NIPIČ, Damijan, GODIČ TORKAR, Karmen, RASPOR, Peter. Available surface dictates microbial adhesion capacity. International journal of adhesion and adhesives, ISSN 0143-7496. [Print ed.], Apr. 2014, vol. 50, str. 265-272, ilustr., doi: 10.1016/j.ijadhadh.2014.01.027. [COBISS.SI-ID 4669803]
6. FINK, Rok, ODER, Martina, RANGUS, Dušan, RASPOR, Peter, BOHINC, Klemen. Microbial adhesion capacity : influence of shear and temperature stress. International journal of environmental health research, ISSN 0960-3123, 2015, vol. 25, no. 6, str. 656-669, ilustr. http://dx.doi.org/10.1080/09603123.2015.1007840, doi: 10.1080/09603123.2015.1007840. [COBISS.SI-ID 4829547]

Martina Oder:

1. ŠARC, Andrej, KOSEL, Janez, STOPAR, David, ODER, Martina, DULAR, Matevž. Removal of bacteria Legionella pneumophila, Escherichia coli, and Bacillus subtilis by (super)cavitation. Ultrasonics Sonochemistry, ISSN 1350-4177, Apr. 2018, vol. 42, str. 228-236.

2. FINK, Rok, OKANOVIČ, Denis, DRAŽIĆ, Goran, ABRAM, Anže, ODER, Martina, JEVŠNIK, Mojca, BOHINC, Klemen. Bacterial adhesion capacity on food service contact surfaces. International journal of environmental health research, ISSN 0960-3123, 2017, vol. 27, no. 3, str. 169-178.
3. ŠARC, Andrej, ODER, Martina, DULAR, Matevž. Can rapid pressure decrease induced by supercavitation efficiently eradicate Legionella pneumophila bacteria?. Desalination and water treatment, ISSN 1944-3994. [Print ed.], Jan. 2016, vol. 57, iss. 5, str. 2184-2194.
4. DULAR, Matevž, GRIESSLER BULC, Tjaša, GUTIÉRREZ-AGUIRRE, Ion, HEATH, Ester, KOSJEK, Tina, KRIVOGRAD-KLEMENČIČ, Aleksandra, ODER, Martina, PETKOVŠEK, Martin, RAČKI, Nejc, RAVNIKAR, Maja, ŠARC, Andrej, ŠIROK, Brane, ZUPANC, Mojca, ŽITNIK, Miha, KOMPARE, Boris. Use of hydrodynamic cavitation in (waste)water treatment. Ultrasonics Sonochemistry, ISSN 1350-4177, 2016, vol. 29, str. 577-588.
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6. JEVŠNIK, Mojca, OVCA, Andrej, BAUER, Martin, FINK, Rok, ODER, Martina, SEVŠEK, France. Food safety knowledge and practices among elderly in Slovenia. Food control, ISSN 0956-7135. [Print ed.], 2013, vol. 31, no. 2, str. 284-290.

Andrej Ovca:

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UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Oksidativni stres in metode za njegovo detekcijo
Course title:	Oxidative stress and methods for its detection

Študijski programi in stopnja	Študijska smer	Letnik	Semestri
Bioznanosti, tretja stopnja, doktorski	Bioinženiring v zdravstvu		Celoletni

Univerzitetna koda predmeta/University course code:	0

Predavanja	Seminar	Vaje	Klinične vaje	Druge oblike študija	Samostojno delo	ECTS
10	20	0	0	0	95	5

Nosilec predmeta/Lecturer:	Borut Poljšak

Izvajalci predavanj:	Polona Jamnik, Irina Milisav Ribarič, Borut Poljšak
Izvajalci seminarjev:	
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type:	teoretični/theoretical

Jeziki/Languages:	Predavanja/Lectures:	Slovenščina
	Vaje/Tutorial:	Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Splošni pogoji za vpis na doktorski študij.	General conditions for enrolment in doctoral studies.

Vsebina:	Content (Syllabus outline):
Oksidativni stres je definiran kot porušenje ravnotežja med tvorbo reaktivnih kisikovih zvrsti (RKZ) in antioksidanti v celici. Posamezni vsebinski sklopi: • Pato-fiziološke spremembe povezane s stanjem oksidativnega stresa • Nastanek reaktivnih kisikovih zvrsti v celicah s poudarkom na singletnem kisiku, superoksidnem anionu, vodikovem peroksidu in	Oxidative stress is defined as the inbalance between the formation of reactive oxygen species (ROS) and antioxidants in the cell. Individual Content Assemblies: • Pato-physiological changes associated with the state of oxidative stress • The formation of reactive oxygen species in cells with emphasis on singlet oxygen, superoxide anion, hydrogen peroxide and

hidroksilnem radikalu – endogeni in eksogeni viri • Vloga kovinskih ionov pri nastanku oksidativnega stresa. • Antioksidativni obrambni (endogeni in eksogeni) sistemi Metode za detekcijo RKZ: Elektronska paramagnetna resonanca, Detekcija vodikovega peroksida, Detekcija superoksidnega aniona, Določanje sprememb koncentracije eksogenih antioksidantov kot indikator oksidativnega stresa, Določanje poškodb DNK kot indikator oksidativnega stresa, Določanje oksidativnih poškodb proteinov, Poškodbe membran in lipidna peroksidacija kot indikator oksidativnega stresa	hydroxyl radical - endogenous and exogenous sources • The role of metal ions in the formation of oxidative stress. • Antioxidant defense (endogenous and exogenous) systems • Methods for ROS detecting: Electronic paramagnetic resonance, Detection of hydrogen peroxide, Detection of superoxide anion, Determination of changes in the concentration of exogenous antioxidants as an indicator of oxidative stress, Determination of DNA damage as an indicator of oxidative stress, Determination of oxidative damage to proteins, Damage of membranes and lipid peroxidation as an indicator of oxidative stress

Temeljna literatura in viri/Readings:
Izbrana poglavja / Selected chapters: Halliwell B., Gutteridge J.M.C. 2015. Free radicals in biology and medicine. Oxford, Oxford University Press: 944 str. Originalni znanstveni članki iz tekoče periodike / actual scientific papers.

Cilji in kompetence:	Objectives and competences:
Cilji: Študenti bodo spoznali kemijsko zgradbo reaktivnih kisikovih zvrsti (RKZ), njihove pozitivne in negativne učinke na zgradbo in delovanje celic / organizmov. V nadaljevanju bodo spoznali definicijo oksidativnega stresa, endogene in eksogene vire ROS ter antioksidativne obrambne sisteme – endogene in eksogene. Primere oksidativnega stresa bodo spoznali pri različnih organizmih, od prokariontov do različnih evkariontov. V drugem delu bo sledil pregled metod za detekcijo oksidativnega stresa. Študenti bodo izdelali seminar, pri katerem bodo spoznali aktualno problematiko s področja oksidativnega stresa, zmožni bodo uporabljati in kombinirati različne vire informacij. Kompetence: Študenti bodo znali detektirati oksidativni stres v celicah in ovrednotiti njegov vpliv na različnih nivojih organizacije bioloških sistemov.	Aims: Students will learn about the chemical structure of reactive oxygen species (ROS), their positive and negative effects on the structure and function of cells/organisms. This will be followed by learning definition of oxidative stress, internal and external sources of ROS and endogenous and exogenous antioxidant defence systems. Examples of oxidative stress will be introduced in different organisms, from prokaryotes to different eukaryotes. In the last part a review of methods for oxidative stress detection will be presented. Students will prepare a seminar, which will introduced them with the actual problems in the field of oxidative stress. They will be able to use and combine different sources of information. Competences: Students will be able to detect oxidative stress in the cells and evaluate its effect at different levels of biological systems

Predvideni študijski rezultati:	Intended learning outcomes:
Znanje in razumevanje:	Knowledge and understanding:

Temeljno razumevanje delovanja RKZ in antioksidantov v celicah. Razumevanje principa oksidativnega stresa v bioloških sistemih in posledic oksidativnega stresa za organizem in razvoj bolezni. Poznavanje metod za detekcijo in ovrednotenje oksidativnega stresa v celicah.	Basic understanding of ROS and antioxidants action in the cells. Understanding the principles of oxidative stress in biological systems and consequences of oxidative stress to the organism and disease development. Knowledge about the methods of oxidative stress detection and its evaluation in the cells.

Metode poučevanja in učenja:	Learning and teaching methods:
Predavanja, seminar, diskusije.	Lectures, seminar, discussions.

Načini ocenjevanja:	Delež/Weight	Assessment:
ustni izpit	70,00 %	Oral exam
seminar	30,00 %	seminar

Reference nosilca/Lecturer's references:

Borut Poljšak:

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cerevisiae and human monocyte-derived dendritic cells. *Journal of the science of food and agriculture*, ISSN 0022-5142. [Print ed.], 2015, vol. 95, iss. 15, str. 3096-3106.

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Irina Milisav:

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