Univerza v Mariboru
Medicinska fakulteta

UČNI NAČRT PREDMETA / COURSE SYLLABUS			
Ime predmeta:	**Biološko aktivni orientirani polimeri**		
Course title:	**Bioactive Oriented Polymers**		
Študijski program in stopnja Study programme and cycle	**Študijska smer Study option**	**Letnik Year of study**	**Semester Semester**
Biomedicinska tehnologija/3. stopnja		**2**	**3 ali 4**
Biomedical Technology/3rd Degree			

Vrsta predmeta (obvezni ali izbirni) / Course type (compulsory or elective)	Izbirni Elective
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	**Seminar Seminar**	**Vaje Tutorial**			**Klinične vaje Clinical training**	**Druge oblike študija Other forms of study**	**Samost. delo Individual work**	**ECTS**
		10						
15	**20**	**AV**	**LV**	**RV**			**135**	**6**

Nosilec predmeta / Course coordinator:	Prof. dr. Karin Stana-Kleinschek

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites for enrolling in the course or for performing study obligations:**

Vsebina (kratek pregled učnega načrta):	**Content (syllabus outline):**
Definicija pojmov: biološka aktivnost, biološka kompatibilnost, biološka razgradljivost, itd. vlaknati material v medicini: 1. uporaba na površini kože in tkiv (obliži, kirurške maske, halje in pregrinjala, plenice, tamponi, itd.). 2. uporaba znotraj tkiv – vstavki in vsadki (žile, vezi, mrežice, itd.), 3. uporaba v medicinskih napravah (dializni filtri, sodne, itd.) orientirani polimeri, uporabni v medicini (PLA, PET, PTFE, PU, PEG, celuloza, hitozan, idr.) reagenti, postopki in tehnologije za dosego biološko aktivnih lastnosti orientiranih polimerov (postopki priprave površin: s plazmo, z radiacijo, kemično modifikacijo, itd. ter postopki nanosa aktivnih snovi (PEO, PEG, hitozan, kolagen, heparin, alignat, itd.) s prašenjem, potapljanjem, premazovanjem, idr.)	Definitions of concepts: bioactivity, biocompatibility, biodegradability, etc. Fibrous materials in medicine: 1. external – applicable on the skin or on tissue surface (surgical masks, smocks and aprons, tampons, diapers, wound dressings), 2. internal – applicable within tissues – implants and inserts (vascular grafts, ligaments, mashes, etc.) 3. their use in medical apparatuses (dialysis filters, probes) Oriented polymers applicable in medicine (PLA, PET, PTFE, PU, PEG, cellulose, chitosan, etc.) Reagents, processes and technologies for bioactive properties achievement of oriented polymers (the preparation of surfaces: using plasma, radiation, chemical modification, etc., as well as the application of active materials (PLA, PET, PTFE, PU, PEG,…) by spraying, dipping, painting, etc.

funkcionalne lastnosti orientiranih polimerov v medicini (visoka oz. specifična adsorpcijska kapaciteta, protimikrobnost, specifične mehanske lastnosti, prepustnost, kontrolirano oddajanje substanc, protialergijsko delovanje, itd.) fizikalno kemijske metode za analizo biološko aktivnih površin orientiranih polimerov (morfologija in kemijska struktura površine, poroznost, prepustnost, hidrofilno/hidrofobni značaj, elektrokinetične lastnosti, površinski naboj, …) analizne metode za ugotavljanje biološke kompatibilnost orientiranih polimerov: 1. »in vitro«: v stiku s tkivom (rast celic, razvoj tkiv) oz. s krvjo in biološkimi tekočinami (statičnimi in dinamičnimi testi); 2. »in vivo« (funkcionalni in nefunkcionalni testi na živalih in ljudeh).	Functional properties of oriented polymers in medicine (a high, or rather specific adsorption capacity, antimicrobic qualities, specific mechanical properties, permeability, the controlled delivery of substances, antiallergic properties, etc.) Physical-chemical methods of analysis of bioactive oriented polymer surfaces (the morphology and chemical structure of the surfaces, porosity, permeability, hydrophylic/hydrophobic character, electro kinetic properties, surface charge, surface free energy, …) Methods of analysis to the biocompatibility of oriented polymers: 1. in vitro: in contact with the tissue (cell growth, tissue development) or contact with blood and biological fluids (static and dynamic tests); 2. in vivo (functional and non-functional tests on humans and animals)

Temeljni literatura in viri / Reading materials:

TEMELJNA LITERATURA:

1. T. Mohan and K. Stana Kleinschek: Functional Biomaterials: Design and Development for Biotechnology, Pharmacology, and Biomedicine, 2023, Wiley-VCH GmbH (ISBN:9783527347711).

DOPOLNILNA LITERATURA:

2. T. Maver et al.: Bioactive Polysaccharide Materials for Modern Wound Healing, SpringerBriefs in Molecular Science (BRIEFSMOLECULAR), 2018, Springer Cham (ISBN: 978-3-319-89607-6).

3. T. Zidarič et al.: Function-Oriented Bioengineered Skin Equivalents - Continuous Development Towards Complete Skin Replication, SpringerBriefs in Molecular Science (BRIEFSMOLECULAR), 2023, Springer Cham (ISBN: 978-3-031-21297-0).

4. MOHAN, Tamilselvan, AJDNIK, Urban, NAGARAJ, Chandran, LACKNER, Florian, DOBAJ-ŠTIGLIC, Andreja, PALANI, Thirvengadam, AMORNKITBAMRUNG, Lunjakorn, GRADIŠNIK, Lidija, MAVER, Uroš, KARGL, Rupert, STANA-KLEINSCHEK, Karin. One-step fabrication of hollow spherical cellulose beads: application in pH-responsive therapeutic delivery. ACS applied materials & interfaces. [Online ed.]. 2022, [v tisku] [14 str.]. ISSN 1944-8252. https://pubs.acs.org/doi/10.1021/acsami.1c19577, DOI: 10.1021/acsami.1c19577. [COBISS.SI-ID 93881603],

Cilji in kompetence:	**Objectives and competences:**
Osvojitev pojmov s področja bioloških lastnosti orientiranih polimerov Osvojitev znanj s področja izdelave in obdelave materialov (tehnologije in postopki za pridobitev biološko aktivnih lastnosti) Poznavanje funkcionalnih lastnosti vlaknatih materialov, uporabnih v medicini Osvojitev teoretičnih osnov o fizikalno kemijskih metodah za analizo površinskih lastnosti orientiranih polimerov Seznanitev z metodami za ugotavljanje specifičnih lastnosti biološko aktivnih orientiranih polimerov	Mastering the concepts in the field of the biological qualities of oriented polymers Mastering knowledge in the area of producing and Processing of materials (technology and procedures for achieving bioactive qualities) Gaining and understanding of the functional qualities of fibrous materials applicable in medicine Mastering the theoretical basis of physical chemistry methods of analysing the surface qualities of oriented polymers Familiarity with methods used to determine the specific properties of bioactive oriented polymers
Predvideni študijski rezultati:	**Intended learning outcomes:**

Znanje in razumevanje: Študent bo dobil specialna znanja o bioloških in funkcionalnih lastnostih vlaknatih materialov, pa tudi o postopkih in tehnologijah pridobivanja biološko aktivnih lastnosti.	**Knowledge and understanding:** Student will get special knowledge about biological and functional characteristics of fibrous materials, about procedures and technologies of production biologically active characteristics.
Prenosljive/ključne spretnosti in drugi atributi: Študent bo osvojil fizikalno kemijske metode za analizo biološko aktivnih površin orientiranih polimerov	**Transferable/key competences and other abilities:** The student will acquire physical and chemical methods for the analysis of biologically active surfaces of oriented polymers.
Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja Seminarji Vaje Samostojno delo	Lectures Seminars Tutorial Individual work

Načini ocenjevanja:	**Delež (v %) / Share (in %)**	**Assessment methods:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt)		Method (written or oral exam, coursework, project):
Ustni izpit	**50 %**	Oral exam
Seminarska naloga	**50 %**	Seminar paper

Reference nosilca / Course coordinator's references:

Prof. dr. Karin Stana-Kleinschek

MOHAN, Tamilselvan, AJDNIK, Urban, NAGARAJ, Chandran, LACKNER, Florian, DOBAJ-ŠTIGLIC, Andreja, PALANI, Thirvengadam, AMORNKITBAMRUNG, Lunjakorn, GRADIŠNIK, Lidija, MAVER, Uroš, KARGL, Rupert, STANA-KLEINSCHEK, Karin. One-step fabrication of hollow spherical cellulose beads: application in pH-responsive therapeutic delivery. ACS applied materials & interfaces. [Online ed.]. 2022, [v tisku] [14 str.]. ISSN 1944-8252. https://pubs.acs.org/doi/10.1021/acsami.1c19577, DOI: 10.1021/acsami.1c19577. [COBISS.SI-ID 93881603], [JCR, SNIP, WoS do 10. 10. 2023: št. citatov (TC): 10, čistih citatov (CI): 8, čistih citatov na avtorja (CIAu): 0.77, Scopus do 29. 9. 2023: št. citatov (TC): 9, čistih citatov (CI): 7, čistih citatov na avtorja (CIAu): 0.67]
financer: ARRS, Programi, P-0036, SI, Bio-psiho-socialni model kvalitete življenja; ARRS, Projekti, J3-1762, SI, Nov inovativen pristop k zdravljenju pleničnega izpuščaja z uporabo plenic z vgrajenimi probiotičnimi bakterijami; ARRS, Projekti, J4-1764, SI, Razvoj multifunkcionalnih polisaharidnih kompozitnih nanodelcev za razkislinjenje,izboljšanje trdnosti in preprečevanje mikrobiološkega napada zgodovinskih artefaktov na osnovi celuloze; Austrian Research Promotion Agency (FFG no. 846065)
kategorija: 1A1 (Z, A'', A', A1/2); uvrstitev: SCIE, Scopus, MBP (COMPENDEX, INSPEC, MEDLINE, PUBMED); tip dela še ni verificiran
točke: 12.64, št. avtorjev: 11

BRAČIČ, Matej, MOHAN, Tamilselvan, KARGL, Rupert, GRIESSER, Thomas, HEINZE, Thomas, STANA-KLEINSCHEK, Karin. Protein repellent anti-coagulative mixed-charged cellulose derivative coatings. Carbohydrate polymers. [Print ed.]. Feb. 2021, vol. 254, str. 1-10, ilustr. ISSN 0144-8617. DOI: 10.1016/j.carbpol.2020.117437. [COBISS.SI-ID 40797443],

KATAN, Tadeja, KARGL, Rupert, MOHAN, Tamilselvan, STEINDORFER, Tobias Alexander, MOZETIČ, Miran, KOVAČ, Janez, STANA-KLEINSCHEK, Karin. Solid phase peptide synthesis on chitosan thin films. Biomacromolecules. [Online ed.]. 2022, [vol.] 23, [iss.] 3, str. 731-742. ISSN 1526-4602. DOI: 10.1021/acs.biomac.1c01155. [COBISS.SI-ID 94308611],