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:

- J. V. Edwards, T. L. Vigo, Bioactive fibres and Polymers, American Chemical Society, Washington, DC, 2001
- M. Szycher, High performance Biomaterials, A comprehensive guide to medical and pharmaceutical applications, Technomic Publishing Company Inc., 1991, Lancaster, USA
- J. Black, Biological Performance of materials, Marcel Dekker, Inc., New York, 1999
- K. Park, Controlled Drug Dellivery. Challenges and Strategies, ACS professional reference book, 1997, Washington DC
- J. Richard, M. S. LaPorte, Hydrophylic Polymer Coatings for Medical Devices, Technomic Publishing Company Inc., 1997
- J. I. Gallin, I. M. Goldstein, R. Snyderman, Inflammation, Basic Principles and Clinical Correlates, Raven Press New York, 1992
- Sharma R.: Surfactant Adsorption and Surface Solubilization, Washington DC: Americal Chemical Society, 1995.
- Parfitt G. D.: Adsorption from Solution at the Solid/Liquid Interface; London: Academic Press, 1983
- Ruthven, D. M.: Principles of adsorption and adsorption processes; New York (etc): John Wiley & sons, 1984
- Lyklema J.: Fundamentals of Interface and Colloid Science, Vol. 1: Fundamentals, London (etc.): Academic Press, 1993
- Kithara A., Watenabe A.: Electrical Phenomena at Interfaces; New York, Basel: Marcel Dekker inc., 1984
- Drew, M.: Surfaces, Interfaces and Colloids, Second Edition; New York (etc.): John Wiley & Sons, 1999

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	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

Seznanitev z metodami za ugotavljanje specifičnih lastnosti biološko aktivnih orientiranih polimerov	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):
Ustno izpraševanje Seminarska naloga	**50 %** **50 %**	Oral examination Report

Reference nosilca / Course coordinator's references:

Prof. dr. Karin Stana-Kleinschek

ELSCHNER, Thomas, OBST, Franziska, HEINZE, Thomas, KARGL, Rupert, STANA-KLEINSCHEK, Karin. Reactive maleimido dextran thin films for cysteine-containing surfaces adsorbing BSA. Macromolecular chemistry and physics, ISSN 1521-3935. [Online ed.], 2017, vol. 218, iss. 16, str. 1-8, doi: 10.1002/macp.201600535. [COBISS.SI-ID 20599318], [JCR, SNIP, WoS do 15. 9. 2019: št. citatov (TC): 2, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.20, Scopus do 29. 8. 2019: št. citatov (TC): 2, čistih citatov (CI): 1, čistih citatov na avtorja (CIAu): 0.20] kategorija: 1A2 (Z, A1/2); uvrstitev: SCI, Scopus, MBP; tip dela je verificiral OSICN točke: 19.59, št. avtorjev: 5

MAVER, Tina, SMRKE, Dragica, KUREČIČ, Manja, GRADIŠNIK, Lidija, MAVER, Uroš, STANA-KLEINSCHEK, Karin. Combining 3D printing and electrospinning for preparation of pain-relieving wound-dressing materials. Journal of sol-gel science and technology, ISSN 0928-0707, First Online: 20 March 2018, str. 1-16. https://link.springer.com/article/10.1007/s10971-018-4630-1, doi: 10.1007/s10971-018-4630-1. [COBISS.SI-ID 21262870], [JCR, SNIP, WoS do 11. 8. 2019: št. citatov (TC): 6, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 0.33, Scopus do 29. 8. 2019: št. citatov (TC): 8, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 0.33] kategorija: 1A1 (Z, A', A1/2); uvrstitev: SCI, Scopus, MBP; tip dela še ni verificiran točke: 16.67, št. avtorjev: 6

KUREČIČ, Manja, MAVER, Tina, VIRANT, Natalija, OJSTRŠEK, Alenka, GRADIŠNIK, Lidija, HRIBERNIK, Silvo, KOLAR, Mitja, MAVER, Uroš, STANA-KLEINSCHEK, Karin. A multifunctional electrospun and dual nano-carrier biobased system for simultaneous detection of pH in the wound bed and controlled release of benzocaine. Cellulose, ISSN 0969-0239, First Online 03 October 2018, str. [1-21]. https://link.springer.com/article/10.1007%2Fs10570-018-2057-z, doi: 10.1007/s10570-018-2057-z.

[COBISS.SI-ID 21754390], [JCR, SNIP, WoS do 15. 9. 2019: št. citatov (TC): 3, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 0.22, Scopus do 20. 10. 2018: št. citatov (TC): 0, čistih citatov (CI): 0, čistih citatov na avtorja (CIAu): 0] kategorija: 1A1 (Z, A'', A', A1/2); uvrstitev: SCI, Scopus, MBP; tip dela še ni verificiran točke: 18.89, št. avtorjev: 9