Univerza v Mariboru

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Biološko aktivni orientirani polimeri**
Course title:	**Bioactive Oriented Polymers**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Biomedicinska tehnologija/Biomedical Technology 3. stopnja/3rd Degree		2	3 ali 4

Vrsta predmeta / Course type	Izbirni/Elective
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. Delo Individ. Work	ECTS
15	20	10			105	5

Nosilec predmeta / Lecturer:	Prof. dr. Karin Stana-Kleinschek Prof. dr. Simona Strnad

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Kandidat mora doseči 300 ECTS na predhodnem študiju.	Graduate degree 300 ECTS

Vsebina:	**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.) - 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, …)	- definitions of concepts: bioactivity, biocompatibility, biodegradibility, 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. - 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,

- analizne metode za ugotavljanje biološke kompatibilnosti 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).	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 / Readings:

- 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 - 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 **Prenesljive/ključne spretnosti in drugi atributi:** Študent bo osvojil fizikalno kemijske metode za analizo biološko aktivnih površin orientiranih polimerov	**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 **Transferable/Key Skills and other attributes:** 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, individualno raziskovalno delo	Lectures, independent research

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Ustno izpraševanje		Oral examination
Seminarska naloga		Report