Univerza v Mariboru

UČNI NAČRT PREDMETA / COURSE SYLLABUS			
Ime predmeta:	**Ortopedska tehnologija**		
Course title:	**Orthopaedic technology**		
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**
15	**30**	**AV**	**LV**	**RV**			**135**	**6**

Nosilec predmeta / Course coordinator:	Izr. prof. dr. Samo Karel FOKTER

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

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):**
Biomateriali in biomehanika	**Biomaterials and biomechanics**
Temeljna načela	**Basic concepts**
Poglavitne fizikalne količine	Principal physical quantities
Analiza prostih teles	Free-body analysis
Analiza z metodo končnih elementov	Finite element analysis
Obraba	Wear
Biomateriali	**Biomaterials**
Trdnost materialov	Strength of materials
Materiali in strukture	Materials and structure
Ortopedske strukture	Orthopaedic structures
Biomehanika	**Biomechanics**
Biomehanika hrbtenice	Spine biomechanics
Biomehanika sklepov	Joint biomechanics

Temeljni literatura in viri / Reading materials:

Mark D. Miller, Stephen R. Thompson. Miller's Review of Orthopaedics, 8th Ed. Elsevier, 2019 Dominique G. Poitout (ed). Biomechanics and Biomaterials in Orthopedics. Springer, 2016 Bingyun Li, Thomas Webster. Orthopedic Biomaterials. Springer, 2017 Najnovejše objave glede na področje	
Cilji in kompetence:	**Objectives and competences:**
Cilj: Študenti bodo usposobljeni za razumevanje fizikalnih zakonitosti pri delovanju človeškega telesa, njihovo povezavo z razvojem okvar gibalnega sistema ter možnostmi sodobnega ortopedskega zdravljenja. **Kompetence**: Pridobili bodo znanje o biomehaniki gibalnega sistema, vplivu fizikalnih zakonitosti na razvoj akutnih poškodb in degenerativnih okvar gibal in značilnostih biomaterialov, ki se uporabljajo v sodobni ortopedski kirurgiji.	**Objective:** Students will be trained to understand the physical principles governing the functioning of the human body, their connection to the development of musculoskeletal disorders, and the possibilities of modern orthopedic treatment. **Competencies:** They will gain knowledge of the biomechanics of the musculoskeletal system, the impact of physical principles on the development of acute injuries and degenerative disorders, and the characteristics of biomaterials used in modern orthopedic surgery.
Predvideni študijski rezultati: Študenti na izbranih kliničnih primerih analizirajo klinično sliko, biomehanske zakonitosti in patofiziologijo pri posameznih okvarah gibal ter predvidijo ustrezno zdravljenje.	**Intended learning outcomes:** Students will analyze clinical cases, examining clinical presentations, biomechanical principles, and pathophysiology in specific musculoskeletal disorders, and propose appropriate treatments.
Znanje in razumevanje: Študenti povežejo obstoječe znanje in razumevanje anatomije, biomehanike, patofiziologije in klinične slike posameznih bolezni in okvar gibalnega sistema z načeli sodobnega ortopedskega zdravljenja.	**Knowledge and understanding:** Students will integrate existing knowledge and understanding of anatomy, biomechanics, pathophysiology, and the clinical presentation of specific diseases and disorders of the musculoskeletal system with the principles of modern orthopedic treatment.
Prenosljive/ključne spretnosti in drugi atributi: V poteku raziskovalnega projekta študent pridobi znanje o posameznih boleznih gibal, njihovo povezavo z morebitnimi pridruženimi biomehanskimi okvarami in/ali probremenitvami ter jih poveže s sodobnim ortopedskim zdravljenjenjem, ki ga omogoča uporaba ustreznih biomaterialov.	**Transferable/key competences and other abilities:** Through the research project, the student will acquire knowledge of individual musculoskeletal diseases, their potential association with related biomechanical disorders and/or overload, and link this understanding with modern orthopedic treatments enabled by the use of appropriate biomaterials.
Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja Seminar (seminarske naloge) Samostojno delo	Lectures Seminars Individual work

Načini ocenjevanja:	**Delež (v %) / Share (in %)**	**Assessment methods:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt): Seminarska naloga	**40 %**	Method (written or oral exam, coursework, project): Seminar paper

Raziskovalna naloga	**60 %**	Research assignment

Reference nosilca / Course coordinator's references:

1. FOKTER, Samo K., LEDINEK, Živa, KLJAIĆ-DUJIĆ, Milka, NOVAK, Igor. Extreme serum titanium concentration induced by acetabular cup failure : unveiling a unique scenario of titanium alloy debris accumulation. Bioengineering. 2024, vol. 11, issue 3, [article no.] 235, str. [1]-13, ilustr. ISSN 2306-5354. https://doi.org/10.3390/bioengineering11030235, https://www.mdpi.com/2306-5354/11/3/235, DOI: 10.3390/bioengineering11030235. [COBISS.SI-ID 187733251]

2. STRAHOVNIK, Andrej, STRAHOVNIK, Igor, FOKTER, Samo K. Coronal knee alignment and tibial rotation in total knee arthroplasty : a prospective cohort study of patients with end-stage osteoarthritis. Bioengineering. 2024, vol. 11, issue 3, str. [1]-12, ilustr. ISSN 2306-5354. https://www.mdpi.com/2306-5354/11/3/296, https://doi.org/10.3390/bioengineering11030296, DOI: 10.3390/bioengineering11030296. [COBISS.SI-ID 191094531]

3. FOKTER, Samo K., KUHTA, Matevž, HOJNIK, Marko, LEDINEK, Živa, KOSTANJŠEK, Rok. Tissue integration of calcium phosphate compound after subchondroplasty : 4-year follow-up in a 76-year-old female patient. Bioengineering. 2023, vol. 10, issue 2, [article no.] 208, str. [1]-12, ilustr. ISSN 2306-5354. https://www.mdpi.com/2306-5354/10/2/208, https://doi.org/10.3390/bioengineering10020208, DOI: 10.3390/bioengineering10020208. [COBISS.SI-ID 141341955] projekt: financer: Mikro-CT analizo je financirala Javna agencija za raziskovalno dejavnost Republike Slovenije (Infrastrukturni center za mikroskopijo bioloških vzorcev, MRIC UL, I0-0022-0481-08) na Biotehniški fakulteti Univerze v Ljubljani, Slovenija

4. FOKTER, Samo K., GUBELJAK, Nenad, PUNZÓN QUIJORNA, Esther, PELICON, Primož, KELEMEN, Mitja, VAVPETIČ, Primož, PREDAN, Jožef, FERLIČ, Luka, NOVAK, Igor. Total Knee replacement with an uncemented porous tantalum tibia component: A failure analysis. Materials. Mar. 2022, vol. 15, iss. 7 (2575), 13 str. ISSN 1996-1944. DOI: 10.3390/ma15072575. [COBISS.SI-ID 103785475]

5. FOKTER, Samo K., ZAJC, Jan, MERC, Matjaž. Interchangeable neck failures of bi-modular femoral stems in primary total hip arthroplasty cannot be predicted from serum trace element analysis. International orthopaedics. Apr. 2021, vol. 45, issue 4, str. 877-881, ilustr. ISSN 1432-5195. https://link.springer.com/article/10.1007%2Fs00264-020-04812-6, https://doi.org/10.1007/s00264-020-04812-6, DOI: 10.1007/s00264-020-04812-6. [COBISS.SI-ID 29172995] Projekt: IRP-2017/01-01; financer: Univerzitetni klinični center Maribor

6. PODLIPEC, Rok, PUNZÓN QUIJORNA, Esther, PIRKER, Luka, KELEMEN, Mitja, VAVPETIČ, Primož, KAVALAR, Rajko, HLAWACEK, Gregor, ŠTRANCAR, Janez, PELICON, Primož, FOKTER, Samo K. Revealing inflammatory indications induced by titanium alloy wear debris in periprosthetic tissue by label-free correlative high-resolution ion, electron and optical microspectroscopy. Materials. 2021, vol. 14, issue 11, str. [1-16], ilustr. ISSN 1996-1944. https://www.mdpi.com/1996-1944/14/11/3048, DOI: 10.3390/ma14113048. [COBISS.SI-ID 66427395]; projekt: PIE-0007 CROSSING project; financer: Helmholtz European Partnering, projekt: Marie Skłodowska-Curie grant agreement No. 799182 TissueMaps project, projekt: J7-9398 Molekularno slikanje v celici; financer: ARRS, projekt: N1-0090 Slikanje molekularnih porazdelitev na nivoju celice; financer: ARRS, projekt: P1-0112 Raziskave atomov, molekul in struktur s fotoni in delci; financer: ARRS, projekt: I0-0005 Infrastrukturni program Instituta Jožef Stefan; financer: ARRS, projekt: P1-0212 Biologija rastlin; financer: ARRS, projekt: P1-0099 Fizika mehkih snovi, površin in

nanostruktur; financer: ARRS, projekt: 824096 European Union's Horizon 2020 research and innovation programme, RADIATE project.

7. PUNZÓN QUIJORNA, Esther, KELEMEN, Mitja, VAVPETIČ, Primož, KAVALAR, Rajko, PELICON, Primož, FOKTER, Samo K. Particle Induced X-ray Emission (PIXE) for elemental tissue imaging in hip modular prosthesis fracture case. Nuclear instruments and methods in physics research. Section B, Beam interactions with materials and atoms. 1. Jan. 2020, vol. 462, str. 182-186, ilustr. ISSN 1872-9584. https://www.sciencedirect.com/science/article/pii/S0168583X19306846, DOI: 10.1016/j.nimb.2019.10.019. [COBISS.SI-ID 6863423]