

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Biomehanika sklepov
Course title:	Joints Biomechanics

Študijski programi in stopnja	Študijska smer	Letnik	Semestri
Medicina, druga stopnja, enovit magistrski	Medicina (študijski program)	2 - 6. letnik	4,6,8,9,10,11

Univerzitetna koda predmeta/University course code: 151

Predavanja	Seminar	Vaje	Klinične vaje	Druge oblike študija	Samostojno delo	ECTS
25	15	15	0	20	105	6

Nosilec predmeta/Lecturer: Vane Antolič, Veronika Kralj-Iglič

Vrsta predmeta/Course type: izbirni strokovni/professional elective

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Opravljen izpit iz anatomije.	Completed anatomy exam.

Vsebina:	Content (Syllabus outline):
Študent se nauči določiti kontaktni kolčni sklepni tlak, rezultantno kolčno sklepno silo, obremenjeno površino kolka in sile nekaterih mišic ter oceniti radiografske parametre, s katerimi standardno opredeljujejo status okolčja. Z analizo slikovnega materiala in opisa zdravljenja skuša povezati biomehanski, radiografski in klinični status okolčja pri določenem bolniku. Študent se seznani z modelom hrbtenice. Študent se seznani z osnovami biomehanike in z osnovami mehanike mehkih tkiv sklepa (sklepni hrustanec, vezi, meniskusi).	The student will learn how to determine the contact hip stress, the resultant hip force, the weight-bearing surface, muscle forces and how to evaluate the standard pelvic radiographic parameters. The goal is to connect imaging studies analysis and treatment course description with biomechanical, radiographic and clinical hip status in an individual patient. Student acknowledges model of the spine. Student acknowledges basics of cell biomechanics. Student acknowledges basics of cell biomechanics and biomechanics of soft tissues (articular cartilage, ligaments, meniscus).

Temeljna literatura in viri/Readings:
Veronika Kralj - Iglič, Drago Dolinar, Matic Ivanovski, Ivo List and Matej Daniel, Role of Biomechanical Parameters in HipOsteoarthritis and Avascular Necrosis of Femoral Head, in: Applied Biological Engineering, Intech Open, 2012, DOI: 10.5772/30159
Veronika Kralj-Iglič: Validation of Mechanical Hypothesis of hip Arthritis Development by HIPSTRESS Method , in: Osteoarthritis, Intech Open, 2015, DOI: 10.5772/59976
Veronika Kralj-Iglič Understanding Hip Biomechanics: From Simple Equilibrium to Personalized HIPSTRESS Method , in: Developmental Diseases of the Hip – Diagnosis and Management, Intech Open, 2017, DOI: 10.5772/66753
Aleš Iglič, Veronika Kralj-Iglič, Damjana Drobne, Nanostructures in Biological Systems, CRC Press, 2015
Članki, v katerih so objavljene metode določanja biomehanskih parametrov okolčja, kot na primer metoda HIPSTRESS (vir: http://physics.fe.uni-lj/publications)
Articles describing determination of biomechanical hip parameters, e.g. the HIPSTRESS method (vir: http://physics.fe.uni-lj/publications)

<p>Cilji in kompetence:</p> <p>Študent se spozna z invazivnimi in neinvazivnimi metodami za določanje biomehanskih parametrov okoličja, nauči določati biomehanske parametre in jih povezovati s kliničnim statusom okoličja.</p> <p>Študent se spozna z osnovami celične biomehanike in biomehanike sklepnih mehkih tkiv ter njihovimi povezavami s kliničnimi problemi.</p>	<p>Objectives and competences:</p> <p>The student shall be acquainted with invasive and non-invasive methods of determination of biomechanical hip parameters. The student shall learn how to determine the biomechanical parameters and correlate them with clinical hip status.</p> <p>Student shall be acquainted with basics of the cell and joint soft tissue biomechanics and their connections to clinical disorders.</p>
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<p>Predvideni študijski rezultati:</p> <p>Znanje in razumevanje: Določanje biomehanskega in radiografskega statusa kolka, razumevanje vzrokov za klinični status kolka. Razumevanje osnov celične biomehanike in biomehanike sklepnih mehkih tkiv.</p> <p>Uporaba: Načrtovanje zdravljenja v klinični praksi: odločanje o optimalni pooperativni geometriji, načinu zdravljenja, načinu rehabilitacije in o preventivnih ukrepih.</p> <p>Refleksija: Analiza uspešnosti zdravljenja s primerjavo klinične slike z načrtovanim razvojem okostja. Prenosljive spretnosti – niso vezane le na en predmet: Analiza slike, razumevanje matematičnih modelov in temeljnih mehanizmov.</p>	<p>Intended learning outcomes:</p> <p>Knowledge and understanding: Determination of biomechanical and radiographic hip status, comprehension of etiology of clinical hip status. Understanding basics of cell biomechanics and joint soft-tissue biomechanics.</p> <p>Use: Treatment planning in clinical practice: Decision on the optimal postoperative geometry. Therapeutic procedures, rehabilitation procedures and preventive measures.</p> <p>Reflection: Analysis of treatment outcomes by comparison of clinical status with bone geometry.</p> <p>Transferable skills – not related to one subject: Image analysis, understanding of mathematical models and basic mechanisms.</p>
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<p>Metode poučevanja in učenja:</p> <p>Predavanja, vaje, seminar, individualno delo z mentorjem, mini-simpozij.</p>	<p>Learning and teaching methods:</p> <p>Lectures, practical exercises, seminar, individual work with mentor, mini-symposium.</p>
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Načini ocenjevanja:	Delež/Weight	Assessment:
<p>Demonstracija metode in prikaz rezultatov Ocenjevalna lestvica 1-10 (1-5 negativno, 6-10 pozitivno)</p>	<p>100,00 %</p>	<p>Method demonstration and presentation of results. Evaluation scale 1-10 (1-5 negative, 6-10 positive)</p>

<p>Reference nosilca/Lecturer's references:</p> <p>Prof. dr. Vane Antolič (full references at www.pubmed.com):</p> <p>MOLIČNIK, Andrej, JANŠA, Jošt, KOCJANČIČ, Boštjan, KRALJ-IGLIČ, Veronika, DOLINAR, Drago. Secondary hip dysplasia increases risk for early coxarthrosis after Legg-Calve-Perthes disease. A study of 255 hips. <i>Computer methods in biomechanics and biomedical engineering</i>, ISSN 1025-5842, 2019, vol. 22, no. 14, str. 1107-1115, ilustr., doi: 10.1080/10255842.2019.1634193.</p> <p>TOMAŽEVIČ, Matevž, KAIBA, Tina, KURENT, Urban, TREBŠE, Rihard, CIMERMAN, Matej, KRALJ-IGLIČ, Veronika. Hip stress distribution, predictor of dislocation in hip arthroplasties : a retrospective study of 149 arthroplasties. <i>PloS one</i>, ISSN 1932-6203, Nov. 2019, vol. 14, no. 11, str. 1-13, ilustr. https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0225459&type=printable, doi: 10.1371/journal.pone.0225459.</p> <p>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. <i>Computer methods in biomechanics and biomedical engineering</i>, ISSN 1025-5842, 2015, vol. 18, no. 13, str. 1468-1473, ilustr., doi: 10.1080/10255842.2014.916700.</p> <p>DANIEL, Matej, RIJAVEC, Boris, DOLINAR, Drago, POKORNÝ, David, IGLIČ, Aleš, KRALJ-IGLIČ, Veronika. Patient-specific hip geometry has greater effect on THA wear than femoral head size. <i>Journal of biomechanics</i>, ISSN 0021-9290. [Print ed.], Dec. 2016, vol. 49, iss. 16, str. 3996-4001, ilustr., graf. prikazi. http://www.sciencedirect.com/science/article/pii/S0021929016311307, doi: 10.1016/j.jbiomech.2016.10.030</p>
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