2025/2026

Univerza v Mariboru
Medicinska fakulteta

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Ime predmeta:	**Medicinska informatika, e-zdravje in medicinska statistika**
Course title:	**Medical informatics, e-Health and medical statistics**

Študijski program in stopnja **Study programme and cycle**	**Študijska smer** **Study option**	**Letnik** **Year of study**	**Semester** **Semester**
Splošna medicina, enovit magistrski študijski program		Drugi	3.
General medicine, Uniform master's degree study program		Second	3rd

Vrsta predmeta (obvezni ali izbirni) / **Course type (compulsory or elective)**	obvezni compulsory
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**
		AV	**LV**	**RV**				
20	10		30				30	3

Nosilec predmeta / Course coordinator:	prof. dr. Dejan Dinevski, doc. dr. Petra Povalej Bržan
Jeziki /Languages: **Predavanja / Lectures:**	slovenski/slovene
Vaje / Tutorial:	slovenski/slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites for enrolling in the course or for performing study obligations:**
Elementarno znanje statistike (pridobljeno pri predmetu Metode raziskovalnega dela v medicini)	Elementary knowledge of Statistics (acquired from course Research Methods in Medicine)

Vsebina (kratek pregled učnega načrta):	**Content (syllabus outline):**
Medicinska informatika in e-zdravje • Osnove računalništva in informatike, lastnosti informacije, prvine informacijskih sistemov • Internet – razvoj in lastnosti, internetne storitve, svetovni splet, splet 2.0, semantični splet in uporaba v medicini • Informacijska varnost – varnostne zahteve in mehanizmi ter pravni in etični vidiki varovanja informacij na zdravstvenem področju	**Medicine and Information Technology** • Basics of computer science and informatics, properties of information and information systems • Internet – development and properties, internet services, world wide web, web 2.0, semantic web and usability in medicine • Information security – security technologies and requirements, legal and ethical aspects of information protection in health systems

- Definiranje informacijskih procesov obravnave in oskrbe pacienta v zdravstvenih institucijah
- Signali, slike in video v medicini, informacijska predstavitev dvodimenzionalnih in 3D struktur
- Biomedicinska informatika in klinična informatika: osnove, namen, področja uporabe v medicini in raziskovanju
- Medicinski informacijski standardi – DICOM, HL7, IHE
- E-izobraževanje v medicini in virtualni pacienti
- E-zdravje, zdravstvena omrežja, bolnišnični informacijski sistemi, elektronski zdravstven karton, standardi v e-zdravju
- Telemedicina; zgodovina, tehnologije telemedicine, praktične aplikacije telemedicine (telekonzultacije, medicinska obravnava na daljavo, nega na daljavo, nadzor bolnika na daljavo) dokazane prednosti na posameznih področjih telemedicine

Medicinska statistika

Ponovitev osnovnih statističnih testov:

- Inferenčna statistika
- Bivariatni parametrični testi
- Bivariatni neparametrični testi

Multipla linearna regresija

- linearni regresijski model
- predpostavke
- mere ustreznosti modela
- interpretacija rezultatov

- Information processes definition in the field of medical treatment and care in health institutions
- Signals, graphics and video in medicine, information formats of 2D and 3D entities

- Biomedical informatics, clinical informatics: basics, purpose, application fields in medicine and research work.
- Medical information standards – DICOM, HL7, IHE
- E-learning in medicine and virtual patients.

- E-health, health networks, hospital information systems, electronic health record, e-health standards.
- Telemedicine; history, telemedicine technologies, applications of telemedicine in medical practice (teleconsultations, tele-medical treatment, telecare) evidence based advantages of telemedicine in particular medical areas.

Medical statistics

A review of basic statistical tests:

- Statistical inference
- Bivariate parametric tests
- Bivariate nonparametric tests

Multiple linear regression

- linear regression model
- assumptions
- adequacy of the model
- interpretation of the results

Temeljni literatura in viri / Reading materials:

- POVALEJ BRŽAN, Petra, DINEVSKI, Dejan. Medicinske raziskave in biostatistika s praktičnimi primeri v programu SPSS. V: TAKAČ, Iztok (ur.), ARKO, Darja. *Ginekološka onkologija*. 1. izd. Maribor: Univerzitetna založba Univerze, 2020. Str. 111-139. ISBN 978-961-286-330-2. [COBISS.SI-ID 512972088]
- Holzinger A: Biomedical informatics, Medical University Graz, Published by BoD, Germany, 2012
- Riffenburgh RH: Statistics in Medicine, Elsevier Ltd, Oxford, August 2012.

Dodatna literatura:

- Shortliffe EH, Cimino J: Biomedical Informatics**,** Springer USA, 2006
- Revija Informatica Medica Slovenica, izbor strokovnih člankov na temo medicinske informatike in telemedicine. Izdaja Slovensko društvo za medicinsko informatiko.

- Field A: An Adventure in Statistics: The Reality Enigma, SAGE Publications Ltd, May 2016.

Cilji in kompetence:

Medicinska informatika, e-zdravje

- Doseči vse tri ravni informacijske pismenosti ter spoznati elemente in principe informacijske družbe.
- Pridobiti raven znanja in spretnosti za samostojno praktično uporabo informacijskih aplikacij za študij in v medicinski praksi
- Razviti sposobnost vrednotenja, iskanja, selekcije in umeščanja novih informacij ter pridobiti zmožnost njihove interpretacije in ocene relevantnosti v medicinskem kontekstu
- Spoznati področje in standarde medicinske informatike in vidike e-zdravja

Statistični del predmeta prispeva predvsem k razvoju naslednjih kompetenc:

- usposobljenost za ustrezno pripravo podatkov za izvedbo statistične analize
- usposobljenost za uporabo osnovnih statističnih testov in razvoj regresijskih modelov
- sposobnost razlage rezultatov uporabljenih statističnih analiz

sposobnost uporabe pridobljenega znanja v praksi

Prenesljive/ključne spretnosti in drugi atributi: -

Objectives and competences:

Medical informatics, e-Health

- Acquire all three levels of information literacy and get to know the elements and principles of information society.
- To gain the knowledge for independed use of information applications for study and medical practice
- To develop the ability to evaluate, search, select and use the new information and capacity to interpret them in medical context.
- To get to know the field of medical informatics, its standards and the principles of e-Health applications

The learning unit on statistics contributes to the development of the following competencies:

- ability to adequately prepare the data for statistical analysis
- ability to use basic statistical tests and the development of regression models
- ability to interpret the results of the statistical analysis

the ability to use the acquired knowledge in practice

Transferable/Key Skills and other attributes: -

Predvideni študijski rezultati:

Znanje in razumevanje:

- Poznavanje področij medicinske informatike in e-zdravja ter telemedicine
- Razumevanje temeljnih principov in standardov po katerih deluje prenos, shranjevanje in uporaba informacij ter

Intended learning outcomes:

Knowledge and understanding:

- Acquired knowledge about medical informatics, e-Health and telemedicine
- Understanding basic principles and standards of data/information processes

delovanje medicinskih informacijskih sistemov • Razumeti osnovne statistične pojme ter uporabo osnovnih statističnih testov. • Razviti sposobnost za uporabo specifičnih statističnih testov in razumeti regresijsko modeliranje. • Razviti sposobnosti, ki omogočajo dosledno razlago raziskovalnih podatkov in zagotavljajo ustrezne informacije o pridobljenih rezultatih.	and usage. Understanding medical information systems. • Understand basic statistical concepts and the use of basic statistical tests. • Develop strategies to use specific statistical tests and understand basic regression modeling. • Develop strategies that enable consistent interpretation of research data and provide correct information on study results.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Seminar • Domače naloge • Vaje, e-izobraževanje	• Lectures • Seminars • Homework • Excercises, e-learning

Načini ocenjevanja:	Delež (v %) / Share (in %)	**Assessment methods:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt)		Method (written or oral exam, coursework, project):
Domače naloge	**10 %**	Homework
Seminarska naloga	**20 %**	Seminar work
Pisni izpit	**70 %**	Written exam
ŠTUDIJSKE OBVEZNOSTI ŠTUDENTOV Glede na sklep Senata z dne 13. 6. 2011 je za študente obvezna 50 % udeležba na predavanjih. POGOJI ZA PRISTOP K POSAMEZNEMU PREVERJANJU ZNANJA Opravljen seminar in vaje.		ACADEMIC OBLIGATIONS OF STUDENTS According to the decision of the Senate on June 13, 2011, 50% attendance at lectures is obligatory for students. REQUIREMENTS FOR ACCESS TO INDIVIDUAL KNOWLEDGE CHECKING Completed seminar assignment and exercises.

Reference nosilca / Course coordinator's references:

DEJAN DINEVSKI

KLEMENC-KETIŠ, Zalika, ČAGRAN, Branka, DINEVSKI, Dejan. Evaluating the difference between virtual and paper-based clinical cases in family medicine undergraduate education. *Advances in Medicine*. 2018, vol. 2018, str. 1-7. ISSN 2314-758X.

DINEVSKI, Dejan, LUČOVNIK, Miha, ŽEBELJAN, Ivan, GUZELJ, Domen, VESENJAK DINEVSKI, Izidora, SALON, Adam, DE BOEVER, Patrick, GOSWAMI, Nandu. Analysis of retinal blood vessel diameters in pregnant women practicing yoga: a feasibility study. *Healthcare*. 2022, vol.10, iss.7, str. 1-6, ilustr. ISSN 2227-9032.

BIZJAK, Mojca (avtor, korespondenčni avtor), KOŠNIK, Mitja, DINEVSKI, Dejan, THOMSEN, Simon Francis, FOMINA, Daria, BORZOVA, Elena, KULTHANAN, Kanokvalai, MESHKOVA, Raisa, AHSAN, Dalia Melina, AL-AHMAD, Mona, MILJKOVIĆ, Jovan, TERHORST, Dorothea, MAURER, Marcus (avtor, korespondenčni avtor), et

al. Risk factors for systemic reactions in typical cold urticaria : results from the COLD-CE study. *Allergy*. [Online ed.]. Jul. 2022, vol. 77, iss. 7, str. 2185-2199, ilustr. ISSN 1398-9995.

PETRA POVALEJ BRŽAN

KLANJŠEK, Petra, PAJNKIHAR, Majda, MARČUN-VARDA, Nataša, MOČNIK, Mirjam, GOLOB JANČIČ, Sonja, POVALEJ BRŽAN, Petra. Development and validation of a new screening tool with non-invasive indicators for assessment of malnutrition risk in hospitalised children. Children. 2022, vol. 9, issue 5, str. [1]-16. ISSN 2227-9067. https://doi.org/10.3390/children9050731, https://www.mdpi.com/2227-9067/9/5/731, DOI: 10.3390/children9050731. [COBISS.SI-ID 108194307], [JCR, SNIP]

MEŠTROVIČ POPOVIČ, Katarina, POVALEJ BRŽAN, Petra, LANGERHOLC, Tomaž, MARČUN-VARDA, Nataša. The impact of Lactobacillus plantarum PCS26 supplementation on the treatment and recurrence of urinary tract infections in children – a pilot study. Journal of clinical medicine. 2022, vol. 11, issue 23, str. [1]-12, ilustr. ISSN 2077-0383. https://doi.org/10.3390/jcm11237008, https://www.mdpi.com/2077-0383/11/23/7008, DOI: 10.3390/jcm11237008. [COBISS.SI-ID 131253251], [JCR, SNIP, WoS, Scopus]

ČAS, Katarina, COSSUTTA, Irena, ESIH, Maruša, POVALEJ BRŽAN, Petra, MARČUN-VARDA, Nataša. Meritve podajnosti arterij pri slovenskih otrocih in mladostnikih = Arterial compliance measurements in Slovenian children and adolescents. Zdravniški vestnik : glasilo Slovenskega zdravniškega društva. [Tiskana izd.]. 2021, letn. 90, št. 1/2, str. 10-20, ilustr. ISSN 1318-0347. https://vestnik.szd.si/index.php/ZdravVest/article/view/3036/3059, http://www.dlib.si/details/URN:NBN:SI:DOC-ROIS0AUS. [COBISS.SI-ID 53507331], [SNIP]

KLANJŠEK, Petra, PAJNKIHAR, Majda, MARČUN-VARDA, Nataša, POVALEJ BRŽAN, Petra. Screening and assessment tools for early detection of malnutrition in hospitalised children : a systematic review of validation studies. BMJ open. 2019, vol. 9, no. 5, str. 1-17. ISSN 2044-6055. https://bmjopen.bmj.com/content/bmjopen/9/5/e025444.full.pdf, DOI: 10.1136/bmjopen-2018-025444. [COBISS.SI-ID 2496420], [JCR, SNIP, WoS do 20. 4. 2023: št. citatov (TC): 29, čistih citatov (CI): 29, čistih citatov na avtorja (CIAu): 7,25, Scopus do 5. 4. 2023: št. citatov (TC): 30, čistih citatov (CI): 30, čistih citatov na avtorja (CIAu): 7,50]

GABROVEC, Tina, DRAGAR, Jana, GUZELJ, Domen, POVALEJ BRŽAN, Petra, REBOL, Janez. Comparison of perioperative electrophysiological measurements and postoperative results in cochlear implantation with a slim straight electrode. Applied sciences. 2023, vol. 13, issue 5, [article no.] 3292, str. [1]-11, ilustr. ISSN 2076-3417. https://www.mdpi.com/2076-3417/13/5/3292, https://doi.org/10.3390/app13053292, DOI: 10.3390/app13053292. [COBISS.SI-ID 144499459], [JCR, SNIP, WoS, Scopus]