

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
20	10							3
		AV	LV	RV				
			30					

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:

Elementarno znanje statistike (pridobljeno pri predmetu Metode raziskovalnega dela v medicini)

Prerequisites for enrolling in the course or for performing study obligations:

Elementary knowledge of Statistics (acquired from course Research Methods in Medicine)

Vsebina (kratek pregled učnega načrta):

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
- Definiranje informacijskih procesov obravnave in oskrbe pacienta v zdravstvenih institucijah
- Signali, slike in video v medicini, informacijska predstavitev dvodimenzionalnih in 3D struktur

Content (syllabus outline):

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
- Information processes definition in the field of medical treatment and care in health institutions

• 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	• 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
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Temeljni literatura in viri / Reading materials:

• 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 • Grasclew G and Roelofs TA, Advances in Telemedicine: Technologies, Enabling Factors and Scenarios, InTech Open Publishing 2011; chapter: Dejan Dinevski et al., Video Communication in Telemedicine • Field A: An Adventure in Statistics: The Reality Enigma, SAGE Publications Ltd, May 2016.
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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 independent 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 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

Intended learning outcomes:

Knowledge and understanding:

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

zagotavljajo ustrezne informacije o pridobljenih rezultatih.	
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Metode poučevanja in učenja:

• Predavanja • Seminar • Domače naloge • Vaje, e-izobraževanje

Learning and teaching methods:

• Lectures • Seminars • Homework • Exercises, 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		ACADEMIC OBLIGATIONS OF STUDENTS
Glede na sklep Senata z dne 13. 6. 2011 je za študente obvezna 50 % udeležba na predavanjih.		According to the decision of the Senate on June 13, 2011, 50% attendance at lectures is obligatory for students.
POGOJI ZA PRISTOP K POSAMEZNEMU PREVERJANJU ZNANJA		REQUIREMENTS FOR ACCESS TO INDIVIDUAL KNOWLEDGE CHECKING
Opravljen seminar in vaje.		Completed seminar assignment and exercises.

Reference nosilca / Course coordinator's references:
DEJAN DINEVSKI

DINEVSKI, Dejan, MERTIK, Matej, KOKOL, Peter. Diagnosing mitral valve prolapse by improving the predictive power of classifiers. Journal of international medical research, ISSN 0300-0605, 2011, vol. 39, no. 3, str. 1075-1083. [COBISS.SI-ID 512130104]

HRISTOVSKI, Dimitar, DINEVSKI, Dejan, KASTRIN, Andrej, RINDFLESCH, Thomas C. Biomedical question answering using semantic relations. BMC bioinformatics, ISSN 1471-2105, 2015, vol. 16, no. 6, 14 str., doi: 10.1186/s12859-014-0365-3. [COBISS.SI-ID 2048297218]

VINKO, Matej, BRECELJ, Špela, ERŽEN, Ivan, DINEVSKI, Dejan. Sprejemanje in uporaba informacijskih tehnologij v slovenskem javnem zdravstvu : nacionalna raziskava z uporabo modela UTAUT = Acceptance and use of health information technology in Slovenian public health institutions : a national survey based on UTAUT model. Zdravniški vestnik, ISSN 1318-0347. [Tiskana izd.], apr. 2013, letn. 82, št. 4, str. 234-242. [COBISS.SI-ID 2888677]

DINEVSKI, Dejan, POVALEJ, Petra, KRAVOS, Matej. Intelligent data analysis for the diagnosis of alcohol dependence syndrome. Journal of international medical research, ISSN 0300-0605, 2011, vol. 39, no. 3, str. 988-1000. [COBISS.SI-ID 512129848]

POVALEJ, Petra, LENIČ, Mitja, ZORMAN, Milan, KOKOL, Peter, DINEVSKI, Dejan. Accuracy of intelligent medical systems. Computer methods and programs in biomedicine, ISSN 0169-2607. [Print ed.], 2005, vol. 80, suppl. 1, str. S95-S105. [COBISS.SI-ID 10105622]

PETRA POVALEJ BRŽAN

POVALEJ, Petra, VERLIČ, Mateja, ŠTIGLIC, Gregor. Discovery systems. V: MEYERS, Robert A. (ur.). Encyclopedia of complexity and systems science. New York: Springer, cop. 2009, vol. 2, str. 1982-2002, ilustr. [COBISS.SI-ID 1521572]

ŠTIGLIC, Gregor, POVALEJ, Petra, FIJAČKO, Nino, WANG, Fei, KALOUSIS, Alexandros, DELIBAŠIĆ, Boris, OBRADOVIĆ, Zoran. Comprehensible predictive modeling using regularized logistic regression and comorbidity based features. PloS one, ISSN 1932-6203, 2015, vol. 10, no. 12, str. 1-6, ilustr.
<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0144439>, doi: 10.1371/journal.pone.0144439.
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DINEVSKI, Dejan, POVALEJ, Petra, KRAVOS, Matej. Intelligent data analysis for the diagnosis of alcohol dependence syndrome. Journal of international medical research, ISSN 0300-0605, 2011, vol. 39, no. 3, str. 988-1000. [COBISS.SI-ID 512129848]

POVALEJ, Petra, GALLEGU, J.A., FARINA, Dario, HOLOBAR, Aleš. On repeatability of motor unit characterization in pathological tremor. V: International Conference on Neurorehabilitation, ICNR 2012, Toledo, Spain, November 14-16, 2012. PONS, José L. (ur.), TORRICELLI, Diego (ur.), PAJARO, Marta (ur.). Converging clinical and engineering research on neurorehabilitation, (Biosystems & Biorobotics, ISSN 2195-3562). Heidelberg [etc.]: Springer, cop. 2013, part 1, str. 553-556, ilustr. [COBISS.SI-ID 16456214]

FIJAČKO, Nino, POVALEJ, Petra, ŠTIGLIC, Gregor. Mobile applications for type 2 diabetes risk estimation : a systematic review. Journal of medical systems, ISSN 1573-689X, oct. 2015, vol. 39, iss. 10, 10 str.
<http://link.springer.com/article/10.1007/s10916-015-0319-y/fulltext.html>, doi:10.1007/s10916-015-0319-y.
[COBISS.SI-ID 2143908]