UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Biomedicinska Informatika**
Course title:	**Biomedical Informatics**

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		1	1

Vrsta predmeta / Course type	Obvezni/Compulsory
Univerzitetna koda predmeta / University course code:	1001

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
20	40	-	15	-	195	9

Nosilec predmeta / Lecturer:	Prof. dr. Dejan Dinevski Izr. prof. dr. Miljenko Križmarič
Jeziki / Languages: **Predavanja / Lectures:**	Slovensko/Slovene
Vaje / Tutorial:	Slovensko/Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Kandidat mora imeti pred vpisom ustrezno znanje iz naravoslovnih ved z ustreznega področja na nivoju univerzitetnega študija.	Prior to entering, the candidate for postgraduate program must have an appropriate knowledge and understanding of bioscience (biology, chemistry, physics, mathematics) on the university level.

Vsebina:	**Content (Syllabus outline):**
- Računalništvo in informacijske tehnologije - Medicinska informatika - Podatkovne zbirke: vrste in namen, podatkovno modeliranje, podatkovno rudarjenje relacijske zbirke, bibliografske zbirke - Informacijska omrežja: topologije, gradniki, internetne storitve, intranet - Uporaba slik in grafike v medicini - Odločitveni sistemi v medicini - Inteligentni sistemi v medicini - Bioinformatika - Napredno iskanje strokovnih in bibliografskih informacij s področja medicine - biomedicinska tehnologija v kliničnih procesih - simulatorji in simulacije v medicini - Osnove telemedicinske tehnologije, telezdravstvo, telenega, telenadzor, telekonzultacije - Pregled telemedicinske prakse (teledermatologija, telekirurgija, telepatologija, telekardiologija…) - Tehnologija v diagnostiki in tehnologija v terapiji. Neinvazivna in invazivna tehnologija. Monitoring	- Computer science and information technology - Medical informatics - Databases: types and purpose, data modeling, data mining, relational databases, bibliographic databases - Information networks, topology, internet services, intranet - Pictures and graphics in medicine - Decision support systems in medicine - Intelligent systems in medicine - Bioinformatics - Advanced search methods of medical and bibliographic data - biomedical technology in clinical settings - simulators and simulations in medicine - Basics of telemedicine technology, telehealth, telecare, telemonitoring, teleconsultations - Overview of telemedicine practice (teledermatology, telesurgery, telepathology, telecardiology…) - Technology for diagnostic and technology for therapy. Non-invasive and invasive technology. Haemodynamic and respiratory monitoring. - Medical devices in resuscitation and in intensive care.

organskih sistemov obtočil in dihal. Medicinski pripomočki v reanimaciji in intenzivnem zdravljenju.	

Temeljni literatura in viri / Readings:

- Edward H. Shortliffe, James J. Cimino: Biomedical Informatics, Springer USA, 2006
- J.H. van Bemmel, M.A. Musen (Editors). The Handbook of Medical Informatics. Springer-Verlag, New York, 1998
- Bashshur RL, Shannon GW, History of Telemedicine –Evolution, Context and Transformation, Mary Ann Liebert publishers, New York, 2009.
- Kyle RR, Murray BW. Clinical simulation: operations, engineering, and management. Amsterdam, Academic Press, 2008
- Enderle J, Blanchard SM, Bronzino JD. Introduction to Biomedical Engineering. Elsevier Science and Technology, 2005.

Cilji in kompetence:	**Objectives and competences:**
Študent bo spoznal biomedicinsko in informacijsko tehnologijo ter aplikacije na področju medicine. Na podlagi osnov se bo poglobil v nekatera specialnima področja odločitvenih in inteligentnih sistemov ter bioinformatike. Specialna področja bodo študentje usvojili predvsem s raziskovalnimi seminarskimi nalogami. To znanje bo študent lahko uporabljal pri raziskovalnem in praktičnem reševanju medicinskih problemov	Students will learn about biomedical and information technology/application in medicine. Special attention will be focused to decision support and intelligent systems and also bioinformatics. Advanced subjects will be studied through research assignments. The gained knowledge will be used by research and practical problem solving.
Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje bioinformacijskih tehnologij s katerimi bo študent sposoben bolj učinkovito reševati raznovrstne medicinske probleme. Prenesljive/ključne spretnosti in drugi atributi: - programiranje in delo z računalnikom - poznavanje računalniško podprte biomedicinske tehnologije - poznavanje simulatorjev in simulacij v medicini - sposobnost napredne analize in razumevanja podatkov.	Knowledge and Understanding of bioinformatics technologies in more efficient solving of various medical problems Transferable/Key Skills and other attributes: - programming and computer skills - knowledge about computer supported biomedical technology - knowledge about medical simulators and simulations - the ability to perform complex data analysis
Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Seminar • Vaje, e-izobraževanje	• Lectures, • Seminar • Exercises, e-learning

Načini ocenjevanja:	**Delež (v %) / Weight (in %)**	**Assessment:**
seminarska naloga	**30%**	Seminar work
pisni izpit	**50%**	Written exam
ustni zagovor	**20%**	Oral exam

Reference nosilca / Lecturer's references:

Prof. dr. Dejan Dinevski:

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.

RIZMAN HERGA, Nataša, GLAŽAR, Saša A., DINEVSKI, Dejan. Dynamic visualization in the virtual laboratory enhances the fundamental understanding of chemical concepts. *Journal of Baltic science education*, ISSN 1648-3898, 2015, vol 14, no. 3, str. 351-365

SOBOČAN, Monika, TURK, Neja, DINEVSKI, Dejan, HOJS, Radovan, PEČOVNIK-BALON, Breda. Problem-based learning in internal medicine : virtual patients or paper-based problems?. *Internal medicine journal*, ISSN 1445-5994, jan. 2017, vol. 47, issue 1, str. 99-103, doi: 10.1111/imj.13304.

Izr. prof. dr. Miljenko Križmarič:

STRNAD, Matej, LEŠNIK, Damjan, KRIŽMARIĆ, Miljenko. Arterial blood gas changes during cardiac arrest and cardiopulmonary resuscitation combined with passive oxygenation/ventilation : a METI HPS study. JIMR on-line, ISSN 1473-2300, 2018, vol. 46, iss. 11, str. 4605-4616

KARNJUŠ, Igor, MEKIŠ, Dušan, KRIŽMARIĆ, Miljenko. Uncontrolled delivery of liquid volatile anaesthetic when using the anaesthetic conserving device. Journal of clinical monitoring and computing, ISSN 1573-2614, str. 1-10

STRNAD, Matej, BOROVNIK LESJAK, Vesna, VUJANOVIĆ, Vitka, PELCL, Tine, KRIŽMARIĆ, Miljenko. Predictors of mortality and prehospital monitoring limitations in blunt trauma patients. BioMed research international, ISSN 2314-6141, 2015, vol. 2015