

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet: Zdravstveni ekspertni sistemi na daljavo
Course title: Expert Systems for eHealth

Študijski program in stopnja Study programme and level	Modul Module	Letnik Academic year	Semester Semester
Informacijske in komunikacijske tehnologije, 3. stopnja	Računalniške strukture in sistemi	1	1
Information and Communication Technologies, 3 rd cycle	Computer Structures and Systems	1	1

Vrsta predmeta / Course type

Izbirni / Elective

Univerzitetna koda predmeta / University course code:

IKT3-909

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Druge oblike	Samost. delo Individ. work	ECTS
15	15			15	105	5

**Navedena porazdelitev ur velja, če je vpisanih vsaj 15 študentov. Drugače se obseg izvedbe kontaktnih ur sorazmerno zmanjša in prenese v samostojno delo. / This distribution of hours is valid if at least 15 students are enrolled. Otherwise the contact hours are linearly reduced and transferred to individual work.*

Nosilec predmeta / Lecturer:

Prof. dr. Barbara Koroušič Seljak

Jeziki /

Languages:

Predavanja / Lectures:

Vaje / Tutorial:

Slovenščina, angleščina / Slovenian, English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Zaključen študij druge stopnje s področja informacijskih ali komunikacijskih tehnologij ali zaključen študij druge stopnje na drugih področjih z znanjem osnov s področja predmeta. Potrebna so tudi osnovna znanja matematike, računalništva in informatike.

Prerequisites:

Completed second cycle studies in information or communication technologies or completed second cycle studies in other fields with knowledge of fundamentals in the field of this course. Basic knowledge of mathematics, computer science and informatics is also requested.

Vsebina:

Znanstvena metoda:
 strukture znanstvenega védenja, znanstvene aktivnosti in procesi
 Računalniška podpora zdravstvu:
 uvod, zgodovinski razvoj področja
 Modeliranje sistemov e-zdravje / m-zdravje:
 metodologije in metode za analizo in načrtovanje sistemov e-zdravje / m-zdravje; osnove načrtovanja (strukturni / objektno-orientirani postopki); sodobni postopki za

Content (Syllabus outline):

Scientific Method:
 scientific knowledge structures, scientific activities / processes
 Computational Scientific Discovery:
 introduction, history of development of the area
 Modeling of e-health and m-health systems:
 software analysis and design – methods and methodologies; design basics – object oriented vs structured techniques; modern diagramming techniques (e.g. UML modeling)

izdelavo diagramov (npr. modeliranje po industrijskem standardu UML)

Napredne računalniške metode:
zajem, obdelava in analiza podatkov ter znanja, s pomočjo statističnih metod, naravne obdelave besedil, rudarjenjem podatkov in strojnega učenja

Izvedba sistemov e-zdravje / m-zdravje:
personalizirani uporabniški vmesniki, spletni portali in aplikacije, mobilne aplikacije, zbirke podatkov in znanja, varnostni in etični vidiki, analiza pristranskosti sistemov eZdravja

Integracija sistemov e-zdravje / m-zdravje v okolje:
izmenjava podatkov, metode za testiranje in validacijo

Aplikacije v klinični prehrani

Advanced computer methods:
capturing, processing and analysis of data and information, using statistical methods, natural language processing, data mining and machine learning

Implementation of e-health and m-health systems:
dashboards, web-portals and applications, mobile apps, databases and knowledge bases, security and ethical aspects, bias analysis of eHealth systems

Integration of e-health and m-health systems in the environment:
data exchange, methods for testing and validation

Applications in Clinical Nutrition

Temeljna literatura in viri / Readings:

Izbrana poglavja iz naslednjih knjig: / Selected chapters from the following books:

- E.J. Cooling; *Real-Time Operating Systems*. Lindentree Associates. UML Modeling, 2013.
- R. Nelson, N. Stagers. *Health Informatics: An Interprofessional Approach*. Elsevier, 2014. ISBN: 978-0-323-10095-3.
- E. Topol, *The Creative Destruction of Medicine: How the Digital Revolution Will Create Better Health Care*. Basic Books, 2012. ISBN 978-0-465-02550-3.
- A. Blum, J. Hopcroft, R. Kannan; *Foundations of Data Science*. Cambridge University Press, 2020. ISBN: 978-1-108-48506-7.
- D. Fensel, U. Šimšek, K. Angele, E. Huaman, E., Kärle, O. Panasiuk, I. Toma, J. Umbrich, A. Wahler; *Knowledge Graphs*. Springer International Publishing, 2020. ISBN: 978-3-030-37439-6.
- E. Alpaydin; *Introduction to machine learning*. MIT press, 2020. ISBN: 978-0-262-02818-9.

Cilji in kompetence:

Cilj predmeta je seznaniti študenta s področjem sistemov e-zdravje in m-zdravje.

Kompetence študenta z uspešno zaključenim predmetom bodo vključevale razumevanje osnovnih pojmov iz področja, poznavanje sodobnih metod in znanje o primerih uporabe le-teh na vse bolj pomembnem znanstvenem področju (znanosti o klinični prehrani).

Objectives and competences:

The goal of the course is to familiarize the student with e-health and m-health systems.

The competencies of the students completing this course successfully would include understanding of basic concepts from both areas, familiarity with state-of-the art methods, and knowledge of examples applications from the advancing scientific field (clinical nutrition).

Predvideni študijski rezultati:

Študenti bodo z uspešno opravljenimi obveznostmi tega predmeta pridobili:

- strukture znanstvenega védenja, kot so znanstvene aktivnosti in procesi
- razumevanje konceptov modeliranja sistemov e-zdravje / m-zdravje

Intended learning outcomes:

Students successfully completing this course will acquire:

- Scientific knowledge structures, such as activities / processes
- Understanding concepts of modelling e-health / m-health systems

- pregled obstoječih nalog in metod za zajem, obdelavo in analizo podatkov ter znanja
- pregled obstoječih nalog in metod za izvedbo sistemov e-zdravje / m-zdravje
- pregled obstoječih nalog in metod za integracijo sistemov e-zdravje / m-zdravje v okolje
- sposobnost uporabe obstoječih metod na novih sistemih e-zdravje / m-zdravje
- sposobnost ugotavljanja primernosti metod za snovanje, izvedbo in validacijo sistemov e-zdravje / m-zdravje

- Overview of existing tasks and methods for data and knowledge capturing, processing and analysis
- Overview of existing tasks and methods for implementing e-health / m-health systems
- Overview of existing tasks and methods for embedding e-health / m-health systems into external systems
- The ability to apply existing methods to new e-health / m-health systems
- The ability to identify whether methods for designing, implementation and validation of e-health / m-health systems are appropriate

Metode poučevanja in učenja:

Predavanja, seminar, konzultacije, individualno delo

Learning and teaching methods:

Lectures, seminar, consultancy, individual work

Načini ocenjevanja:

Seminarska naloga
Ustni zagovor seminarske naloge

Delež (v %) /

Weight (in %)

Assessment:

Seminar work
Oral defense of seminar work

Reference nosilca / Lecturer's references:

- **B. Koroušič Seljak**, V Stibilj, L Pograjc, N Fidler Mis, E Benedik. Food composition databases for effective quality nutritional care. Food chemistry 140 (3), 553-561, 2013.
- P. Novak, F. Novak, **B. Koroušič Seljak**. Enhancement of web application design of the Open Platform for Clinical Nutrition. Lecture notes in computer science 7946, 791-802, 2013.
- N.Reščič, T. Eftimov, **B. Koroušič Seljak**, M. Luštrek. Optimising an FFQ Using a Machine Learning Pipeline to teach an Efficient Nutrient Intake Predictive Model. Nutrients 12(12), 3789, 2020.
- G. Ispirova, T. Eftimov, **B. Koroušič Seljak**. Evaluating missing value imputation methods for food composition databases. Food and Chemical Toxicology, 111368, 2020.
- S. Mezgec, T. Eftimov, T. Bucher, **B. Koroušič Seljak**. Mixed deep learning and natural language processing method for fake-food image recognition and standardization to help automated dietary assessment. Public health nutrition 22(7) 1193-1202, 2019.