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|-----------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------------|---------------------------------------------------|------------------------------------------------------|-------------------------------|-------------------------------------------------------------------------------------|
|  | Univerza v Mariboru<br>University of Maribor |                                                    | Medicinska fakulteta UM<br>Faculty of Medicine UM |                                                      |                               |  |
| OPIS PREDMETA / SUBJECT SPECIFICATION                                             |                                              |                                                    |                                                   |                                                      |                               |                                                                                     |
| Predmet:                                                                          |                                              | Inteligentna analiza podatkov v medicini           |                                                   |                                                      |                               |                                                                                     |
| Subject Title:                                                                    |                                              | Intelligent Data Analysis in medicine              |                                                   |                                                      |                               |                                                                                     |
|                                                                                   |                                              |                                                    |                                                   |                                                      |                               |                                                                                     |
| Študijski program<br>Study programme                                              |                                              | Študijska smer<br>Study field                      |                                                   | Letnik<br>Year                                       |                               | Semester<br>Semester                                                                |
| Podiplomski<br>Postgraduate                                                       |                                              | Biomedicinska tehnologija<br>Biomedical Technology |                                                   | 2                                                    |                               | zimski<br>winter                                                                    |
|                                                                                   |                                              |                                                    |                                                   |                                                      |                               |                                                                                     |
| Univerzitetna koda predmeta / University subject code:                            |                                              |                                                    |                                                   | 1078                                                 |                               |                                                                                     |
|                                                                                   |                                              |                                                    |                                                   |                                                      |                               |                                                                                     |
| Predavanja<br>Lectures                                                            | Seminar<br>Seminar                           | Sem. vaje<br>Tutorial                              | Lab. vaje<br>Labor work                           | Teren. vaje<br>Field work                            | Samost. delo<br>Individ. work | ECTS                                                                                |
| 15                                                                                | 30                                           |                                                    |                                                   |                                                      | 105                           | 5                                                                                   |
|                                                                                   |                                              |                                                    |                                                   |                                                      |                               |                                                                                     |
| Nosilec predmeta / Lecturer:                                                      |                                              | Prof. dr. Milan Zorman                             |                                                   |                                                      |                               |                                                                                     |
|                                                                                   |                                              |                                                    |                                                   |                                                      |                               |                                                                                     |
| Jeziki /                                                                          |                                              | Predavanja / Lecture:                              |                                                   | Slovenščina / Slovene                                |                               |                                                                                     |
| Languages:                                                                        |                                              | Vaje / Tutorial:                                   |                                                   | Slovenščina / Slovene                                |                               |                                                                                     |
|                                                                                   |                                              |                                                    |                                                   |                                                      |                               |                                                                                     |
| Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:             |                                              |                                                    |                                                   | Prerequisites:                                       |                               |                                                                                     |
| Osnovno poznavanje dela z računalnikom, osnove bioinformatike                     |                                              |                                                    |                                                   | Basic computer user skills, basics of bioinformatics |                               |                                                                                     |

#### Vsebina:

- Uvod v inteligentne sisteme
- Osnove zbirk podatkov
- Priprava podatkov za inteligentno analizo
- Delo z manjkajočimi podatki
- Metode nadzorovanega strojnega učenja:
  - Metoda podpornih vektorjev
  - Ansambelske metode
  - Hibridne metode
- Metode nenadzorovanega strojnega učenja:
  - Razvrščanje
- Evalvacija pridobljenega znanja

#### Content (Syllabus outline):

- Introduction to intelligent systems
- Basics of data sets
- Data preprocessing for intelligent analysis
- Working with missing data
- Methods for supervised machine learning:
  - Support Vector Machines
  - Ensemble methods
  - Hybrid methods
- Methods for unsupervised machine learning:
  - Clustering
- Evaluation of acquired knowledge

#### Temeljni študijski viri / Textbooks:

-Zorman Milan, Podgorelec Vili, Lenič Mitja, Povalej Petra, Kokol Peter in Tapajner Alojz: Inteligentni sistemi in profesionalni vsakdan, Univerza v Mariboru, Center za Interdisciplinarne in multidisciplinarne raziskave in študije UM, Maribor, 2003

- I. H. Witten, E. Frank, Data Mining: Practical machine learning tools with Java implementations. Morgan Kaufmann, San Francisco, 2005.

-Toshinori Munakata: Fundamentals of the New Artificial Intelligence: Beyond Traditional Paradigms. Springer Verlag New York, 1998.

-spletni viri / internet sources

**Cilji:**

- Seznaniti študente s postopki iskanja novega znanja v bazah podatkov.
- Naučiti študente dela z inteligentnimi metodami za avtomatski zajem in evaluacijo znanja iz podatkovnih zbirk.

**Objectives:**

- To introduce students to knowledge acquisition from data sets.
- To teach students about intelligent methods for automatic acquisition and evaluation of knowledge.

**Predvideni študijski rezultati:****Znanje in razumevanje:**

- Zajemanja podatkov
- Shranjevanja podatkov
- Priprave podatkov za obdelavo z inteligentnimi metodami
- Uporaba naprednih inteligentnih metod
- Evalvacije rezultatov inteligentnih metod
- Uporabe pridobljenega znanja.

**Prenesljive/ključne spretnosti in drugi atributi:**

- Sposobnost učinkovitejšega zajema, shranjevanja in uporabe podatkov.
- Znanje za uporabo podatovnega rudarjenja in iskanja novega znanja na poljubnih področjih.
- Poznavanje naprednih inteligentnih metod.

**Intended learning outcomes:****Knowledge and Understanding:**

- Data acquisition
- Storing data.
- Data preprocessing for analysis with intelligent methods.
- Usage of advanced intelligent methods.
- Evaluation of results of intelligent methods.
- Usage of acquired knowledge.

**Transferable/Key Skills and other attributes:**

- Capability to more efficiently acquire, store and use data.
- Knowledge about data mining and knowledge acquisition in various areas.
- Familiarity with advanced intelligent methods.

**Metode poučevanja in učenja:**

Predavanja, razgovor, demonstracija, računalniške vaje.

**Learning and teaching methods:**

Lectures, discussion, demonstration, computer exercises

**Načini ocenjevanja:**

Način (pisni izpit, ustno izpraševanje, naloge, projekt)

- seminarska naloga
- ustni izpit.

Delež (v %) /  
Weight (in %)

60  
40

**Assessment:**

Type (examination, oral, coursework, project):

- seminar work
- oral examination.

**Materialni pogoji za izvedbo predmeta :**

Računalniška učilnica

**Material conditions for subject realization**

Computer room

**Obveznosti študentov:**

(pisni, ustni izpit, naloge, projekti)

pisni, ustni izpit, naloge

**Student's commitments:**

(written, oral examination, coursework, projects):

written, oral examination, coursework