

COURSE SYLLABUS

General information		
Course title	Optimization techniques for data mining	
Study programme	Graduate course Discrete Mathematics and Its Applications	
Year of study	2nd	
Course status	Elective	
Course homepage	Merlin	
Language of instruction	English	
Credit values and modes of instruction	ECTS credits / student workload	5
	Hours (L+E+S)	30+15+15
Lecturer	Name and surname	Daniel Hawtin
	Office	O-507
	Office hours	By appointment
	Phone number	584-668
	E-mail	dhawtin@math.uniri.hr
Teaching assistant	Name and surname	
	Office	
	Office hours	
	Phone number	
	E-mail	

1. COURSE DESCRIPTION

1.1. Course objectives

The objective of this course is to get students acquainted with some basic issues and algorithms used in data mining i.e. in the process of discovering patterns in big data using mathematical techniques.

For this aim it is needed to:

- introduce fundamental concepts and methods for data mining,
- develop some basic algorithms and techniques and their applications in data mining,
- illustrate the application of these algorithms in data mining,
- introduce programming language associated with data mining.

1.2. Course prerequisites

None.

1.3. Learning outcomes

After completing the course, students will be able to:

- describe data mining techniques, (A5,B5,C5,E4,F4)
- analyse different types of algorithms in data mining, (A5,B5,C5,E4,F4)
- use some techniques of data mining in practice, (A5, B5,C6,D5,E4,F4,G7)
- design algorithms in data mining that can address real problem. (A7,B5,C7,D4,E4,F7,G7)

1.4. Course content

Data mining. Regression. Classification. Supervised learning. Support-Vector Machines. Learning from Nearest Neighbors. Comparison of Learning Methods. Unsupervised learning. Clusters.

<p>1.5. Modes of instruction</p>	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> exercises <input checked="" type="checkbox"/> e-learning <input type="checkbox"/> field work	<input checked="" type="checkbox"/> independent work <input checked="" type="checkbox"/> multimedia and the internet <input type="checkbox"/> laboratory <input checked="" type="checkbox"/> tutorials <input type="checkbox"/> mentoring work <input type="checkbox"/> consultative teaching <input type="checkbox"/> other
<p>1.6. Comments</p>		
<p>1.7. Student requirements</p>		
<p>Students are required to attend classes, actively participate in all forms of classes, earn a determined amount of points throughout semester and pass the final exam (details will be disclosed in the implementation plan of the course).</p>		

2. GRADING POLICY

2.1. Grading of students' work during the semester and on the final exam

There will be the following assessment during semester:

- Three quizzes, worth a maximum of 10 points each, totaling a maximum of 30 points.
- A midsemester exam, worth a maximum of 20 points.
- A small take home project, worth a maximum of 20 points.

There will be a final oral exam, worth a maximum of 30 points.

2.2. Minimal requirements for access to the final exam / passing grade

ACTIVITY	MINIMAL NUMBER OF POINTS REQUIRED
TOTAL:	35
OTHER REQUIREMENTS:	-

2.3. Final grade – grading scale

GRADE	POINTS
Excellent (5), A	90% - 100%
Very good (4), B	75% - 89,9%
Good (3), C	60% - 74,9%
Sufficient (2), D	50% - 59,9%
Insufficient (1), F	0% - 49,9%

3. LITERATURE

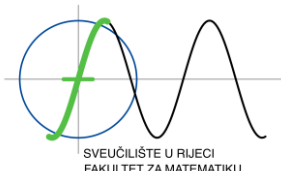
3.1. Required literature

1. J. Leskovec, A. Rajaraman, J. D. Ullman, Mining of Massive Datasets, Cambridge University Press, 2014.

3.2. Recommended literature

1. B. Schölkopf, A. J. Smola, Learning with Kernels. Support Vector Machines, Regularization, Optimization, and Beyond, MIT Press, Massachusetts, 2002.
2. T. Hastie, R. Tibshirani, J. Friedman, Data Mining, Inference, and Prediction, Springer-Verlag New York, 2009.

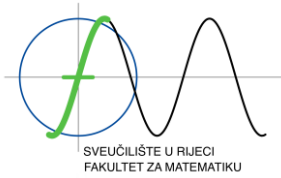
3. ADDITIONAL INFORMATION



a. Class attendance	
Any form of disruption during the class will not be tolerated as well as the usage of mobile phones.	
b. Informing students	
All relevant informations will be provided via the online course. It is the responsibility of a student to be regularly informed.	
c. Other relevant information	
d. Assessment of quality and performance for the course	
Anonymous survey in which students will evaluate the quality of classes will be carried out during last week of classes. The analysis of students' success at final exams will be carried out at the end of semester.	
e. Examination period	
Final exam (1st examination period)	16.06.2023 from 10:00
Final exam (2nd examination period)	30.06.2023 from 10:00
Final exam (3rd examination period)	08.09.2023 from 10:00

4. COURSE OUTLINE*

DATE	TIME	MODE OF INSTRUCTION	TOPIC	GROUP	LECTURE HALL
27.02.2023	12:15 - 14:00	L	Introduction to the course	All	O-335
28.02.2023	10:15 - 12:00	S/E	Introduction to data mining	All	O-363
06.03.2023	12:15 - 14:00	L	MapReduce	All	O-335
07.03.2023	10:15 - 12:00	S/E	MapReduce	All	O-363
13.03.2023	12:15 - 14:00	L	Classification	All	O-335
14.03.2023	10:15 - 12:00	S/E	First quiz	All	O-363
20.03.2023	12:15 - 14:00	L	Similarity	All	O-335
21.03.2023	10:15 - 12:00	S/E	Similarity	All	O-363
27.03.2023	12:15 - 14:00	L	Nearest neighbour search	All	O-335
28.03.2023	10:15 - 12:00	S/E	Nearest neighbour search	All	O-363
03.04.2023	12:15 - 14:00	L	Link analysis	All	O-335
04.04.2023	10:15 - 12:00	S/E	Second quiz	All	O-363
10.04.2023			No class		
11.04.2023	10:15 - 14:00	L/S/E	PageRank	All	O-335



17.04.2023	12:15 - 14:00	L	Graphs and mining social networks	All	O-335
18.04.2023	10:15 - 12:00	S/E	Graphs and mining social networks	All	O-363
24.04.2023	12:15 - 14:00	L	Graphs and mining social networks	All	O-335
25.04.2023	10:15 - 12:00	S/E	Midterm exam	All	O-363
01.05.2023			No class		
02.05.2023	10:15 - 14:00	L/S/E	Mining data streams	All	O-335
08.05.2023	12:15 - 14:00	L	Clustering	All	O-335
09.05.2023	10:15 - 12:00	S/E	Clustering	All	O-363
15.05.2023	12:15 - 14:00	L	Dimensionality reduction	All	O-335
16.05.2023	10:15 - 12:00	S/E	Third quiz	All	O-363
22.05.2023	12:15 - 14:00	L	Dimensionality reduction	All	O-335
23.05.2023	10:15 - 12:00	S/E	Machine learning	All	O-363
29.05.2023	12:15 - 16:00	L/S/E	Machine learning	All	O-335
30.05.2023			No class		
05.06.2023	12:15 - 14:00	L	Revision	All	O-335
06.06.2023	10:15 - 12:00	S/E	Exam practice	All	O-363

**Minor changes are possible. Some teaching activities may be online.*

L – lectures
E – exercises
S – seminars