COURSE OUTLINE

(1) GENERAL

SCHOOL	ENGINEERING
ACADEMIC UNIT	INFORMATICS AND COMPUTER ENGINEERING
LEVEL OF STUDIES	UNDERGRADUATE
COURSE CODE	**SEMESTER** 7
COURSE TITLE	DATA MINING

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits	WEEKLY TEACHING HOURS	CREDITS
LECTURES	3	
TUTORIALS	1	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).	4	5

COURSE TYPE general background, special background, specialised general knowledge, skills development	Science area, Skills Development
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	http://eclass.uniwa.gr

(2) LEARNING OUTCOMES

The aim of the course is to present Data Mining techniques, as well as their applications. It will provide and introduction to the field of analytics, and therefore the extensive use of data, statistical and quantitative analysis, exploratory and predictive models to mine and discover unexpected but ueful glimpses of previously unkown information. We discuss standard data mining algorithms that can be applied both on structured and unstructured data and experience their impact on decision making situations.

Upon successful completion of the course students:

- Will acquire knowledge of the principles, procedures and applications of the scientific field of Data Mining.
- Will delved into the methods and algorithms of data mining and acquire the appropriate skills to implement these algorithms, as well as the practical experience, having become familiar with specialized software packages.
- Will study standard cases of data mining algorithms to real problems, in order to acquire specialized problem-solving skills, which are required in research and/or innovation in order to develop new knowledge and processes, especially in multidisciplinary fields,
- Will acquire the necessary learning skills that will allow them to continue their studies in the field of Data Mining in an autonomous fashion, to a large extent.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	Project planning and management Respect for difference and multiculturalism Respect for the natural environment
Adapting to new situations	Showing social, professional and ethical
Decision-making	responsibility and sensitivity to gender issues

Working independently	Criticism and self-criticism
Team work	Production of free, creative and inductive thinking
Working in an international environment	……
Working in an interdisciplinary environment	Others…
Production of new research ideas	…….

- Search, analysis and synthesis of data and information, using the necessary technologies
- Working independently
- Team work
- Working in interdisciplinary environment
- Production of new research ideas
- Production of free, creative and inductive thinking

(3) SYLLABUS

- Introduction – Basic concepts of Data Mining
- Data quality
- Data pre-processing
- Association rule mining
- Classification
    - basic concepts and algorithms
    - decision trees
    - Model evaluation
    - Alternative classification/predictions algorithms: Naïve Bayes, Neural Networks
- Clustering
    - Partitional Algorithms
    - Hierarchical Algorithms
    - Clustering Categorical Data
- Association Rules
- Visualization techniques
- Case studies of Data Mining Algorithms - Applications

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	• Face-to-face. In-class lectures with active student participation. There will be presentations and tutorials on the course web-page as well as in class, as well as use of specialized software. • Project work.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Use of specialized software. • Use of the university's online teaching platform for posting theory and exercises. • Use of e-mail and the online teaching platform for communication with the students.

TEACHING METHODS

The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Activity	Semester workload
Lectures	26
Tutorials	26
Projects	33
Individual study	40
Course total	**125**

STUDENT PERFORMANCE EVALUATION

Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.

Language of evaluation: Greek
The final marks will be extracted as the weighted sum of a final written exam (70%) and team projects (30%).

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:
1. P. Tan, M. Steinbach, V. Kumar, Εισαγωγή στην Εξόρυξη Δεδομένων, Εκδόσεις Τζιόλα, 2010.
2. M. Zaki, W. Meira Jr., Εξόρυξη και Ανάλυση Δεδομένων – Βασικές Έννοιες και Αλγόριθμοι, Εκδόσεις Κλειδάριθμος, 2017.
3. Μ. Χαλκίδη, Μ. Βαζιργιάννης, Εξόρυξη Γνώσης από Βάσεις Δεδομένων και τον Παγκόσμιο Ιστό, Εκδόσεις Τυπωθήτω, 2005.
4. R. Roiger, M. Geatz, G. Chen, Εξόρυξη Πληροφορίας, Εκδόσεις Κλειδάριθμος, 2008.
5. Α. Νανόπουλος, Ι. Μανωλόπουλος, Εισαγωγή στην Εξόρυξη και τις Αποθήκες Δεδομένων, Εκδόσεις Νέων Τεχνολογιών, 2008.

- Related scientific journals:
1. Data Mining and Knowledge Discovery, Springer.
2. IEEE Transactions on Knowledge and Data Engineering, IEEE.
3. ACM Transactions on Knowledge Discovery from Data, ACM.
4. SIGKDD Explorations, ACM.
5. Intelligent Data Analysis, IOS Press.
6. IEEE Transactions on Neural Networks and Learning Systems, IEEE.