COURSE OUTLINE: DATA ANALYTICS WITH AI

GENERAL

SCHOOL	ECONOMICS AND BUSINESS		
ACADEMIC UNIT	ECONOMICS		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**OE706**	**SEMESTER**	**7th (Major B)**
COURSE TITLE	**DATA ANALYTICS WITH AI**		

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**
	3	6
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialized general knowledge, skills development*	SPECIAL BACKGROUND, SKILLS DEVELOPMENT
PREREQUISITE COURSES:	NO
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO
COURSE WEBSITE (URL)	https://www.econ.uth.gr/

LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

Upon completion of the course, students will be able to:

- Understand the basic data mining models and how they work.
- Develop programs and applications for data analysis, data processing, and visualization.
- Apply their knowledge of data science to measure and evaluate the effectiveness of strategies in various fields of economics and social sciences.
- Implement techniques and algorithms in artificial intelligence and machine learning across a wide range of problems, such as prediction, classification, and optimization in various sectors and application areas.

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*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

- *Search for, analysis and synthesis of data and information,* with the use of the necessary technology
- Working in an interdisciplinary environment
- Project planning and management
- Production of free, creative and inductive thinking

SYLLABUS

The aim of the course is to familiarize students with modern tools for data mining, data processing, and data analysis. The course covers both the basic theoretical principles of data analytics, and the programming techniques required to develop related applications. Special emphasis is placed on the programming languages Python and R, which with the appropriate libraries allow the application of complex data mining models to various problems, leading to meaningful and beneficial conclusions. The course uses modern data analysis platforms, enabling students to utilize the most well-known data mining algorithms. Additionally, an introduction is provided to Artificial Intelligence and Machine Learning algorithms, which are a fundamental part of modern data analysis. An important aspect of the course is the visualization and presentation of results through specialized graphical tools, enhancing the understanding and communication of findings.

The main course topics are:

- Artificial Intelligence in Economics
- Essential data science principles
- Platforms and tools for developing data science applications using Python and R programming languages
- Indicators and probabilities
- Model fitting to data
- Predictive modeling
- Similarity, neighbors, and clustering
- Text representation and mining
- Natural Language Processing (NLP)
- Machine Learning: Classification, regression, and clustering
- Visualization and analysis of model performance
- Deep Learning

TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Use of the eclass online platform for posting (a) lecture materials, (b) announcements, and (c) exercises, case studies, and relevant articles (d) use PowerPoint presentations for lectures and Jupyter Notebooks for programming examples, (e) programming exercises using Python and R within the Anaconda development environment.</td></tr>
<tr><td>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,</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Laboratory practice</td><td>93</td></tr>
<tr><td>Study and analysis of bibliography</td><td>46</td></tr>
<tr><td>Exams</td><td>2</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>180</td></tr>
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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*	
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.*	The final course grade is determined as follows: • A written exam at the end of the semester, accounting for 25% of the final grade, consisting of short-answer questions. • An assessment of the laboratory assignment, accounting for 75% of the final grade. The above assessment criteria are communicated to students in the first lecture of the course and remain continuously accessible through relevant announcements on the course's eclass platform.

ATTACHED BIBLIOGRAPHY

- Harvey M. Deitel, Paul J. Deitel. Introduction to Python for Computer and Data Sciences. (EUDOXUS code: 10207065)
- Foster Provost, Tom Fawcett. Data Science for Business. (EUDOXUS code: 86055865)
- Tan Pang-Ning, Steinbach Michael, Kumar Vipin, Vasilios Verykios (editor). Introduction to Data Mining, 2nd Edition. (EUDOXUS code: 77107675)
- Hadley Wickham, Garrett Grolemund. R Programming for Data Science. (EUDOXUS code: 108881551)
- Joel Grus. Data Science: Essential Principles and Applications with Python, 2nd Edition. (EUDOXUS code: 94690736)
- Johnny Wei-Bing Lin, Hannah Aizenman, Erin Manette Cartas Espinel, Kim Gunnerson, Joanne Liu, Theodoros Katsaounis (Scientific Editor). Python – Programming for Computer and Data Sciences. (EUDOXUS code: 122086119)
- Additional bibliography/articles will be recommended during lectures.