COURSE OUTLINE

(1) OVERVIEW

SCHOOL	MARITIME & INDUSTRY		
DEPARTMENT	INDUSTRIAL MANAGEMENT & TECHNOLOGY		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ΤΕΠΑΡ03	SEMESTER	6
COURSE TITLE	ARTIFICIAL INTELLIGENCE		

DISCRETE TEACHING ACTIVITIES *In cases where ECTS credits are awarded to distinct components of the course (e.g., Lectures, Laboratory Exercises, etc.), please indicate them separately. If the credits are awarded as a whole for the entire course, please state the weekly teaching hours and the total number of credits*	WEEKLY TEACHING HOURS	ECTS
Lectures, Laboratory & Projects	4	5.5
Please add additional rows if needed. A detailed description of the teaching organization and instructional methods is provided in Section (4).		

COURSE TYPE *core (C), core elective (CE), elective (E) - background, specialization, skill development*	E - Specialization
PREREQUISITE COURSES:	None. To enhance understanding and performance, it is recommended that students have previously attended the course: Business Analytics
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek (English for ERASMUS students)
THIS COURSE IS AVAILABLE TO ERASMUS STUDENTS	Yes
COURSE WEBPAGE (URL)	

(2) LEARNING OUTCOMES

Learning Outcomes

The learning outcomes of the course are described, specifying the particular knowledge, skills, and competencies at the appropriate level that students will acquire upon successful completion of the course.

Please refer to Appendix A

- *Description of the Level of Learning Outcomes for each study cycle according to the Qualifications Framework of the European Higher Education Area.*
- *Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B.*
- *Concise Guide for Writing Learning Outcomes*

The course provides basic knowledge of artificial intelligence as it analyzes a series of topics that constitute its core, from data processing, cleaning and enrichment and the selection of appropriate learning methods, to the creation of different Machine Learning models and applications, including Neural Networks and Deep Learning architectures, as well as Reinforcement Learning techniques.

Upon successful completion of the course, students will:

- Know basic issues of artificial intelligence as well as its modern applications.
- Be familiar with data management with the Python programming language.
- Know the basic principles of machine learning.
- Understand the type of learning required for each problem (prediction, classification, clustering) and the type of models that should be used.
- Be able to develop artificial intelligence models using the Python programming language.
- Know how to model problems and solve them using reinforcement learning.
- Be able to create methods for solving problems with reinforcement learning using the Python programming language.

General Competences

Taking into account the general competences that a graduate should have acquired (as listed in the Diploma Supplement and outlined below), which of these competences does the course aim to develop?

Searching, analyzing, and synthesizing data and information, using the *Project design and management*

necessary technologies *Adaptation to new situations* *Decision making* *Autonomous work* *Teamwork* *Working in an international environment* *Working in an interdisciplinary environment* *Generation of new research ideas*	*Respect for diversity and multiculturalism* *Respect for the natural environment* *Demonstration of social, professional, and ethical responsibility and sensitivity to gender issues* *Exercising critical and self-critical thinking* *Promotion of free, creative, and inductive thinking* *…* *Other competences: …*

- Searching, analyzing, and synthesizing data and information, using the necessary technologies
- Adaptation to new situations
- Decision making
- Autonomous work
- Teamwork
- Generation of new research ideas
- Respect for diversity and multiculturalism
- Demonstration of social, professional, and ethical responsibility and sensitivity to gender issues
- Exercising critical and self-critical thinking
- Promotion of free, creative, and inductive thinking

(3) COURSE CONTENT

The course covers the following topics:

Week	Topics
1	Introduction to Artificial Intelligence
2	Data management, visualization and analysis
3	Data cleaning and enrichment
4	Introduction to Machine Learning, supervised and unsupervised learning
5	Creation of linear regression models and interpretation of results, application
6	Classification, the K Nearest Neighbors (KNN) algorithm and interpretation of results
7	Decision trees and random forest models
8	Unsupervised learning, clustering, use of K-Means algorithm
9	Basic architectures and development of neural networks
10	Deep Learning architectures
11	Reinforcement Learning, Q-learning
12	Creating Reinforcement Learning models and solving problems
13	Artificial Intelligence and Ethics - Review

Students are trained in the Laboratory Production Management Information Systems. Furthermore, articles, audiovisual lecture material, web links to useful resources, exercises, and software are uploaded in electronic format on the eClass platform.

(4) TEACHING and LEARNING METHODS - ASSESSMENT

TEACHING MODE *Face-to-face, in-class lecturing, distance teaching and distance learning etc.*	• Face-to-face in a classroom or the Lab • Distance teaching & learning (if required)
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY *Use of ICT in Teaching, Laboratory Education, Communication with students*	**Teaching**: Lectures using modern audiovisual equipment, learning support through the eClass electronic platform, synchronous distance teaching via MS Teams. **Laboratory**: open-source software

<table>
<tr><td></td><td>Communication with students: face-to-face during office hours, email, eClass platform, MS Teams tools</td></tr>
<tr><td>Organization of Teaching
A detailed description of the teaching methods and approach is provided.
Lectures, seminars, laboratory exercises, fieldwork, study and analysis of literature, tutorials, internships (placements), clinical practice, artistic workshops, interactive teaching, educational visits, project work, writing assignments, artistic creation, etc.

The student's study hours for each learning activity, as well as the hours of independent study, are specified in accordance with the principles of ECTS</td><td>
<table>
<tr><th>Activity</th><th>Semester Workload</th></tr>
<tr><td>Lectures</td><td>26</td></tr>
<tr><td>Laboratory sessions</td><td>26</td></tr>
<tr><td>Individual project</td><td>16</td></tr>
<tr><td>Team project</td><td>42</td></tr>
<tr><td>Self-study of lecture & Lab material</td><td>25</td></tr>
<tr><td>Consultation Support</td><td>0.5</td></tr>
<tr><td>Exams (written)</td><td>2</td></tr>
<tr><td>Course Total</td><td>137.5</td></tr>
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<tr><td>STUDENT ASSESSMENT
Description of the assessment process

Language of assessment, assessment methods, formative or summative evaluation, multiple-choice tests, short-answer questions, essay questions, problem-solving, written assignments, reports, oral examinations, public presentations, laboratory work, clinical patient examination, artistic interpretation, other(s)

Explicitly state assessment criteria and information on whether and where these criteria are accessible to students are included.</td><td>Language of Assessment: Greek (English for ERASMUS students)
Assessment Mode: Face-to-face and/or distance learning (if required)
Assessment Methods: The final grade for the course is determined as follows:
10% based on the individual project
40% based on the team project
50% from the written laboratory examination during the spring semester exam period, and in case of failure, during the September resits.
The written exam includes short-answer questions and is conducted as a closed-book exam.
Students with Learning Difficulties: Students with certified learning difficulties in reading and writing (as recognized by the competent authority) are assessed according to the procedures established by the Department.
Disclosure of Assessment Criteria: The assessment criteria are communicated during the first class and are clearly stated on the course website and the eClass platform. The exam syllabus is announced on eClass following the final lecture of the semester. The exam answers are posted on eClass after the examinations take place. Students have the right to review their graded exams and receive explanations regarding their grades. In cases of further requests, the procedures outlined in the current Study Regulations apply.</td></tr>
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(5) SUGGESTED BIBLIOGRAPHY

- Books:

- Journals:

- ACM Transactions on Intelligent Systems and Technology (TIST)
- Artificial Intelligence
- IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
- Journal of Artificial Intelligence Research (JAIR)
- Journal of Machine Learning Research (JMLR)
- Machine Learning
- Neural Computation

- Other educational material:

- Lecture Notes and Supporting Material provided by the Instructor
- Laboratory Workbook