COURSE OUTLINE

1. GENERAL

SCHOOL	School of Engineering		
DEPARTMENT	Department of Civil Engineering/ Master Program 'Hydrometeorological Disasters Program		
LEVEL OF STUDIES	7		
COURSE CODE	**ΥΝΚΣΕ**	**SEMESTER**	**1st**
COURSE TITLE	Computational Intelligence and Control Systems		

TEACHING ACTIVITIES *If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	3	6
Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.		

COURSE TYPE *Background, General Knowledge, Scientific Area, Skill Development*	Scientific Area
PREREQUISITES:	NO
TEACHING & EXAMINATION LANGUAGE:	Greek/ English
COURSE OFFERED TO ERASMUS STUDENTS:	NO
COURSE URL:	https://eclass.duth.gr/courses/1021376/

2. LEARNING OUTCOMES

Learning Outcomes

Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.

Once the course is completed, participants will be able to:

- Understand the basic principles of optimization techniques.
- Know how real-time control systems work
- Identify control options for solving hydrological problems.
- To design a general plan for a regional real-time control system.
- To know the basic techniques of data modeling from machine learning (neural networks, model trees, vague systems etc.).
- Be able to correctly classify a modeling problem based on physics, data or hybrid
- Choose appropriate methods and tools for constructing models based on real time data

General Skills

Name the desirable general skills upon successful completion of the module

Search, analysis and synthesis of data and information, ICT Use
Adaptation to new situations
Decision making
Autonomous work
Teamwork
Working in an international environment
Project design and management
Equity and Inclusion
Respect for the natural environment
Sustainability
Demonstration of social, professional and moral responsibility and sensitivity to gender issues
Critical thinking

Working in an interdisciplinary environment *Promoting free, creative and inductive reasoning* *Production of new research ideas*
• Search, analysis and synthesis of data and information • Production of new research ideas • Project design and management • Respect for the natural environment • Promoting free, creative and inductive reasoning

3. COURSE CONTENT

1. Development of Machine Learning templates
2. Introduction - Basic Concepts
3. Sorting - Classification
4. Regression - Regression
5. Ambiguous Set Fundamentals
6. Data Preprocessing
7. Decrease Parameters
8. Directed Machine Learning
9. Artificial Neural Networks (Front Feeding Multiplanes)
10. Applications in the development of Classification-Regression Standards in the water sector
11. Rating Indicators
12. Unbalanced data cases
13. Nondirected Machine Learning
14. Fuzzy fc-means cluster analysis
15. Introduction to the internet of things
16. Exercises and laboratories: optimal water distribution, automatic model calibration.
17. Hydroinformatics modeling based on data and physical models. Use of data-based methods in hydrological forecasts..

4. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD *Face to face, Distance learning, etc.*	Distance learning
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) *Use of ICT in Teaching, in Laboratory Education, in Communication with students*	Use of ICT in Teaching, and Communication with students • Digital slides • videos • MsTeams/ e-class, webmail
TEACHING ORGANIZATION *The ways and methods of teaching are described in detail.* *Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc.* *The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.*	

Activity	*Workload/semester*
Lectures	39
Final project	60
Bibliographic research & analysis	78
Final examination	3
TOTAL	**180**

STUDENT EVALUATION *Description of the evaluation process*	Written Assignment, 100%

Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others *Please indicate all relevant information about the course assessment and how students are informed*	

5. SUGGESTED BIBLIOGRAPHY

ANNEX OF THE COURSE OUTLINE

Alternative ways of examining a course in emergency situations

Teacher (full name):	Iliadis L., Papaleonidas A.
Contact details:	liliadis@civil.duth.gr, papaleon@civil.duth.gr,
Supervisors: (1)	YES
Evaluation methods: (2)	Written Assignment (100%)
Implementation Instructions: (3)	Written assignment should be submitted via eclass on a specified date.