2nd Semester

FUZZY LOGIC AND APPLICATIONS

1. GENERAL

SCHOOL	SCHOOL OF ENGINEERING
DEPARTMENT	CIVIL ENGENEERING
LEVEL OF STUDIES	POST-GRADUATE, LEVEL 7

		SEMESTER	2nd SEMESTER
COURSE CODE			

COURSE TITLE	FUZZY LOGIC AND APPLICATIONS

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**
	3	7,5
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:	None
TEACHING & EXAMINATION LANGUAGE:	Greek
COURSE OFFERED TO ERASMUS STUDENTS:	No
COURSE URL:	https://eclass.duth.gr/courses/ENG129/

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.
<u>Learning Outcomes of the course Fuzzy Logic and Applications</u> Upon successful completion of the course, students: • 1. They will have understood and be able to explain the difference between the concept of fuzzy set and classical set. They will be able to understand that the fuzzy set, is a natural evolution of the classical set. • 2. They will have acquired a satisfactory level of knowledge of the fundamental principles and models of fuzzy logic.

- 3. They will have an understanding of the concept of a fuzzy relation. They will also have understood that the cornerstone of modern sciences, such as robotics and technical intelligence, is the "fuzzy entailment", which is a fuzzy relation.
- 4. They will be able to distinguish when and why we apply intelligent techniques to a specific system, such as a social system, engineering system, etc.

General Skills

Name the desirable general skills upon successful completion of the module

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

Search, analysis and synthesis of data and information, ICT Use.

Adaptation to new situations.

Decision making.

Autonomous work.

3. COURSE CONTENT

1. From classical logic to fuzzy logic

2. Operations between classical and fuzzy sets

3. Properties of fuzzy sets

4. a-intercepts of a fuzzy set

5. The negation (n) in fuzzy logic

6. De Morgan triad

7. Classical and fuzzy entailment

8. Degree of truth of fuzzy inference

9. Equivalence classes

10. Boolean matrix and relations

11. Fuzzy Linear Regression

4. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD *Face to face, Distance learning, etc.*	Live distance learning
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY	Use of ICT in teaching and in communication with the students

(ICT) *Use of ICT in Teaching, in Laboratory Education, in Communication with students*	

TEACHING ORGANIZATION		
The ways and methods of teaching are described in detail.	**Activity**	**Workload/semester**
	Lectures	39
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.	Bibliographicalresearchandstudy	78
	Assignmentsduringthecourse	30
	Finalwritten exam	3
	Total	**150**
The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.		

STUDENT EVALUATION	
Description of the evaluation process *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*	Assignments during the course. Final written exam.

5. SUGGESTED BIBLIOGRAPHY

1. Τζιμόπουλος Χ., Παπαδόπουλος Β., (2013), «Ασαφής λογική με εφαρμογές στις επιστήμες του μηχανικού», Εκδόσεις ΖΗΤΗ, Θεσσαλονίκη.

2. Timothy J. Ross, (2010), «Fuzzy Logic with Engineering Applications», Third edition, Wiley.

3. Μποτζώρης Γ., Παπαδόπουλος Β., (2015), «Ασαφή σύνολα Εφαρμογές στο σχεδιασμό και την διαχείριση έργων μηχανικού», Εκδόσεις σοφία Α.Ε.

ANNEX OF THE COURSE OUTLINE

Alternative ways of examining a course in emergency situations

Teacher (full name):	Emeritus Prof. Basil Papadopoulos
Contact details:	Email: papadob@civil.duth.gr
Supervisors: (1)	No
Evaluation methods: (2)	Students are evaluated via written assignments during the course and a written final assignment.
Implementation Instructions: (3)	The course is given via live distance learning and emergency situations will not affect lectures and student evaluation.

(19) Please write YES or NO

(20) Note down the evaluation methods used by the teacher, e.g.

6. *written assignment* or/and exercises
7. written or oral examination with distance learning methods, provided that the integrity and reliability of the examination are ensured.

(21) In the **Implementation Instructions** section, the teacher notes down clear instructions to the students:

a) in case of **written assignment and / or exercises:** the deadline (e.g. the last week of the semester), the means of submission, the grading system, the grade percentage of the assignment in the final grade and any other necessary information.

b) in case of **oral examination with distance learning methods:** the instructions for conducting the examination (e.g. in groups of X people), the way of administration of the questions to be answered, the distance learning platforms to be used, the technical means for the implementation of the examination (microphone, camera, word processor, internet connection, communication platform), the hyperlinks for the examination, the duration of the exam, the grading system, the percentage of the oral exam in the final grade, the ways in which the inviolability and reliability of the exam are ensuredand any other necessary information.

c) in case of **written examination with distance learning methods**: the way of administration of the questions to be answered, the way of submitting the answers, the duration of the exam, the grading system, the percentage of the written exam of the exam in the final grade, the ways in which the integrity and reliability of the exam are ensured and any other necessary information.

There should be an attached list with the Student Registration Numbers only of students eligible to participate in the examination.