

COURSE OUTLINE

1. GENERAL

SCHOOL	Engineering		
DEPARTMENT	Environmental Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	15AY4N	SEMESTER	1st
COURSE TITLE	Computer Programming		
TEACHING ACTIVITIES <i>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.</i>		TEACHING HOURS PER WEEK	ECTS CREDITS
2 hours of lectures per week and 1 hour of practical problem solving with R		3 hours	5
Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.			
COURSE TYPE <i>Background, General Knowledge, Scientific Area, Skill Development</i>	Scientific area, skill development		
PREREQUISITES:	None		
TEACHING & EXAMINATION LANGUAGE:	Greek		
COURSE OFFERED TO ERASMUS STUDENTS:	Yes. The course is offered in English for Erasmus+ students		
COURSE URL:	https://eclass.duth.gr/courses/TMC340/		

2. LEARNING OUTCOMES

Learning Outcomes <i>Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.</i>
- Understanding computer data processing - Familiarization with algorithms - Understanding the way mathematical problems are handled within R - Customized programming for environmental engineers
General Skills <i>Name the desirable general skills upon successful completion of the module</i>
Search, analysis and synthesis of data and information, ICT Use Adaptation to new situations Decision making Autonomous work Teamwork Working in an international environment Working in an interdisciplinary environment Production of new research ideas 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 Promoting free, creative and inductive reasoning
- Improvement of computer programming skills - Acquisition of using open programming package R

3. COURSE CONTENT

- Information handling. The binary system. - Algorithms and flow charts. - Introduction to R programming.

4. The R Studio platform
5. Data objects: vectors, array
6. Data objects: lists, factors, data frames.
7. Functions in R
8. Mathematical computations in R: mathematical operations, simple functions, operations with vectors and arrays
9. Linear systems of equations, random numbers, other useful functions.
10. Graphics: the ggplot package
11. Linear regression analysis
12. Multivariate linear regression analysis
13. The R Shiny web apps development environment

14. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD <i>Face to face, Distance learning, etc.</i>	Face-to-face teaching with Power Point presentations. All presentations available with additional study material and assignments via e.class platform	
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) <i>Use of ICT in Teaching, in Laboratory Education, in Communication with students</i>	ICT is used throughout the course activities in teaching, laboratory exercises and communication. The course is strongly oriented to the use and application of open source software and open data analysis.	
TEACHING ORGANIZATION <i>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.</i> <i>The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.</i>	Activity	Workload/semester
	Lectures – face to face	26
	Exercises - supervised	13
	Bibliographic research - unsupervised	28
	Problem solving - unsupervised	30
	Project development - supervised	33
	Presentation preparation - unsupervised	20
STUDENT EVALUATION <i>Description of the evaluation process</i> <i>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</i> <i>Please indicate all relevant information about the course assessment and how students are informed</i>	Assessment is based on two assignments (50% of the total score). Students are expected to submit their assignments to e.class platform and present their findings in audience. The rest 50% is allocated through written exams.	

15. SUGGESTED BIBLIOGRAPHY

An Introduction to R. Notes on R: A Programming Environment for Data Analysis and Graphics Version 3.3.1 (2016-06-21) by W. N. Venables, D. M. Smith and the R Core Team, <http://cran.us.r-project.org/doc/manuals/R-intro.pdf>

ANNEX OF THE COURSE OUTLINE

Alternative ways of examining a course in emergency situations

Teacher (full name):	Alexandra Gemitzi
Contact details:	agkemitz@env.duth.gr
Supervisors: (1)	YES
Evaluation methods: (2)	Oral examination with distance learning methods, provided that the integrity and reliability of the examination are ensured
Implementation Instructions: (3)	The oral examinations are conducted through presentation in Teams platform of the assignment conducted by each student. Five questions are set to the student and the grade is extracted by the assessment of the quality and clarity of presentation and the correctness of answers provided to the questions. Students should be equipped with a microphone, camera, internet connection and should be connected to the Teams platform. The inviolability of the exam is guaranteed by the identification of the student and the presence of a second examiner throughout the exams process.

(1) Please write YES or NO

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

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

(3) 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 ensured and 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.