

1st Semester

APPLIED FUNCTIONAL ANALYSIS

1. GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
DEPARTMENT	CIVIL ENGINEERING		
LEVEL OF STUDIES	POST-GRADUATE, LEVEL 7		
COURSE CODE		SEMESTER	1 st SEMESTER
COURSE TITLE	APPLIED FUNCTIONAL ANALYSIS		
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
		3	7,5
<i>Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.</i>			
COURSE TYPE <i>Background, General Knowledge, Scientific Area, Skill Development</i>	Scientific Area		
PREREQUISITES:	None		
TEACHING & EXAMINATION LANGUAGE:	Greek		
COURSE OFFERED TO ERASMUS STUDENTS:	No		
COURSE URL:	https://eclass.duth.gr/courses/TMB291/		

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>
<p>Learning outcomes in Applied Functional Analysis</p> <p>Upon successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> - Understand the basic properties of metrics. - Prove simple results in metric spaces, which are essentially generalizations of absolute value. - Understand the concept of topological non-metric spaces.

- To formulate problems from other areas of mathematics, such as the fixed point theorem, in differential equations,
- Understand that series integration and derivation are essentially inference of uniform convergence of a sequence of functions.
- To understand the importance of non-metric spaces and their applications in various sciences, such as physics

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. Real numbers (Limits and continuity)
2. Countable and non-countable sets.
3. Metric spaces with norm and their properties
4. Continuity of a function
5. Sequences in metric spaces
6. Convergence of function sequences (point convergence, uniform convergence, the space of terminated functions)
7. The space of continuous functions
8. Topological spaces

4. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD

Face to face, Distance learning, etc.

Live distance learning

<p align="center">USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT)</p> <p align="center"><i>Use of ICT in Teaching, in Laboratory Education, in Communication with students</i></p>	<p>Use of ICT in teaching and in communication with the students</p>													
<p align="center">TEACHING ORGANIZATION</p> <p><i>The ways and methods of teaching are described in detail.</i></p> <p><i>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></p> <p><i>The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.</i></p>	<table border="1"> <thead> <tr> <th align="center"><i>Activity</i></th> <th align="center"><i>Workload/semester</i></th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td align="center">39</td> </tr> <tr> <td>Bibliographicalresearchandstudy</td> <td align="center">78</td> </tr> <tr> <td>Assignmentsduringthecourse</td> <td align="center">30</td> </tr> <tr> <td>Finalwritten exam</td> <td align="center">3</td> </tr> <tr> <td>Total</td> <td align="center">150</td> </tr> </tbody> </table>		<i>Activity</i>	<i>Workload/semester</i>	Lectures	39	Bibliographicalresearchandstudy	78	Assignmentsduringthecourse	30	Finalwritten exam	3	Total	150
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<p align="center">STUDENT EVALUATION</p> <p><i>Description of the evaluation process</i></p> <p><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></p> <p><i>Please indicate all relevant information about the course assessment and how students are informed</i></p>	<p>Assignments during the course.</p> <p>Final written exam.</p>													

5. SUGGESTED BIBLIOGRAPHY

<p>1. N. L. Carothers, (2006), "Real Analysis", Cambridge University Press.</p>

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 , Telephone: +30 25410 79747
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.

(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.