COURSE OUTLINE

1. GENERAL

SCHOOL	School of Environment and Agricultural Engineering		
ACADEMIC UNIT	Department of Natural Resources Development and Agricultural Engineering		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	**630040**	**SEMESTER**	1ο
COURSE TITLE	PARTIAL DIFFERENTIAL EQUATIONS		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	5
Laboratory exercises	2	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Special background, specialized knowledge, skills development
PREREQUISITE COURSES:	Topics on Applied Mathematics (undergraduate)
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	http://openeclass.aua.gr

2. LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

With the successful completion of the course, the student will be able to:

- To understand what partial differential equations are, their applications, and methods of solving them.
- To model problems related to wave propagation, heat diffusion, and transmission of acoustic waves.
- To solve initial and boundary value problems using theoretical and computational tools.
- To use numerical methods for solving differential equations with applications in engineering and agriculture.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

- Search for, analysis and synthesis of data and information, with the use of the necessary technology.
- Decision making.
- Working independently.
- Production of free, creative and inductive thinking.

3. SYLLABUS

Theory (3 ECTS)

- Introduction to partial differential equations, linear equations of the first order, initial and boundary conditions, applications.
- Well-posed problems, types of second-order partial differential equations.
- Wave equation, waves in bounded and semi-infinite domains.
- Heat equation, diffusion in bounded and semi-infinite domains.
- Applications of the Laplace transform in infinite domains.
- Fourier series, trigonometric series, convergence theorem, complex form.
- Fourier transform, sine and cosine-Fourier transform.

Lab (2 ECTS)

- Introduction to Octave/Matlab.
- Wave equation: Examples and applications.
- Heat equation: Examples and applications.
- Laplace transform: Examples and applications.
- Fourier transform: Examples and applications.

4. TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of ICT in teaching, laboratory education and communication with students
• Use of programming software</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39 hours</td></tr>
<tr><td>Laboratory</td><td>26 hours</td></tr>
<tr><td>Study</td><td>60 hours</td></tr>
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<tr><td>Course total
(25 working hours per ECTS)</td><td>125 hours</td></tr>
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</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>Final exam that might contain multiple choice questions, short-answer questions, open-ended questions and problem solving.</td></tr>
</table>

5. ATTACHED BIBLIOGRAPHY

- *Suggested bibliography (in Greek):*

- Μερικές διαφορικές εξισώσεις και μιγαδικές συναρτήσεις: θεωρία και εφαρμογές, Ν. Σταυρακάκης, Εκδόσειες ΤΣΟΤΡΑΣ ΑΘΑΝΑΣΙΟΣ Ε.Ε., 2022, Κωδικός βιβλίου στον Εύδοξο: 112690349
- Μερικές διαφορικές εξισώσεις: Μια εισαγωγή, W. A. Strauss, Πανεπιστημιακές εκδόσεις ΕΜΠ, 2017, Κωδικός Βιβλίου στον Εύδοξο: 68387914.
- Εφαρμοσμένα Μαθηματικά, Ν. Τσίτσας, Κάλλιπος ανοικτές ακαδημαϊκές εκδόσεις, 2016, Κωδικός Βιβλίου στον Εύδοξο: 320079.