

COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Environment		
ACADEMIC UNIT	Department of Environment		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	EY5859	SEMESTER	6
COURSE TITLE	Applied Mathematics and Numerical Analysis		
INDEPENDENT TEACHING ACTIVITIES		WEEKLY TEACHING HOURS	CREDITS
Lectures		1	
Laboratory exercises		2	
Total credits			5
COURSE TYPE		Skills development	
PREREQUISITE COURSES:		Mathematics	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:		Greek	
IS THE COURSE OFFERED TO ERASMUS STUDENTS			
COURSE WEBSITE (URL)		http://www.env.aegean.gr/spoudes/proptychiakes-spoudes/programma-spoudon/mathimata/efarmosmena-mathimatika/	

(2) LEARNING OUTCOMES

Learning outcomes
<ul style="list-style-type: none"> To learn and choose different computational numerical methods to solve assessments related to Physical Sciences To differentiate the characteristics of numerical vs analytical methods and determine the most appropriate to solve specific problems (knowledge, analysis and implementation) To apply mathematical theory by running code written in advanced programming language associated with environmental issues (problem analysis, definition of parameters and variables, physical interpretation, constraints and requirements etc) To learn how to use the mathematical theory and structure to express classical physical problems (e.g. volume through interval, exponential change through differential equations) Address a given natural application by analyzing, planning, composing, developing the solution To interpret the result and propose/support a solution based on the problem's outcome
General Competences
Search for, analysis and synthesis of data and information, with the use of the necessary technology Adapting to new situations Decision-making Working independently

Working in an interdisciplinary environment

(3) SYLLABUS

Numerical analysis and Advanced Programming Languages
Solving System of Linear Equations
Linear Algebra (Eigenvalues and Eigenvectors)
Integral Calculus
Applications of Integral Calculus to Natural Sciences
Ordinary Differential Equations
Systems of Differential Equations
Numerical Solving of Differential Equations
Partial Differential Equations
Monte-Carlo methods and applications

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY.	Face to face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	E-class Laboratory education with programming language	
TEACHING METHODS	Activity	Semester workload
	Lectures	13
	Laboratory practice	26
	Study and analysis of bibliography	50
	Tutorials	25
	Implementation of laboratory exercises	40
	Course total	154
STUDENT PERFORMANCE EVALUATION	Language of evaluation: Greek Methods of evaluation Implementation of Laboratory exercises 20% Problem solving 30% Code implementation and running in advanced programming language 50%	

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. Finney R.L., Giordano F.R., Weir M.D., 2012. Απειροστικός Λογισμός (ενιαίος τόμος). Πανεπιστημιακές Εκδόσεις Κρήτης.
2. Logan D.J., 2009. Εφαρμοσμένα Μαθηματικά. Πανεπιστημιακές Εκδόσεις Κρήτης.
3. Τραχανάς Σ., 2001. Συνήθεις διαφορικές εξισώσεις. Πανεπιστημιακές Εκδόσεις Κρήτης.
4. Φωκιανός Κ., Χαραλάμπους Χ. 2010. Εισαγωγή στην R (Πρόχειρες Σημειώσεις). Πανεπιστήμιο Κύπρου
5. Καρλής Δ., Ντζούγκρας Ι. 2015. Εισαγωγή στον Προγραμματισμό και στη Στατιστική Ανάλυση με R. Εκδόσεις Κάλλιπος (www.kallipos.gr).
6. Παπαιωάννου Σ., Βοζίκης Χ., 2015. Αριθμητική Ανάλυση. Εκδόσεις Κάλλιπος (www.kallipos.gr).
7. Τσίτσας Ν., 2015. Εφαρμοσμένα Μαθηματικά. Εκδόσεις Κάλλιπος (www.kallipos.gr).
8. Χαραλάμπους Χ.Μ.Α., Φωτιάδης Α., 2015. Μια εισαγωγή στη Γραμμική Άλγεβρα. Εκδόσεις Κάλλιπος (www.kallipos.gr).

- Related academic journals:

Applied Mathematics and Computation
Archives of Computational Methods in Engineering
Environmental Modelling and Software