COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF MATHEMATICS		
LEVEL OF STUDIES	UNDERGRADUATE PROGRAM		
COURSE CODE		**SEMESTER**	**D**
COURSE TITLE	ORDINARY DIFFERENTIAL EQUATIONS I		
INSTRUCTOR	Konstantinos Housiadas		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS**
		6	9
COURSE TYPE	General background		
PREREQUISITE COURSES:	NO		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	http://www.math.aegean.gr/index.php/en/academics/undergraduate-programs		

(2) LEARNING OUTCOMES

Learning outcomes
By completing this course, student should demonstrate competency in the following skills: • To understand and suitably apply the basic concepts of ordinary differential equations in solving initial value problems. • To categorize physical processes to the life or physical science they belong to (such a Mathematical Biology and Physics respectively) and also model them by using ordinary differential equations.
General Competences
Working independently. Team working. Working in an interdisciplinary environment. Decision-making . Production of free, creative and inductive thinking.

(3) SYLLABUS

First order equations: Special types (Exact, separable, linear, Bernoulli, Riccati, homogeneous, Clairaut, Lagrange); The notion of integrating factor; Fundamental theorems on the existence and uniqueness of solutions (Picard-Lindelöf, the notion of maximal interval of existence, Peano's theorem). Higher order linear equations: Existence and uniqueness of solutions. Homogeneous equations (superposition of solutions, linearly independent solutions, formulation of the general solution, Wronskians, Abel-Liouville theorem); Non-homogeneous equations (formulation of the general solution, d'Alembert's method on the reduction of order); Homogeneous equations with constant coefficients (characteristic polynomial, form of the general solution); Special solutions of non-homogeneous equations (method of undetermined coefficients, Lagrange's variation of parameters method); Euler-Cauchy equations. Introduction to linear systems: the method of eigenvalues-eigenvectors. Introduction on the analysis of scalar flows.	
TEACHING MATERIAL DISTRIBUTION	The teaching material of the course is uniformly distributed during the semester.

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY</td><td>Face-to-face lectures</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</td><td>• Communication with students via e-mail.
• Potential case studies with suitable symbolic and numerical computations scientific software.</td></tr>
<tr><td>TEACHING METHODS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>52</td></tr>
<tr><td>Tutorials</td><td>26</td></tr>
<tr><td>Independent study</td><td>147</td></tr>
<tr><td>Course total (25 per ECTS)</td><td>225</td></tr>
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<tr><td>COURSE COMMITMENTS</td><td>Attending course and tutorial sessions is not obligatory.</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION</td><td>Student’s performance is evaluated in Greek, by a written examination paper which includes short-answer questions and problem solving. Disabled students are evaluated by suitably structured examinations (pending on the disability of the student, e.g., oral exams, etc.).</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

1. W. E. Boyce and R. DiPrima. *Elementary differential equations and boundary value problem, 10th ed. Wiley2012.*
2. J. C. Robinson*. An introduction to Ordinary Differential Equations. Cambridge texts in Applied Mathematics. Cambridge University Press, 2004.*

- *Related academic journals:* Academic journals focused in the field of Differential equations, Mathematical Analysis, and Mathematical Physics.