

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF MATHEMATICS		
LEVEL OF STUDIES	POSTGRADUATE Studies in Mathematics		
COURSE CODE	B1	SEMESTER	A
COURSE TITLE	APPLIED MATHEMATICAL METHODS		
INDEPENDENT TEACHING ACTIVITIES	WEEKLY TEACHING HOURS	CREDITS	
	3	10	
COURSE TYPE	SPECIALISED GENERAL KNOWLEDGE		
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
<p>On completion of this course, students should be armed with analytical mathematical methods and techniques for solving a wide variety of mathematical problems that arise in the modelling of physical phenomena and technological applications.</p> <p>In particular, students will be able to solve analytically frequently occurring small-parameter problems using a combination of asymptotic methods such as matching, multiple scales (in space and time), and series approximations.</p> <p>The advanced topics should form a solid foundation for potential research students.</p>
General Competences
<p>Working independently</p> <p>Team work</p>

(3) SYLLABUS

<p>Introduction and basic concepts on asymptotic analysis. Asymptotic expansions. Asymptotic sequence of functions. Laplace's method for integrals. Integration by parts. Watson's lemma. Method of steepest descents with examples. The method of stationary phase. Integral transformations and asymptotic calculation of integrals. Differential equations, singularities and asymptotic methods of solution. The WKB method. Boundary layer theory. Multiple-scale analysis. The Poincare-Lindsted method.</p>
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(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	<ul style="list-style-type: none"> • Communication with students via e-mail • Uploading course material on moodle system

TEACHING METHODS	<i>Activity</i>	<i>Semester workload</i>
	Lectures	39
	Independent study	148.5
	Assignments	62.5
	Course total (25 per ECTS)	250
STUDENT PERFORMANCE EVALUATION	<p>Student evaluation is done in Greek through a written examination which includes short-answer equations and problem solving.</p> <p>For students with disabilities, evaluation takes place via oral exams.</p>	

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- E.J. Hinch, Perturbation methods, Cambridge University Press, 1991
- C.M. Bender, S.A. Orszag, Advanced Mathematical Methods for Scientists and Engineers I Asymptotic Methods and Perturbation Theory, Springer-Verlag New York, 1st ed. 1999.
- G. Dassios, "Introduction to Asymptotic Analysis" Tsotras Publications. Athens, Greece (2016)

- Related academic journals: Asymptotic analysis.