COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Science		
ACADEMIC UNIT	Physics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**10YKO11**	**SEMESTER**	**1**
COURSE TITLE	**Analysis I and Applications**		

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 (theory and exercises)	6	7

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	General Background
PREREQUISITE COURSES:	No
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes(in Greeklanguage for Erasmus students)
COURSE WEBSITE (URL)	*https://eclass.uoa.gr/courses/PHYS234/*

(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*

The course provides a rigorous, systematic and an in-depth introduction in the analysis of functions on the real line.

With the completion of the course the student is able to:

- Use mathematical induction to prove mathematical statements.
- Know the definition of a limit and be able to establish the convergence or divergence of simple real sequences and series.
- Understand the completeness of the real line and be able to use it to prove the basic properties of continuous functions.
- Be able to compute the derivatives and integrals of elementary functions.
- Expand a function in its Taylor series.
- Know how to define the exponential function and know how to graph exponential and trigonometric functions and their inverses.
- Know the definition of a Riemann integral and be able to determine the integrability of simple functions.

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

The course aims at the following general competences

Working Independently
Production of free, creative and inductive thinking
Analytical and synthetic thinking
Critical thinking
Problem solving

(3) SYLLABUS

- Numbers (natural, rational, irrational and real numbers). Mathematical Induction. Basic inequalities. Bounded sets. Supremum and infimum of sets.
- The field of real numbers. Bounded sets of numbers. Upper and lower bound. The principle of completion.
- Sequences. Series. Radius of convergence of power series.
- Continuous functions and their basic properties.
- Differentiation. The mean value theorem. Extrema of functions. Taylor's theorem.
- Riemann integral (upper and lower bound of an integral). Fundamental theorem of integral calculus. Integration techniques. Approximation of definite integrals.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Yes Electronic communication with the students using ICT (Information and Communications Technology), eclass platform.

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

Activity	Semester workload
Lectures	52
Exercises	26
Seminars	-
Individual Study/Study and Analysis of bibliography / Preparation	97
CourseTotal	**175**

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.

Final written exams in Greek

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- *Spivak, M. – Διαφορικός και ολοκληρωτικός λογισμός. Πανεπιστημιακές εκδόσεις Κρήτης,*
- *Πηχωρίδη, Σ. Κ. Απειροστικός λογισμός, Σάμος 2006*
- *Burkill J. C. – A first course in mathematical analysis. Cambridge University Press, 1991.*