COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Science		
ACADEMIC UNIT	Physics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**10YKO12**	**SEMESTER**	**2**
COURSE TITLE	**Analysis II 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)	5	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 English, for Erasmus students).
COURSE WEBSITE (URL)	Webpage (eclass platform): https://eclass.uoa.gr/courses/MATH147

(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*

In this course the student acquires the basic knowledge on multivariable and vector valued functions. This mathematical knowledge is necessary for the understanding of the physical laws and the ability to deal with problems that appear in all physics classes in the following semesters. With the completion of the course the student is able:

- To understand the formulation of physical phenomena that take place in the real three-dimensional space and laws that the variables involved are vectors.
- To use the differential and integral calculus in Euclidean spaces, and in particular in dimensions 2 and 3 so that it solves problems that concern vector variables and their functions.
- To compute instant change rates of functions with respect to their various variables.
- To compute maxima and minima of smooth functions of several variables.
- To compute areas of 2-dimensional and volumes of 3-dimenstional subsets.
- To use the important theorems of Analysis as Stokes and Gauss theorems in problems of Physics.

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
- Team work
- Cultivation of free, creative and inductive thinking
- Analytical and synthetic thinking
- Time management
- Problem solving

(3) SYLLABUS

- Vectors, vector functions, inner and outer product, lines, planes, surfaces, arc length, unit tangent vector, TNB frame, multivariable functions, derivatives, limit, continuity.
- Partial derivatives, chain differentiation, directional derivative, tangent planes, linearization, differentials, extrema and saddle points.
- Lagrange multipliers, partial derivatives of functions under constraints, Taylor's theorem for multivariable functions.
- Curvilinear coordinate systems, norm, gradient, divergence and curl.
- Double and triple integrals in Cartesian and other coordinates, applications to the evaluation of areas, moments of inertia and centers of mass, change of variables (Jacobian determinants).
- Integration of vector fields, line and surface integrals, path independence, potential functions and conservative fields, Green, Gauss and Stokes theorems and applications.

(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, 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	50
Exercises	15
Individual study/ study and bibliographical review	110
Course total	**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:

- Διανυσματικός Λογισμός, Marsden J., A. Tromba, ΙΤΕ ΠΑΝ/ΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ,
- Απειροστικός Λογισμός *(σε έναν Τόμο),* B. Tomas, ΙΤΕ ΠΑΝ/ΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ,
- Απειροστικός Λογισμός σε πολλές μεταβλητές, Τ. Χατζηαφράτης, ΕΚΔΟΣΕΙΣ Σ.ΑΘΑΝΑΣΟΠΟΥΛΟΣ& ΣΙΑ Ο.Ε,
- Εφαρμοσμένος Απειροστικός Λογισμός, Λ.Ν. Τσίτσας, ΕΚΔΟΣΕΙΣ Σ.ΑΘΑΝΑΣΟΠΟΥΛΟΣ& ΣΙΑ Ο.Ε,
- Μαθηματικά ΙΙ, Β' έκδοση, Θ. Μ. Ρασσιάς, ΕΚΔΟΣΕΙΣ ΑΘ. ΤΣΟΤΡΑΣ