1.1.1 Differential and Integral Calculus II

GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	CIVIL ENGINEERING		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	ΓΕΝ004	**SEMESTER**	2nd
COURSE TITLE	Differential and Integral Calculus II		

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**
	4	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Scientific Background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	

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*

Upon completing this course students should be able to use: functions of most variables and recognize their graphic representations 2. The concepts of partial derivative and total differential 3. The solving of double and triple integrals 4. Basic concepts of Differential Geometry 5. Line integrals and surface integrals. 6. Implement the above in the field of Civil Engineering.

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

…….
The course contributes to the following skills: - Working independently - Production of free, creative and inductive thinking

SYLLABUS

Course content: 1. Introduction to functions of two real variables, examples of graphical representations, sphere, ellipsoid, paraboloid, cone, intersection of surfaces and planes, domain and definition of continuity for z=f(x, y). 2. The concept of partial derivative, physical and geometric interpretation, types and theorems of partial derivatives. The concept of total differential, higher-order partial derivatives. 3. Study of extrema, the problem of least squares, constrained extrema 4. Double Integrals, their physical and geometric interpretation, properties, and methods of computation. Types of integration domains 5. Double integrals, change of variables. Polar Coordinates. Generalization of the Change of Variables Problem, moment of Inertia of a Plane Surface. 6. Triple Integrals. Physical Interpretation. Properties and Computation Methods 7-9. Fundamental knowledge of vector analysis: scalar and vector fields, vector functions. Derivative of a vector function. Angular velocity. Uniform circular motion. Arc length of a curve. Derivative of z=f(x,y) in a given direction. Integration of vector functions. Gradient of scalar fields. Divergence and curl of vector fields 10-11. Line integrals (definition, properties and calculation methods). Path-independent line integrals. Conservative vector fields. 12. Surface integrals (definition, properties and calculation methods). 13. Stokes' theorem and Gauss's Divergence theorem.

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*	Poweroint presentations, Excel, Matlab/Octave, E-learning platform for educational material.
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 Individual study: Practice/exercises: Course total (26 hours workload per ECTS credit): ***130***
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 examination - open-ended questions (30-40%) - problem - solving questions (70-60%)

ATTACHED BIBLIOGRAPHY

[In Greek]. Τερζίδης Χαράλαμπος, Λογισμός συναρτήσεων μιας μεταβλητής με στοιχεία διανυσματικής γραμμικής άλγεβρας, Εκδόσεις Χριστοδουλίδης, Θεσσαλονίκη 2006

[In greek]. Hass J., Heil C., Weir M.D., Απειροστικός Λογισμός, Πανεπιστημιακές Εκδόσεις Κρήτης, Κρήτη 2005, ISBN 978-960-524-515-3, Κωδικός στον Εύδοξο: 77107082

[In greek]. Μπράτσος Αθανάσιος, Μαθήματα Ανώτερων Μαθηματικών, ISBN 978-960-603-030-7, [ηλεκτρ. βιβλ.] Αθήνα: Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών, Ηλεκτρονική Διεύθυνση: https://repository.kallipos.gr/handle/11419/424

[In greek} Παπαϊωάννου Σταύρος, Βογιατζή, Δέσποινα, Μαθηματικά Ι, ISBN 978-960-603-427-5, [ηλεκτρ. βιβλ.] Αθήνα: Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών, Ηλεκτρονική Διεύθυνση: https://repository.kallipos.gr/handle/11419/4551