COURSE OUTLINE

(1) General information

FACULTY/SCHOOL	TECHNOLOGY		
DEPARTMENT	ENVIRONMENTAL SCIENCES		
LEVEL OF STUDY	*Undergraduate*		
COURSE UNIT CODE	NEW **COURSE**	**SEMESTER**	2
COURSE TITLE	MATHEMATICS II		

INDEPENDENT TEACHING ACTIVITIES in case credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the entire course, give the weekly teaching hours and the total credits	**WEEKLY TEACHNG HOURS**	**CREDITS**
THEORETICAL BACKGROUND	6	5
LABORATORY PRACTICE		
TOTAL	6	5

COURSE TYPE Background knowledge, Scientific expertise, General Knowledge, Skills Development	BACKROUND KNOWLEDGE
PREREQUISITE COURSES:	NO
LANGUAGE OF INSTRUCTION &EXAMINATION/ASSESSMENT:	GREEK
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	

(2) LEARNING OUTCOMES

Learning Outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail.
It is necessary to consult:

APPENDIX A

- *Description of the level of learning outcomes for each level of study, in accordance with the European Higher Education Qualifications' Framework.*
- *Descriptive indicators for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and*

APPENDIX B

- *Guidelines for writing Learning Outcomes*

After the successful completion of the course, students will acquire the first basic knowledge of mathematics required to attend a Level 6 study programme in general and more specifically to attend a series of other courses in the Department of Environmental Sciences study programme. Specifically, they will gain knowledge:

- Vector-valued Functions to describe and understand curves in space and other sizes.
- Multi-Variable Function Analysis that will allow them to work with derivatives, double, triple,

line and surface integrals and their applications in geometry, physics and engineering.
- Ordinary Differential Equations for understanding mathematical modeling of natural phenomena and processes and solving them with analytical and numerical methods.

General Competences

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aim?

Search for, analysis and synthesis of data and information by the use of appropriate technologies,	*Project planning and management*
Adapting to new situations	*Respect for diversity and multiculturalism*
Decision-making	*Environmental awareness*
Individual/Independent work	*Social, professional and ethical responsibility and sensitivity to gender issues*
Group/Team work	*Critical thinking*
Working in an international environment	*Development of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Introduction of innovative research	*(Other…….citizenship, spiritual freedom, social awareness, altruism etc.)*
	…….

- Search for, analysis and synthesis of data and information
- Decision-making
- Individual work
- Group/Team work
- Critical thinking
- Development of free, creative and inductive thinking

(3) COURSE CONTENT

Vector – valued function:

1. Limits, continuity, derivatives και integration. Curves in space, tangent and vertical vector in curve, curvature and torsion, Frenet frame.

Multiple Variable Function Analysis:

2. Graphs, Stationary curves and surfaces. Limits, continuity and R_n derivation.
3. Partial derivative. Directional derivative.
4. Extreme values, constrained extrema and Lagrange multipliers.
5. Double integrals over rectangles and polar coordinates, calculation of areas and centers of mass.
6. Triple integrals over rectangles and polar coordinates, calculation of areas and centers of mass.
7. Line integrals of the first and second kind. Vector fields.
8. Potential functions, conservative fields. Green's theorem in the plane.
9. Surface integrals of the first and second kind, Gauss theorem, Green's theorem in the plane.

Differential Equations:

10. Equations of 1^{st} order
11. Equations of 2^{nd} order
12. Solution of linear differential equations and initial value problems
13. Solution of linear differential equations and border value problems

(4) TEACHING METHODS-ASSESSMENT

<table>
<tr><td>MODES OF DELIVERY
Face-to-face, in-class lecturing, distance teaching and distance learning etc.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY
Use of ICT in teaching, Laboratory Education, Communication with students</td><td>• Powerpoint presentations
• Software use such as MATLAB, Maxima, etc.
• Communication via e-mail.
• E-class platform</td></tr>
<tr><td>COURSE DESIGN
Description of teaching techniques, practices and methods:
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art Workshop, Interactive teaching, Educational visits, projects, Essay writing, Artistic creativity, etc.

The study hours for each learning activity as well as the hours of self-directed study are given following the principles of the ECTS.</td><td><table><tr><th>Activity/Method</th><th>Semester workload</th></tr><tr><td>Lectures</td><td>52</td></tr><tr><td>Practice exercises</td><td>26</td></tr><tr><td>Theory study</td><td>47</td></tr><tr><td>Course total
(25 hours of workload per credit unit)</td><td>125</td></tr></table></td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS
Detailed description of the evaluation procedures:

Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice tests, short- answer questions, open-ended questions, problem solving, written work, essay/report, oral exam, presentation, laboratory work, other……etc.

Specifically, defined evaluation criteria are stated, as well as if and where they are accessible by the students.</td><td><u>The final grade is the outcome of the following evaluations:</u>

The main evaluation is done with written exams at the end of the semester and forms the final grade at a rate of 90% (A).

Also, the student's participation in the lectures, solving exercises and delivering assignments that form the final grade at a rate of 10% is evaluated (B).

Final Grade = 90% (A) + 10% (B)</td></tr>
</table>

(5) SUGGESTED BIBLIOGRAPHY:

-***<u>Suggested bibliography</u>***

- Mathematics I, 2nd edition, Th. Rassias, Tsotras Publications, 2017 (in Greek)
- Calculation of Functions of a Variable and Linear Algebra, 2nd Edition, Mylonas Nikolaos, Schoinas Christos, Papaschoinopoulos G., 2017 (in Greek)
- Real Analysis, 3rd Edition, Georgiou Dimitrios, Iliadis Stavros, Megaritis Athanasios, Tziolas & Sons Publications, 2018 (in Greek)

-Complementary bibliography

Professor's notes: Material of theory lectures and laboratory exercises, which are available through the asynchronous training platform.