## COURSE OUTLINE

## (1) General information

| | | | |
|---|---|---|---|
| **FACULTY/SCHOOL** | TECHNOLOGY | | |
| **DEPARTMENT** | ENVIRONMENTAL SCIENCES | | |
| **LEVEL OF STUDY** | *Undergraduate* | | |
| **COURSE UNIT CODE** | NEW **COURSE** | **SEMESTER** | 1 |
| **COURSE TITLE** | MATHEMATICS I | | |

| **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:

- Analytical Geometry concerning vectors, lines, levels, conical sections and coordinate systems in space.

- Linear Algebra that will allow them to work with tables, solve linear equation systems, and find eigenvalues and eigenvectors.
- Mathematical Analysis of real functions of a variable that can be worked with limits, continuously, derivatives and integrals of a function, and sequences and series.

**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,*
*Adapting to new situations*
*Decision-making*
*Individual/Independent work*
*Group/Team work*
*Working in an international environment*
*Working in an interdisciplinary environment*
*Introduction of innovative research*
*Project planning and management*
*Respect for diversity and multiculturalism*
*Environmental awareness*
*Social, professional and ethical responsibility and sensitivity to gender issues*
*Critical thinking*
*Development of free, creative and inductive thinking*
*……*
*(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

Analytic geometry:

1. Vectors, dot product and cross product of vectors, directional cosines, vector projection on vector.
2. Linear equation, point distance from a line, plane equation, point distance from a plane. Conical sections, ellipse, hyperbola, circle, parable.
3. Coordinate systems and transformations.

Linear Algebra:

4. Tables, table algebra, inverse and symmetrical matrices. Determinants
5. Linear systems, Gauss elimination method, determinant method of Cramer.
6. Vector spaces, linear independence, basis. Linear mappings, change of basis.
7. Eigenvalues and eigenvectors.

Multiple Variable Function Analysis:

8. Introduction to real functions of one real variable. Function Categories: Exponential, Logarithmic, Trigonometric, Hyperbolic, Inverse trigonometric.
9. Function limits and continuity. Derivatives and function study. The meaning of differential.
10. Integrals - antiderivation. Basic Methods of integration.
11. Definite Integrals. Integration Techniques – Applications
12. Improper Integrals. Excising Criteria. Integration Methods.
13. Sequences. Numerical Series. Dynamical Series. Taylor – Maclaurin Series

## (4) TEACHING METHODS-ASSESSMENT

<table>
<tr><td>MODES OF DELIVERY<br>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<br>Use of ICT in teaching, Laboratory Education, Communication with students</td><td>• Powerpoint presentations<br>• Software use such as MATLAB, Maxima, etc.<br>• Communication via e-mail.<br>• E-class platform</td></tr>
<tr><td>COURSE DESIGN<br>Description of teaching techniques, practices and methods:<br>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art Workshop, Interactive teaching, Educational visits, projects, Essay writing, Artistic creativity, etc.<br><br>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<br>(25 hours of workload per credit unit)</td><td>125</td></tr></table></td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS<br>Detailed description of the evaluation procedures:<br><br>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.<br><br>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><br><br>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).<br><br>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).<br><br>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.