## COURSE OUTLINE

### (1) GENERAL

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>ENGINEERING SCHOOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACADEMIC UNIT</td>
<td>MECHANICAL ENGINEERING DEPARTMENT</td>
</tr>
<tr>
<td>LEVEL OF STUDIES</td>
<td>UNDER GRADUATE</td>
</tr>
<tr>
<td>COURSE CODE</td>
<td>2701001</td>
</tr>
<tr>
<td>SEMESTER</td>
<td>1st</td>
</tr>
<tr>
<td>COURSE TITLE</td>
<td>MATHEMATICS I</td>
</tr>
</tbody>
</table>

#### 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.

<table>
<thead>
<tr>
<th></th>
<th>WEEKLY TEACHING HOURS</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>5 (=3+2)</td>
<td>6</td>
</tr>
</tbody>
</table>

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

**PREREQUISITE COURSES:**

**LANGUAGE OF INSTRUCTION and EXAMINATIONS:**
- Greek (official)

**IS THE COURSE 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 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

To acquire the students of department of mechanical engineering the essential knowledge of Mathematics.

The course provides an introduction to the mathematical analysis and linear algebra. The course starts with the real numbers and the related one-variable real functions by studying limits, and continuity. Then it approaches the core of calculus, differential and integral theory for one-variable real functions. The aspects of linear algebra are also included in the course: in particular by studying the linear spaces and the theory and calculus of matrices.
**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
- Decision-making
- Adapting to new situations
- 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
- Showing social, professional and ethical responsibility and sensitivity to gender issues
- Criticism and self-criticism
- Production of free, creative and inductive thinking
- Others...

More specifically, students will be able to:

- Decision making.
- Autonomous work.
- Teamwork.
- Working in an international environment.
- Working in a multidisciplinary environment.
- Production of new research ideas.
- Respect for the natural environment.
- Ability of both criticism and self-criticism.
- Promotion of free, creative and inductive thinking.

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### SYLLABUS

The core modules of the course include:

- Matrices.
- Properties of determinants.
- Eigenvalues and eigenvectors.
- Complex numbers - Properties of complex numbers - Complex number measure
- Calculus Introduction.
- Points, Vectors, and Functions.
- Functions, Graphs, and Limits.
- Continuity of Functions.
- Derivatives.
- Computing Derivatives.
- Second Derivatives and Beyond.
- Indefinite Integrals.
- Definite Integrals.
- The Fundamental Theorem of Calculus.
- Area, Volume, and Arc Length.
- Sequences.
- Series.

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### TEACHING and LEARNING METHODS - EVALUATION

<table>
<thead>
<tr>
<th>DELIVERY</th>
<th>Face-to-face.</th>
</tr>
</thead>
<tbody>
<tr>
<td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</td>
<td>Teaching using ICT, Laboratory Education using ICT</td>
</tr>
</tbody>
</table>
Use of ICT in teaching, laboratory education, communication with students

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.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Semester workload</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>39</td>
</tr>
<tr>
<td>Exercises</td>
<td>26</td>
</tr>
<tr>
<td>Homework on case studies (individual or group work)</td>
<td>35</td>
</tr>
<tr>
<td>Personal study</td>
<td>50</td>
</tr>
<tr>
<td>Total Course</td>
<td>150</td>
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</table>

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: 70%.
Interim examination (advance): 20%.
Team/Personal biannual work (optional): 10%.

(5) ATTACHED BIBLIOGRAPHY