

## COURSE OUTLINE

### (1) OVERVIEW

|                                                                                                                                                                                                                                                                                                                                               |                                      |                              |             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------------|-------------|
| <b>SCHOOL</b>                                                                                                                                                                                                                                                                                                                                 | MARITIME & INDUSTRY                  |                              |             |
| <b>DEPARTMENT</b>                                                                                                                                                                                                                                                                                                                             | INDUSTRIAL MANAGEMENT & TECHNOLOGY   |                              |             |
| <b>LEVEL OF STUDIES</b>                                                                                                                                                                                                                                                                                                                       | UNDERGRADUATE                        |                              |             |
| <b>COURSE CODE</b>                                                                                                                                                                                                                                                                                                                            | TEMA007                              | <b>SEMESTER</b>              | 2           |
| <b>COURSE TITLE</b>                                                                                                                                                                                                                                                                                                                           | MATHEMATICS II                       |                              |             |
| <b>DISCRETE TEACHING ACTIVITIES</b><br><i>In cases where ECTS credits are awarded to distinct components of the course (e.g., Lectures, Laboratory Exercises, etc.), please indicate them separately. If the credits are awarded as a whole for the entire course, please state the weekly teaching hours and the total number of credits</i> |                                      | <b>WEEKLY TEACHING HOURS</b> | <b>ECTS</b> |
| Lectures & Tutorials                                                                                                                                                                                                                                                                                                                          |                                      | 4+2                          | 5.5         |
|                                                                                                                                                                                                                                                                                                                                               |                                      |                              |             |
|                                                                                                                                                                                                                                                                                                                                               |                                      |                              |             |
| <i>Please add additional rows if needed. A detailed description of the teaching organization and instructional methods is provided in Section (4).</i>                                                                                                                                                                                        |                                      |                              |             |
| <b>COURSE TYPE</b><br><i>core (C), core elective (CE), elective (E) - background, specialization, skill development</i>                                                                                                                                                                                                                       | C - Background                       |                              |             |
| <b>PREREQUISITE COURSES:</b>                                                                                                                                                                                                                                                                                                                  | None.                                |                              |             |
| <b>LANGUAGE OF TEACHING AND EXAMINATIONS:</b>                                                                                                                                                                                                                                                                                                 | Greek (English for ERASMUS students) |                              |             |
| <b>THIS COURSE IS AVAILABLE TO ERASMUS STUDENTS</b>                                                                                                                                                                                                                                                                                           | Yes                                  |                              |             |
| <b>COURSE WEBPAGE (URL)</b>                                                                                                                                                                                                                                                                                                                   |                                      |                              |             |

### (2) LEARNING OUTCOMES

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Learning Outcomes</b></p> <p><i>The learning outcomes of the course are described, specifying the particular knowledge, skills, and competencies at the appropriate level that students will acquire upon successful completion of the course.</i></p> <p><i>Please refer to Appendix A</i></p> <ul style="list-style-type: none"> <li>• Description of the Level of Learning Outcomes for each study cycle according to the Qualifications Framework of the European Higher Education Area.</li> <li>• Descriptive Indicators of Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and Appendix B.</li> <li>• Concise Guide for Writing Learning Outcomes</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <p>The course is essentially a continuation of Mathematics I (1st semester) aiming at familiarizing students with the basic concepts of mathematics used in the other courses of the curriculum.</p> <p>Upon successful completion of the course, the students will be able to:</p> <ul style="list-style-type: none"> <li>• Solve first-order differential equations.</li> <li>• Study applications of differential equations in engineering, thermodynamics, kinetics, etc., relevant to the other subjects of the curriculum.</li> <li>• Estimate the independent solutions of a differential equation.</li> <li>• Solve higher order differential equations as well as systems of differential equations.</li> <li>• Use proper integrals and Laplace transformations in problems of mechanics, thermodynamics, kinetics, etc.</li> <li>• Use the Lagrange multiplier method to optimize function under constraints.</li> <li>• Use double and triple integrals in engineering problems.</li> <li>• Know the concepts of sequence, series of real numbers and be able to use Taylor series in order to attend the rest of the Department's courses with a computer part.</li> <li>• Demonstrate the skills necessary to attend other courses of the curriculum with a computing part.</li> <li>• Formulate and solve computer problems by using the mathematical tools taught in the course.</li> </ul> |
| <p><b>General Competences</b></p> <p><i>Taking into account the general competences that a graduate should have acquired (as listed in the Diploma Supplement and outlined below), which of these competences does the course aim to develop?</i></p> <p><i>Searching, analyzing, and synthesizing data and information, using the      Project design and management</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

|                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>necessary technologies</i><br><i>Adaptation to new situations</i><br><i>Decision making</i><br><i>Autonomous work</i><br><i>Teamwork</i><br><i>Working in an international environment</i><br><i>Working in an interdisciplinary environment</i><br><i>Generation of new research ideas</i> | <i>Respect for diversity and multiculturalism</i><br><i>Respect for the natural environment</i><br><i>Demonstration of social, professional, and ethical responsibility and sensitivity to gender issues</i><br><i>Exercising critical and self-critical thinking</i><br><i>Promotion of free, creative, and inductive thinking</i><br>...<br><i>Other competences: ...</i> |
| <ul style="list-style-type: none"> <li>• Searching, analyzing, and synthesizing data and information, using the necessary technologies</li> <li>• Autonomous work</li> <li>• Demonstration of social, professional, and ethical responsibility and sensitivity to gender issues</li> </ul>     |                                                                                                                                                                                                                                                                                                                                                                             |

### (3) COURSE CONTENT

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The course will cover the following topics:</p> <ul style="list-style-type: none"> <li>• Linear Differential equations and applications</li> <li>• Proper integrals and Laplace Transformation</li> <li>• Multivariable calculus: Limits, Continuity, Partial differentiation, Optimization, Optimization under constrictions (Lagrange multipliers), Multiple integration (doubletriple)</li> <li>• Generalized integration of univariate functions</li> <li>• Double and triple integrals</li> <li>• Sequences, Series of reals numbers, Taylor Series and applications</li> <li>• Applications with Mathematica/Matlab/Octave</li> </ul> <p>Students also attend tutorial sessions in the Laboratory of Production Management Information Systems, aiming to familiarize themselves with the computational methods of solving exercises in addition to the analytical approach. Furthermore, articles, audiovisual lecture material, web links to useful resources, exercises, and software are uploaded in electronic format on the eClass platform.</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### (4) TEACHING and LEARNING METHODS - ASSESSMENT

| <b>TEACHING MODE</b><br><i>Face-to-face, in-class lecturing, distance teaching and distance learning etc.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>• Face-to-face in a classroom or a lab</li> <li>• Distance teaching &amp; learning (if required)</li> </ul>                                                                                                                                                                                                                                                                                                                                   |          |                   |          |    |           |    |                                                       |    |                      |     |                 |   |                     |              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------|----------|----|-----------|----|-------------------------------------------------------|----|----------------------|-----|-----------------|---|---------------------|--------------|
| <b>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY</b><br><i>Use of ICT in Teaching, Laboratory Education, Communication with students</i>                                                                                                                                                                                                                                                                                                                                                                                                                              | <p><b>Teaching:</b> Lectures using modern audiovisual equipment, learning support through the eClass electronic platform, synchronous distance teaching via MS Teams.</p> <p><b>Laboratory:</b> open-access software for laboratory exercises</p> <p><b>Communication with students:</b> face-to-face during office hours, email, eClass platform, MS Teams tools</p>                                                                                                                |          |                   |          |    |           |    |                                                       |    |                      |     |                 |   |                     |              |
| <b>Organization of Teaching</b><br><i>A detailed description of the teaching methods and approach is provided.</i><br><i>Lectures, seminars, laboratory exercises, fieldwork, study and analysis of literature, tutorials, internships (placements), clinical practice, artistic workshops, interactive teaching, educational visits, project work, writing assignments, artistic creation, etc.</i><br><i>The student's study hours for each learning activity, as well as the hours of independent study, are specified in accordance with the principles of ECTS</i> | <table> <tr> <th>Activity</th><th>Semester Workload</th></tr> <tr> <td>Lectures</td><td>52</td></tr> <tr> <td>Tutorials</td><td>13</td></tr> <tr> <td>Self-study of lecture material and tutorial exercises</td><td>57</td></tr> <tr> <td>Consultation Support</td><td>0.5</td></tr> <tr> <td>Exams (written)</td><td>2</td></tr> <tr> <td><b>Course Total</b></td><td><b>137.5</b></td></tr> </table>                                                                               | Activity | Semester Workload | Lectures | 52 | Tutorials | 13 | Self-study of lecture material and tutorial exercises | 57 | Consultation Support | 0.5 | Exams (written) | 2 | <b>Course Total</b> | <b>137.5</b> |
| Activity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Semester Workload                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |          |                   |          |    |           |    |                                                       |    |                      |     |                 |   |                     |              |
| Lectures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 52                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |                   |          |    |           |    |                                                       |    |                      |     |                 |   |                     |              |
| Tutorials                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |                   |          |    |           |    |                                                       |    |                      |     |                 |   |                     |              |
| Self-study of lecture material and tutorial exercises                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 57                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |                   |          |    |           |    |                                                       |    |                      |     |                 |   |                     |              |
| Consultation Support                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |                   |          |    |           |    |                                                       |    |                      |     |                 |   |                     |              |
| Exams (written)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |          |                   |          |    |           |    |                                                       |    |                      |     |                 |   |                     |              |
| <b>Course Total</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>137.5</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |                   |          |    |           |    |                                                       |    |                      |     |                 |   |                     |              |
| <b>STUDENT ASSESSMENT</b><br><i>Description of the assessment process</i><br><i>Language of assessment, assessment methods, formative or summative evaluation, multiple-choice tests, short-answer questions, essay questions, problem-solving, written assignments, reports, oral examinations, public presentations, laboratory work, clinical patient examination, artistic interpretation, other(s)</i>                                                                                                                                                             | <p><b>Language of Assessment:</b> Greek (English for ERASMUS students)</p> <p><b>Assessment Mode:</b> Face-to-face and/or distance learning (if required)</p> <p><b>Assessment Methods:</b> The final grade of the course is determined 100% by the written exams during the spring semester examination period and, in case of failure, during the September resit examination period.</p> <p>The written exam includes problem-solving exercises and is conducted closed-book.</p> |          |                   |          |    |           |    |                                                       |    |                      |     |                 |   |                     |              |

|                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><i>Explicitly state assessment criteria and information on whether and where these criteria are accessible to students are included.</i></p> | <p><b>Students with Learning Difficulties:</b> Students with certified learning difficulties in reading and writing (as recognized by the competent authority) are assessed according to the procedures established by the Department.</p> <p><b>Disclosure of Assessment Criteria:</b> The assessment criteria are communicated during the first class and are clearly stated on the course website and the eClass platform. The exam syllabus is announced on eClass following the final lecture of the semester. The exam answers are posted on eClass after the examinations take place. Students have the right to review their graded exams and receive explanations regarding their grades. In cases of further requests, the procedures outlined in the current Study Regulations apply.</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## (5) SUGGESTED BIBLIOGRAPHY

|                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>- Books:</p> <ul style="list-style-type: none"> <li>Filippakis, M. (2017). Applied Analysis and Fourier Theory, 2nd Edition, Tsotras Publications, Athens, ISBN: 9786185066833 [68403139] – in Greek.</li> </ul> <p>- Journals:</p> <p>- Other educational material:</p> <ul style="list-style-type: none"> <li>Lecture Notes and Supporting Material provided by the Instructor</li> </ul> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|