| a) General | | | |
|---|---|---|---|
| *School* | ENGINEERING | | |
| *Academic unit* | MECHANICAL ENGINEERING | | |
| *Level of studies* | Undergraduate | | |
| *Course code* | MM002Y03 | *Semester* | 3 |
| *Course title* | **Mathematics II** | | |

| Independent teaching activities | Weekly teaching hours | ECTS |
|---|---|---|
| Lectures | 5 | 5.5 |
| Laboratory exercises | | |

| | |
|---|---|
| *Course type* | General background |
| *Course category* | Compulsory |
| *Prerequisite courses* | - |
| *Language of instruction and examinations* | Greek |
| *Is the course offered to Erasmus students* | No |
| *Course website (url)* | |

## b) Learning outcomes and general competences

### b1. Learning outcomes

Upon successful completion of this course, the student will be able to:

- Describe the important role of functions of several values and Differential equations.
- Solve basic topics of differential and integral calculus with functions of 2 and 3 variables as well as the ability of standardization by ordinary and partial differential equations.
- Distinguish the meaning of analytic and theoretical methods in the solution of problems as well as the ability of utilization of the related software.
- Handle functions of several values, evaluate double, triple, line and surface integrals as well as recognize, distinguish classificate and solve differential equations that are useful in the attendance of other engineering courses.

### b2. General competences

- Search for, analysis and synthesis of data and information with the use of the necessary technology
- Adapting to new situations
- Decision-making
- 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
- Respect for the natural environment
- Showing social, professional and ethical responsibility and sensitivity to gender issues
- Criticism and self-criticism
- Production of free, creative and inductive thinking
- Others

## c) Syllabus

Calculus of Several Variables: Notion of a function of several real variables. Limits, Continuation. Partial derivative and Geometric interpretation. Partial Derivatives of Composite and implicit functions, the chain rule. Derivatives of inverse functions-Derivatives of higher

| order, Jacobians. Directional Derivatives. Gradient of a function. Tangent Plane and normal line to surface in space. Extreme Values, Lagrange method. Euler's equation, transition from Lagrange's mechanics to Euler's mechanics. Double, triple integrals and their applications. Change of coordinate systems and Region transformation. Line Integrals. Field Theory by means of vector analysis. Green's and Gauss's Theorems and their applications. |
|---|

## d) Teaching and learning methods - Evaluation

| Delivery | Face-to-face, Distance learning, etc. |
|---|---|
| Use of information and communications technology | - Commercial/free/open source software<br>- Multimedia applications<br>- MS Teams/Moodle/eclass<br>- Open courses |

| Teaching methods | *Activity* | *Semester workload* |
|---|---|---|
| | Lectures | 65 |
| | Tutorials | 26 |
| | Laboratory exercises | |
| | Computational exercises | |
| | Individual work | 65 |
| | Course total | 156 |

| Student performance evaluation | Intermediate assessment (20%) and final (written) examination (80%) |
|---|---|

## e) Suggested bibliography

1. Georgoudis, I., Makrigiannis, A. and Prezerakos, N. (2016) Mathematics for Engineers Functions of Several Variables-Differential Equations. Publisher Synchrony Ekdotiki E.P.E.
2. Rassis Th., Mathematical Analysis II, Publisher Tsiotras.