

## COURSE OUTLINE

### GENERAL

|   |   |                 |          |
|---|---|-----------------|----------|
| <b>SCHOOL</b>   | School of Science   |                 |          |
| <b>ACADEMIC UNIT</b>  | Department of Mathematics   |                 |          |
| <b>LEVEL OF STUDIES</b>   | Undergraduate   |                 |          |
| <b>COURSE CODE</b>  | <b>MAY648</b>   | <b>SEMESTER</b> | <b>6</b> |
| <b>COURSE TITLE</b>   | Classical Mechanics   |                 |          |
| <b>INDEPENDENT TEACHING ACTIVITIES</b><br><i>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</i> | <b>WEEKLY TEACHING HOURS</b>  | <b>CREDITS</b>  |          |
|   | 4   | 7,5             |          |
|   |   |                 |          |
|   |   |                 |          |
| <i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>  |   |                 |          |
| <b>COURSE TYPE</b><br><i>general background, special background, specialised general knowledge, skills development</i>  | General background  |                 |          |
| <b>PREREQUISITE COURSES:</b>  |   |                 |          |
| <b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>  | Greek   |                 |          |
| <b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>  | Yes   |                 |          |
| <b>COURSE WEBSITE (URL)</b>   | <a href="http://ecourse.uoi.gr/course/view.php?id=1559">http://ecourse.uoi.gr/course/view.php?id=1559</a> |                 |          |

### 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*

The course provides an introduction to theoretical physics, and aims to broaden the knowledge of Mechanics already gained even in secondary education, with the basic criterion being the mathematical formalism of physical problems. Therefore the course

introduces the basic concepts of Classical Mechanics and their application to particles, particle systems and continuous media.

Upon completion of this course the students will be able to use advanced mathematics to describe natural phenomena and interpret mathematical results in physical terms. Also, students are expected to develop skills for formulating and solving physical problems.

### 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?*

|   |   |
|---|---|
| <i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> | <i>Project planning and management</i>  |
| <i>Adapting to new situations</i>   | <i>Respect for difference and multiculturalism</i>  |
| <i>Decision-making</i>  | <i>Respect for the natural environment</i>  |
| <i>Working independently</i>  | <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> |
| <i>Team work</i>  | <i>Criticism and self-criticism</i>   |
| <i>Working in an international environment</i>  | <i>Production of free, creative and inductive thinking</i>                                      |
| <i>Working in an interdisciplinary environment</i>  | <i>Others</i>   |
| <i>Production of new research ideas</i>   |   |

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Criticism and self-criticism
- Production of free, creative and inductive thinking

### SYLLABUS

- Review and connection via physical concepts with the basic tools: areas, mass and density, inertia, center of mass and moments.
- Review of basic types of differential equations and basic concepts of mechanics (space, time and material point).
- Newton's axioms and the notion of power.
- Linear motion, energy and angular momentum.
- Central forces, many-body systems
- Lagrangian and Hamiltonian mechanics

### TEACHING and LEARNING METHODS - EVALUATION

|  |                 |                          |
|--|-----------------|--------------------------|
| <b>DELIVERY</b><br><i>Face-to-face, Distance learning, etc.</i>  | In class        |                          |
| <b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b><br><i>Use of ICT in teaching, laboratory education, communication with students</i>  |                 |                          |
| <b>TEACHING METHODS</b><br><i>The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials,</i> | <b>Activity</b> | <b>Semester workload</b> |
|  | Lectures        | 42                       |
|  |                 |                          |
|  |                 |                          |
|  |                 |                          |

|  |              |           |
|--|--------------|-----------|
| <p><i>placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i></p> <p><i>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</i></p>   |              |           |
|  |              |           |
|  |              |           |
|  |              |           |
|  | Course total | <b>42</b> |
| <p><b>STUDENT PERFORMANCE EVALUATION</b></p> <p><i>Description of the evaluation procedure</i></p> <p><i>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</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p> | Written exam |           |

#### ATTACHED BIBLIOGRAPHY

|   |
|---|
| <p>- <i>Suggested bibliography:</i></p> <p>- <i>Related academic journals:</i></p> <ul style="list-style-type: none"> <li>• T. W. B Kibble, F. H. Berkshire, <i>Κλασική Μηχανική</i>, Πανεπιστημιακές Εκδόσεις Κρήτης, 2012.</li> <li>• Κ. Τσίγκανος, <i>Εισαγωγή στη Θεωρητική Μηχανική</i>, Εκδόσεις Σταμούλη, 2004.</li> <li>• Ι. Χατζηδημητρίου, <i>Θεωρητική Μηχανική (Τόμος Α')</i>, Εκδόσεις Γιαχούδη, 2000.</li> <li>• Π. Ιωάννου, Θ. Αποστολάτος, <i>Θεωρητική Μηχανική</i>, Πανεπιστήμιο Αθηνών, 2007.</li> <li>• M. R. Spiegel, <i>Θεωρητική Μηχανική</i>, ΕΣΠΙ Εκδοτική, 1985.</li> </ul> |
|---|