

## 1.1.1 Wave Mechanics and Offshore Structures

### GENERAL

|   |  |                 |     |
|---|--|-----------------|-----|
| <b>SCHOOL</b>   | Engineering                            |                 |     |
| <b>ACADEMIC UNIT</b>  | CIVIL ENGINEERING                      |                 |     |
| <b>LEVEL OF STUDIES</b>   | Undergraduate                          |                 |     |
| <b>COURSE CODE</b>  | YΔP011                                 | <b>SEMESTER</b> | 8th |
| <b>COURSE TITLE</b>   | Wave Mechanics and Offshore Structures |                 |     |
| <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                                      | 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>  | Specialization Course                  |                 |     |
| <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>   |  |                 |     |

### LEARNING OUTCOMES

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| <p><b>Learning outcomes</b></p> <p><i>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.</i></p> <p>Consult Appendix A</p> <ul style="list-style-type: none"> <li>• Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</li> <li>• Descriptors for Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</li> <li>• Guidelines for writing Learning Outcomes</li> </ul>  |  |  |
| <p>Upon successful completion of the course, the student will be able to: describe and select appropriate (depending on the physical design problem) theories and principles for linear and non-linear ocean waves and understand the main characteristics of the offshore structures wave-structure interaction mechanism.</p>  |  |  |
| <p><b>General Competences</b></p> <p><i>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></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"> <i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i><br/> <i>Adapting to new situations</i><br/> <i>Decision-making</i><br/> <i>Working independently</i><br/> <i>Team work</i><br/> <i>Working in an international environment</i><br/> <i>Working in an interdisciplinary environment</i><br/> <i>Production of new research ideas</i> </td> <td style="width: 50%; border: none;"> <i>Project planning and management</i><br/> <i>Respect for difference and multiculturalism</i><br/> <i>Respect for the natural environment</i><br/> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i><br/> <i>Criticism and self-criticism</i><br/> <i>Production of free, creative and inductive thinking</i><br/> <i>.....</i><br/> <i>Others...</i> </td> </tr> </table> | <i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i><br><i>Adapting to new situations</i><br><i>Decision-making</i><br><i>Working independently</i><br><i>Team work</i><br><i>Working in an international environment</i><br><i>Working in an interdisciplinary environment</i><br><i>Production of new research ideas</i>      | <i>Project planning and management</i><br><i>Respect for difference and multiculturalism</i><br><i>Respect for the natural environment</i><br><i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i><br><i>Criticism and self-criticism</i><br><i>Production of free, creative and inductive thinking</i><br><i>.....</i><br><i>Others...</i> |
| <i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i><br><i>Adapting to new situations</i><br><i>Decision-making</i><br><i>Working independently</i><br><i>Team work</i><br><i>Working in an international environment</i><br><i>Working in an interdisciplinary environment</i><br><i>Production of new research ideas</i>  | <i>Project planning and management</i><br><i>Respect for difference and multiculturalism</i><br><i>Respect for the natural environment</i><br><i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i><br><i>Criticism and self-criticism</i><br><i>Production of free, creative and inductive thinking</i><br><i>.....</i><br><i>Others...</i> |  |

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The course contributes to the following skills:

- \_ Search for, analysis and synthesis of data and information
- \_ Adapting to new situations
- \_ Decision-making
- \_ Working independently
- \_ Working in an interdisciplinary environment
- \_ Project planning and management
- \_ Respect for the natural environment
- \_ Production of free, creative and inductive thinking.

## SYLLABUS

The course aims to provide students with the basic theoretical background for the course. Includes the necessary material for the understanding of: (a) linear and non-linear theories of wave mechanics, (b) the calculation of hydrodynamic loads on slender members and massive bodies and (c) of analysis and design of mooring cables and fluid transfer pipelines in marine environment.

## TEACHING and LEARNING METHODS - EVALUATION

|   |   |                          |
|---|---|--------------------------|
| <b>DELIVERY</b><br><i>Face-to-face, Distance learning, etc.</i>   | Face to face.   |                          |
| <b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b><br><i>Use of ICT in teaching, laboratory education, communication with students</i>   | Learning process support (teaching and communication with students) through PowerPoint lectures, through the online course website, through the electronic e-learning platform and through additional electronic communication with students (online announcements and comments, emails, etc.). Additional material (lecture presentations, educational videos, useful sites, and scientific articles) posted on the e-learning platform. Teacher-student collaboration time either in person or via teleconference.  |                          |
| <b>TEACHING METHODS</b><br><i>The manner and methods of teaching are described in detail.<br/>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.<br/><br/>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>                              | <b>Activity</b>   | <b>Semester workload</b> |
|   | Lectures  | 36                       |
|   | Practice/exercises  | 16                       |
|   | Project(s)  | 10                       |
|   | Educational visit   |                          |
|   | Individual study  |                          |
|   |   |                          |
|   |   |                          |
|   | Course total (26 hours workload per ECTS credit)  | <b>130</b>               |
| <b>STUDENT PERFORMANCE EVALUATION</b><br><i>Description of the evaluation procedure<br/><br/>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<br/><br/>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i> | Evaluation Language: Greek<br>Written Examination with Extended Response Questions (Formative and/or Conclusive)<br>Theory Assessment (80% of the final grade): <ul style="list-style-type: none"> <li>• Written progress exam (20% of the final grade) which includes:               <ul style="list-style-type: none"> <li>o Extended Response Theoretical Questions (Formative and/or Inferential)</li> <li>o Solving problems-exercises</li> </ul> </li> <li>• Final written exam (60% of the final grade) which includes:               <ul style="list-style-type: none"> <li>o Extended Response Theoretical Questions (Formative</li> </ul> </li> </ul> |                          |

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|  | <p>and/or Inferential)</p> <p>o Solving problems-exercises</p> <p>Individual assignment (20% of the final grade)</p> <p>This course description text with the evaluation criteria is accessible to students in the Department's study guide (Department website) and on the course's website.</p> <p>The outline is communicated orally to the students during the first lecture.</p> |
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#### ATTACHED BIBLIOGRAPHY

- [In Greek] Καραμπάς Θεοφάνης, Δήμας Αθανάσιος, Λουκογεωργάκη Ευαγγελία, ΑΚΤΟΜΗΧΑΝΙΚΗ ΚΑΙ ΛΙΜΕΝΙΚΑ ΕΡΓΑ, Εκδόσεις ΔΙΣΙΓΜΑ, 2020, ISBN: 978-618-5242-92-3. Κωδικός Βιβλίου στον Εύδοξο: 94690348.
- [In Greek] Χατζηγεωργίου Ιωάννης, ΔΥΝΑΜΙΚΗ ΤΩΝ ΑΓΩΓΩΝ ΜΕΤΑΦΟΡΑΣ ΡΕΥΣΤΩΝ, Εκδόσεις Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", 2016, ISBN: 978-960-603-085-7. Κωδικός Βιβλίου στον Εύδοξο: 320023.
- [In Greek] Κουτίτας Χριστόφορος, Εισαγωγή στην παράκτια τεχνική και τα λιμενικά έργα, Εκδόσεις Ζήτη, 1994, ISBN: 960-431-289-8. Κωδικός Βιβλίου στον Εύδοξο: 11264.
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- Karimirad M., Michailides C., Nematbakhsh A., Offshore Mechanics: Structural and Fluid Dynamics for Recent Applications, Εκδόσεις John Wiley Sons, 2018, ISBN: 978-1-119- 21662-9.
- Dean R.G., Dalrymple R.A., Water Wave Mechanics for Engineers and Scientists, World Scientific, ISBN 978-981-02-0420-4, 1991.
- Chakrabarti Subrata K., Handbook of Offshore Engineering, Elsevier Ltd., ISBN 978-0-08- 044381-2, 2005.